unicef
for every child

Draft Final Report: Technical Support on Conducting Citywide Inclusive Sanitation Assessment

May 2024

AWF (PRIVATE) LIMITED

AGUA CONSULT

Contents

List of Figures

List of Tables

Acronyms

ADB	Asian Development Bank
AMA	Antimonopoly Agency
ASP	Activated Sludge Plant
COVID-19	Coronavirus Disease 2019
CSDA	City Service Delivery Assessment
CWIS	Citywide Inclusive Sanitation
DCN	Daily Consumption Norms
DVK	Dushanbe Vodokanal
DWS	Domestic Water Supply
FFM	Financial Flow Model
FSM	Faecal Sludge Management
GBAO	Gorno-Badakhshan Autonomous
GIS	Geographic Information System
HCFs	Healthcare Facilities
HH	Households
IT	Information Technology
JMP	Joint Monitoring Program
KAF-I	Kafarnihan-I
KAF-II	Kafarnihan-II
MHM	Menstrual Hygiene Management
MIS	Management Information Systems
MLD	Million Litres per Day
MoE&WR	Ministry of Energy and Water Resources
MoHSPP	Ministry of Health and Social Protection of the Population
NAP	Napornaya
NDS	National Development Strategy
NRW	Non-Revenue Water
OCCR	High Operating Cost-to-Capital Ratio
PWDs	Persons with Disabilities
SAM	Samatechnaya
SanPiNs	Sanitary Regulations and Standards
SCADA	Supervisory Control and Data Acquisition
SCEP	State Committee on Environmental Protection
SDG	Sustainable Development Goal
SES	Sanitary and Epidemiological Service
SFD	Shit Flow Diagram
SNiPs	SNiPs
SUE	State Utility Enterprise
SWM	Solid Waste Management
USSR	Union of Soviet Socialist Republics
UZ	Ugo-Zapodnaya
WASH	Water, Sanitation, and Hygiene
WWTP	Wastewater Treatment Plant

Executive Summary

Introduction: The assignment "Technical support on Community Wide Inclusive Sanitation (CWIS) in Dushanbe" aimed to address the pressing urban sanitation challenges within the capital city of Tajikistan, Dushanbe. Its objective was to assess urban sanitation context, identify bottlenecks, and develop strategies for improvement and investment areas for better access to sanitation services citywide. This assessment facilitated by UNICEF under technical assistance (TA) to Asian Development Bank (ADB) within its initiative of extending support to Dushanbe Vodokanal for enhancing safe water and sanitation services in Dushanbe. In addition, it is well aligned with the World Bank and ADB support to large reforms agenda for water and sanitation in Tajikistan particularly for Dushanbe city.

Assessment Approach: Utilising diagnostic tools such as the Shit Flow Diagram (SFD) and City Service Delivery Assessment (CSDA), the assessment aimed to identify gaps and develop strategies for improvement. Through a mixed-methodology approach combining quantitative surveys and qualitative insights, the assignment provided recommendations for enhancing sanitation services in Dushanbe.

Challenges in Dushanbe's Water and Sanitation Sector: Dushanbe, with a population of around 1.2 million, faces multifaceted challenges in water and sanitation services spread over technical, regulatory, and institutional domains. Dushanbe Vodokanal (DVK), responsible for water and sanitation services, operates under municipal oversight but struggles with certain weaknesses such as high non-revenue water and suboptimal pressure management. Moreover, its wastewater treatment plant operates below capacity, compounded by regulatory ambiguity surrounding desludging truck operators. Infrastructure management by DVK includes an extensive sewer network, yet challenges persist in water supply, including high losses and inadequate billing practices. Wastewater management faces hurdles due to inadequate treatment facilities and limited coverage of sewerage systems. Estimated less than 2/3rd population of the city is served with sewer network.

Comprehensive Approach for Improvement Addressing these challenges requires a comprehensive approach involving strategic planning, infrastructure investment, and public education initiatives to promote sustainable water usage. Despite legacy equipment limitations, desludging services remain crucial for sanitation standards, highlighting the need for modernisation efforts. Regulatory obstacles hinder private sector involvement in sanitation projects, and non-sewered sanitation systems require urgent attention amid rapid urbanization and threat of environmental pollution and climate change vulnerabilities. Enforcement of regulations for carwash sites, desludging truck operators, inappropriate sanitation designs and systems is essential to mitigate environmental and health risks.

Institutional Arrangements and Stakeholder Engagement: Institutional arrangements involve multiple ministries, committees and institutions, with DVK operating under municipal oversight. However, weak utility management, poor data management, and limited engagement with communities pose significant hurdles. Stakeholders in Dushanbe's water and sanitation sector especially DVK confront diverse challenges including infrastructure limitations, regulatory ambiguities, financial constraints, and governance issues. From infrastructure enhancement needs and regulatory uncertainties to financial sustainability concerns and private sector involvement barriers, addressing these challenges demands collaborative efforts, innovative solutions, and strategic partnerships to achieve sustainable and equitable water and sanitation services in the city.

Financing and Inclusion Considerations: Financing issues stem from weak corporate governance, limited accountability, and incomplete data management systems within DVK, impacting service delivery and financial sustainability. From an inclusion perspective, challenges include affordability barriers for vulnerable groups, insufficient facilities for persons with disabilities, and limited

community awareness about environmental impacts, highlighting the need for gender-sensitive, accessible, and inclusive services, while capacity challenges encompass data management, financial support, regulatory compliance, and community engagement.

Key Findings from SFD and CSDA: This assessment found that as per Joint Monitoring Programme's sanitation ladder, around 21% population of Dushanbe has access to safely managed sanitation, while 78% has a basic level of sanitation. The Shit Flow Diagram of Dushanbe developed under this assignment highlights several critical issues in sanitation management. The vulnerability of the aquifer raises concerns about groundwater contamination due to limited natural filtration capacity. While spatial separation between sanitation facilities and water sources exists, inefficiencies in the sewer network result in significant untreated wastewater discharge. The deteriorated state of the treatment plant further exacerbates the problem, with only 30% of wastewater receiving proper treatment. In non-sewered sanitation, various containment options are used, but inadequate emptying frequencies and aging infrastructure raise health and environmental risks, especially concerning sludge treatment.

Key findings of CSDA include inadequate policy provisions and regulatory frameworks, insufficient budget allocations, and staffing challenges. Funding and regulation for non-sewered sanitation are particularly lacking, impacting service quality and coverage. Additionally, limited data collection and monitoring hinder planning and inclusivity efforts, exacerbating disparities in access to safe sanitation services.

Insights from Qualitative Surveys: Qualitative surveys in households, healthcare facilities, and schools reveal insights on sanitation, water supply, and solid waste management in Dushanbe. Many households rely on lined pit latrines, facing challenges with sewer connections due to distance and cost. Septic tanks are common, often improperly constructed and rarely emptied, posing environmental risks. Water access varies, with concerns about quality and treatment methods. Solid waste management faces issues of service provision, costs, and waste disposal. Despite dissatisfaction, households generally express willingness to pay for improved services and sanitation infrastructure. Schools lack accessible facilities, while healthcare facilities lack menstrual hygiene and disability-friendly amenities. All health facilities have toilets connected to piped sewer systems. Toilets are available for outpatients, but staff often share facilities with them, raising hygiene concerns. None of the facilities have toilets equipped with menstrual hygiene facilities or designed for people with disabilities or limited mobility, presenting critical accessibility gaps.

Risk Assessment and Investment Opportunities: Proposed risk-based sanitation investment approach prioritises public health, environment, and inclusivity with targeted mitigation strategies**.**
(i) To mitigate the risk of faecal sludge contaminating groundwater or surface drains, proposed investments target protecting public health through awareness campaigns and market assessments for safe water options. Exploring new business models like prefab septic tanks and small sewage treatment systems is suggested. Strengthening enforcement of regulations, particularly in septic tank construction and water self-supply, is proposed to ensure sanitation safety.
(ii) To mitigate the risk of unsafely emptied faecal sludge, the proposed investment involves professionalizing vacuum truck operators through upgrading equipment, training, and communicating guidelines. This aims to enhance service quality and ensure safer disposal practices.
(iii) To address the risk of wastewater being unsafely disposed into surface water bodies, the proposed investment focuses on estimating and recovering operational costs. Strategies include enhancing efficiencies, optimizing revenue collection, adjusting tariff structures, and exploring innovative finance options like carbon credits.
(iv) To mitigate the risk of wastewater being unsafely treated prior to disposal into surface water bodies, the proposed investment focuses on setting achievable rehabilitation commitments for sewerage infrastructure. This includes support for annual rehabilitation rates and the development of

a new wastewater treatment plant outside Dushanbe City, prioritised by the City Government and DVK.
(v) To address the risk of unsafely treated sludge prior to reuse, proposed investments focus on improving biosolid safety in agriculture through developing guidance with local expertise and exploring alternative reuse options like biofuel, compost, and black soldier flies. Thorough market assessments and consideration of organic solid sources are emphasised for effective implementation.

Recommended Actions: Recommended actions include the development and updating of a national sanitation strategy that includes CWIS, reviewing and updating regulatory and monitoring frameworks, developing a Dushanbe faecal sludge management (FSM) plan highlighting financing, capacity building, and institutional arrangements, upgrading and rehabilitating existing water treatment plants to improve efficiency and expedite the addition of new plants for the city as being planned, seeking support from key national ministries and the city council for additional financing and regulations for FSM, consulting users to identify sanitation needs and aspirations, taking account willingness to pay, ensuring services for women and vulnerable groups as well as private sector engagement, and identifying capacity gaps and development investment plans for loans from donors for sewerage service needs and O&M.

- A survey to validate the percentage of the population connected to sewer networks and assess the accuracy of existing infrastructure data.
- Develop an integrated database to streamline customer information and improve service delivery.
- Develop comprehensive sanitation regulations of both sewered and non-sewered systems, with clear standards for containment design, desludging practices, and treatment requirements.
- Establish enforcement mechanisms and penalties for non-compliance to ensure adherence to regulatory standards.
- Invest in training programmes for sanitation stakeholders, including government officials, service providers, and community leaders, to enhance technical expertise and promote best practices in sanitation management.
- Collaborate with academic institutions and international partners to develop tailored training curricula and knowledge exchange initiatives.
- Launch a public awareness campaign on the importance of proper sanitation practices, highlighting the health, environmental, and economic benefits of improved sanitation infrastructure. Utilise multimedia channels and community outreach activities to reach diverse groups.
- Integrate inclusive sanitation considerations into broader urban development policies and strategies, emphasising the interconnectedness of sanitation with water resources management, public health, and environmental conservation.
- Establish multi-sectoral coordination mechanisms to facilitate collaboration across government agencies and sectors.
- Develop innovative financing mechanisms for sanitation infrastructure investments, including public-private partnerships, performance-based contracts, and revolving funds.
- Explore opportunities for leveraging climate finance and international development assistance to mobilise additional resources for sanitation projects.

1. Background and Introduction

Despite Tajikistan's possession of abundant freshwater sources, ensuring appropriate access to water and sanitation remains a formidable challenge. This issue stems largely from the legacy of poor infrastructure maintenance since the country gained independence in 1991, following the dissolution of the Soviet Union. The geographical context of Tajikistan is notable, with more than 90 percent of its territory being mountainous, and a significant portion of its landmass lying 10,000 feet or more above sea level. The country is divided into four administrative regions or provinces: Sughd, Khatlon, Gorno-Badakhshan Autonomous Province (GBAO), and the Region of Republican Subordination (Sinor, Hambly, Allworth, Imshenetsky, & Smith, 2021).

On a scale of Very Low to High, ThinkHazard![1] classifies the water scarcity in Tajikistan as Medium, indicating that there is a 20 percent chance of a drought occurrence within the next 10 years. Despite the significant progress made in the past decade in reconfiguring its water laws and existing supply systems, critical issues of water security and continuous supply persist and growing[2]. The Government of Tajikistan has demonstrated its commitment to addressing water and sanitation. challenges through its participation in international initiatives such as the High-Level Panel on Water and Sanitation, initiated by the World Bank and United Nations, and its endorsement of the Sustainable Development Goals (SDGs). Of seventeen SDGs, the SDG-six calls for ensuring availability and sustainable management of water and sanitation for all. Tajikistan's strategic documents, including the National Development Strategy 2030, National Water Sector Strategy 2020-2030, and legislative measures like the New Drinking Water and Sanitation Law 2019 and revised Water Code 2018, underscore its commitment to achieving these goals.

Dushanbe, the capital city, is situated within the Region of Republican Subordination and serves as the largest urban centre in Tajikistan. The state administration of Dushanbe is the local governing body of the city, also referred to as the 'Hukumat' of Dushanbe City. The city's territory of 12,700 ha (hectare) is also administratively divided into four districts: Shohmansur, Firdavsi, Ismoili Somoni (I. Somoni), and Sino with the latter covering the largest territory and population.

Table 1: Population of Districts within Dushanbe

No.	District of Dushanbe	Territory (km^2)	Population	Density of Population (people/km^2)
1	Shohmansur	27.90	162,630	5829.032
2	Firdavsi	29.10	209,043	7183.608
3	I.Somoni	30.52	148,675	4871.396
4	Sino	39.08	326,076	8343.808
	Total for Dushanbe	**126.60**	**846,425**	

Source: Main Department of Statistics under the President of Tajikistan, 2019; calculation of the World Bank team.

In Dushanbe, rapid urbanization compounds the challenges related to water and sanitation services. The city's population, projected to reach 1,100,000–1,200,000 residents by 2030, is driving spatial expansion and increased demand for urban infrastructure. The Dushanbe Master Plan, ratified in 2017, outlines development objectives until 2040, including expansion primarily towards the south, west, and north. However, infrastructure development has not kept pace with urbanization, resulting in inadequate access to essential services for many residents[3].

[1] ThinkHazard! is a web-based tool developed by Global Facility for Disaster Reduction and Recovery (GFDRR) to assess the level of disasters present in a (project) area. https://thinkhazard.org/en/report/239-tajikistan/DG

[2] https://borgenproject.org/water-access-in-tajikistan/

[3] https://documents1.worldbank.org/curated/en/533381560045646099/pdf/Tajikistan-Dushanbe-Water-Supply-and-Wastewater-Project.pdf

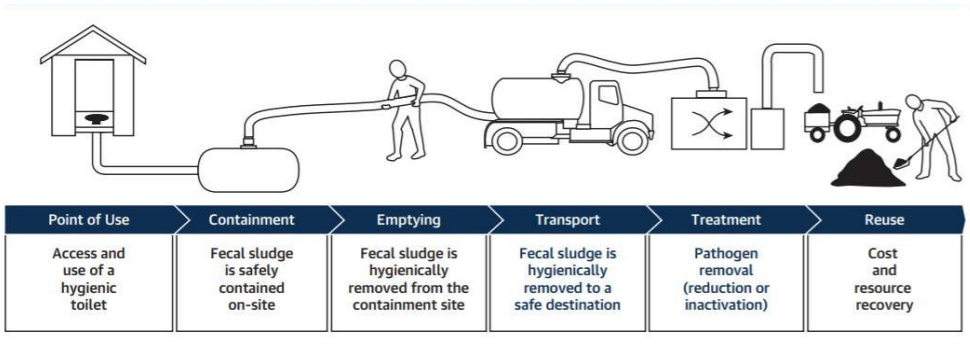
Dushanbe Vodokanal (DVK) manages water and sanitation services of Dushanbe city. The DVK faces challenges in meeting the demands of urban growth, prompting the need for a comprehensive situation analysis of Dushanbe's urban sanitation management systems. This analysis is critical for addressing the pressing issue of poor sanitation, which is linked to the transmission of various diseases such as cholera, dysentery, typhoid, and polio. Moreover, poor sanitation exacerbates stunting and contributes to the spread of antimicrobial resistance (Ramani, 2015). Tailored solutions, including on-site, sewered, centralized, or decentralized approaches, should be promoted to effectively tackle these challenges and to ensure universal access to safely managed sanitation. By addressing these issues comprehensively and inclusively, Dushanbe can work towards ensuring equitable access to essential sanitation services for all residents, thereby improving public health and well-being.

1.1. The Need for Citywide Inclusive Sanitation

Urban sanitation progress globally is slow, leaving millions without basic services, especially in South- and Central Asia. The focus on expanding centralized sewers excludes the poor and non-sewered populations, lacking inclusiveness and neglecting long-term service provision. Despite acknowledging challenges, discussions often revolve around financial constraints rather than addressing systemic issues. Faecal sludge management (FSM) efforts are side-lined, and viewing sanitation challenges solely through a technological lens overlooks overall functionality (Schrecongost, Pedi , Rosenboom , Shrestha, & Ban, 2020).

The Citywide Inclusive Sanitation (CWIS) approach, developed by the World Bank's Water Global Practice, in partnership with sector development partners, addresses limitations of traditional urban sanitation methods that rely solely on sewerage and wastewater treatment. CWIS prioritizes service provision and the enabling environment over infrastructure construction. It aims to ensure universal access to safely managed sanitation by promoting various solutions, including on-site and sewered, centralized or decentralized systems[4]. Unlike conventional approaches, CWIS focuses on incremental hardware and service improvements tailored to diverse urban contexts, bridging the gap between sewered and faecal sludge management approaches. This shift emphasizes planning and investment in technologies suited to specific needs (Drabble, Jacques, Abdumaliki, & Eales). CWIS focuses on providing urban areas with access to and benefits from adequate and sustainable sanitation services, including the safe, effective, and sustainable management of all human waste along the whole sanitation service chain which is portrayed below in figure 1[5].

Figure 1: Sanitation Service Chain



(Source: World Bank)

[4] https://www.worldbank.org/en/topic/sanitation/brief/citywide-inclusive-sanitation#1
[5] https://www.adb.org/sites/default/files/publication/751531/cwis-citywide-inclusive-sanitation-needed.pdf

CWIS recognizes urban waste management's inherent market failures, advocating for its organization as a public service to ensure safety and inclusivity. Government engagement in market structuring is crucial, without excluding the private sector's role. Service authorities must fulfil legal mandates to improve services, encouraging private sector participation through market incentives (Schrecongost, Pedi, Rosenboom, Shrestha, & Ban, 2020). CWIS prioritizes inclusive service provision and city-wide approaches, fostering innovation in implementation tools, business models, technology, and governance to address urban sanitation challenges[6].

The CWIS Framework comprises three core outcomes (Equity, Safety, and Sustainability) and three core functions (Responsibility, Accountability, and Resource Planning and Management). These outcomes align with various Sustainable Development Goals and are essential for achieving effective urban sanitation. The functions are evaluated at both national/state and city levels, where policies, laws, and institutional mechanisms are designed and implemented. The framework emphasizes the importance of integrating these functions to achieve equitable, safe, and sustainable sanitation outcomes, contributing to broader development goals.

Figure 2: CWIS Service Framework

CWIS SERVICE FRAMEWORK			
CORE CWIS OUTCOMES	**EQUITY**	**SAFETY**	**SUSTAINABILITY**
	Services reflect fairness in distribution and prioritization of service quality, prices, and deployment of public finance/ subsidies.	Services safeguard customers, workers, and communities from safety and health risks by reaching *everyone* with safe sanitation.	Services are reliably and continually delivered based on effective management of human, financial and natural resources.
CORE CWIS FUNCTIONS	**RESPONSIBILITY**	**ACCOUNTABILITY**	**RESOURCE PLANNING AND MANAGEMENT**
	National / State Level Design		
	Service authorities have a clear public mandate to ensure safe, equitable, and sustainable sanitation for all.	Service authorities' performance against their mandate is monitored and managed with data, transparency and incentives.	Resources—human, financial, natural, assets—are effectively managed at the national/ state level to support execution of mandate across time/space.
	City Level Implementation		
	Service authorities are delivering safe, equitable, and sustainable sanitation services as per their mandate.	Service authorities regularly collect and report data for performance monitoring.	Resources are effectively managed at the city level to deliver safe, equitable, and sustainable sanitation for all.

Source: CWIS Measurement[7]

1.2. Integrated Sanitation Improvement Plan for Dushanbe

UNICEF Tajikistan and the Asian Development Bank (ADB) are collaborating to provide additional financial support for technical assistance aimed at enhancing diagnostics, planning, and institutional capabilities in Tajikistan. This assistance focuses on rehabilitating selected water supply networks, replacing main sewerage pipelines, and expanding services in unserved areas, integrating climate-proofing measures. Additionally, it emphasizes institutional strengthening and capacity development to improve service efficiency and effectiveness through tailored IT management solutions.

Part of this technical assistance includes a Citywide Inclusive Sanitation assessment covering the entire city of Dushanbe, extending beyond areas covered by ADB financing. This assessment aimed to comprehensively evaluate urban sanitation systems and services, aligning with CWIS framework principles for equitable access to safely managed sanitation. Key focus included identifying

[6] https://www.eawag.ch/en/department/sandec/projects/sesp/citywide-inclusive-sanitation-cwis/
[7] https://s3.amazonaws.com/resources.cwis.com/learning/201/CWISMeasurementNote2021Julyv3.pdf

bottlenecks, developing a faecal flow diagram, and devising improvement strategies at the city level. The assessment informs necessary investments and culminates in the development of an investment and business model, along with a costed action plan to enhance sanitation services access in Dushanbe.

1.3. Summary of Water and Service Levels in Tajikistan

Water Service Levels: In 2022, Joint Monitoring Program (JMP)[8] reported that Tajikistan achieved 55.29 percent coverage of safely managed drinking water, with separate rural and urban data not available. Access to basic drinking water services was reported at 26.65 percent for households (HH), with rural areas at 76.6 percent and urban areas at 95.58 percent. However, 12.09 percent of households in Tajikistan still use surface water for drinking, with a notable difference between rural (16.01 percent) and urban (2.01 percent) areas. Regarding facility type, 65.15 percent of households have access to piped drinking water, but there's a significant gap between rural (55.52 percent) and urban (89.95 percent) areas. Those not connected to piped water use alternative sources like springs, canals, wells, or rainwater.

Sanitation Service Levels: In 2022, the JMP reported 96.75 percent coverage of basic sanitation in Tajikistan, with rural and urban coverage disparities at 38.51 percent and 94.10 percent respectively. Safely managed sanitation data was only available for rural areas, reaching 59.26 percent. Of these, 16.51 percent coverage is attributed to sewer connections and 3.17 percent to septic tanks, with rural sewer connections at a mere 0.50 percent and urban coverage at 57.74 percent.

Regarding **sanitation services in schools**, for 2021, JMP reports no service in 18.03 percent of schools, with a significant difference between rural and urban areas at 21.80 percent and 6.25 percent respectively. Sanitation is classified as limited in 35.33 percent of the schools and basic in 46.64 percent of schools. JMP does not report data for **healthcare facilities** (HCFs) due to insufficient data availability. However, in 2021, WHO conducted a survey on WASH to form a situational analysis of WASH services in HCFs in Tajikistan. Limited service was reported in 100 percent of the HCFs in Dushanbe.

1.4. Climate Resilience in Tajikistan: Enhancing Water and Sanitation Infrastructure

Climate resilience in water infrastructure is paramount for Tajikistan, a nation rich in water resources yet facing increasing variability and extremes due to climate change. The country's abundant water sources exhibit spatial and seasonal variations, necessitating proactive measures to address climate-related threats to water supply, sanitation infrastructure, and communities.

Central to Tajikistan's response is the National Strategy of Adaptation to Climate Change (NSAICC), spanning until 2030. Grounded in constitutional provisions, national laws, and international commitments, the NSAICC aligns with the Sustainable Development Goals and prioritizes climate-sensitive sectors like energy, water resources, transport, and agriculture. Emphasizing cross-sectoral adaptation measures, the strategy underscores the importance of community resilience in mitigating climate impacts.

However, disruptions in rainfall patterns, rising temperatures, glacier melt, and extreme weather events accelerate soil erosion, deteriorate water quality and availability, and threaten biodiversity. These impacts heighten risks of natural disasters, underscoring the urgency of integrating climate resilience into infrastructure planning and implementing local adaptation measures. Climate change

[8] https://washdata.org/data/household#!/tjk

exacerbates vulnerabilities in Tajikistan's water systems and infrastructure, increasing the risks of floods, droughts, and water contamination. Soil erosion, glacier melt, and extreme weather events compromise water supply and sanitation services, necessitating integrated strategies to enhance resilience. In response, Tajikistan must prioritize sustainable solutions and invest in climate-resilient water and sanitation infrastructure. By doing so, the nation can ensure the long-term availability and quality of sanitation services for its communities, safeguarding public health and well-being amidst evolving climate challenges.
(Source: Development of the Dushanbe Wastewater Master Plan and Integrated Urban Water Resilience Plan; SUE DVK, The World Bank)

2. Objectives of the Assignment

The CWIS assessment has been undertaken to assess the gaps and bottlenecks in below seven thematic areas followed by identification of measures and actions to develop the provision of sustainable safely managed sanitation services in Dushanbe city.

1. Ensure inclusive urban planning principles, set affordable prices reflecting service levels, and maintain waste-free communities.
2. Engage marginalized groups and women in decision-making, incorporate user and worker needs into planning, and ensure worker health and rights.
3. Protect workers and communities throughout waste management, safeguard groundwater and environmental health, and encourage resource recovery.
4. Prioritize service to the poor with clear mandates, monitor performance tied to regulatory measures, and design effective financing supporting mandates.
5. Prioritize safety, inclusivity, and sustainability regardless of technology, and deploy various models for different customer segments.
6. Base investment decisions on comprehensive cost analysis and performance targets, incorporate resource constraints, and engage stakeholders in planning.
7. Demonstrate commitment to safe, inclusive urban sanitation, allocate budgets transparently, and design autonomous accountability systems.

3. Methodology and Diagnostic Tools

The CWIS assessment was conducted to evaluate the current state of sanitation services in Dushanbe, analysing the factors contributing to the existing situation and assessing the status of the enabling environment for sanitation services. It aimed to identify the necessary key strategic actions and determine the required investment for achieving equitable, safe, and sustainable sanitation services in Dushanbe. Various diagnostic tools were modified and contextualized to the situation of Tajikistan. These diagnostic tools included:

- Faecal flow diagrams are a useful tool to for understanding citywide sanitation and visually illustrate how excreta flows through urban settings. It demonstrates how excreta is contained (or not) along the entire sanitation chain.
- City Service Delivery Assessments (CSDA) assesses the existing policies, laws, institutions, processes, and budgets which support FSM services, and highlights weaknesses in the enabling environment along the sanitation service chain.
- Sanitation Service Chain Risk Assessment assesses key risks associated with sanitation service chain with level of impact and possible mitigation actions.
- The business model canvas is an illustrative tool for development of business models, clearly describing the rationale for delivering and capturing value. Through meticulous analysis, various business models were scrutinized, and those deemed appropriate for Dushanbe's unique context were identified and documented.
- Financial flow models are a visual illustration of the structure of the sanitation service chain and the flow of various financial transactions amongst the sector players. This tool is effective in

illustrating the leakages and failures of an existing business model and can supplement the identification disincentives for safe management of excreta such as high tariffs leading to illegal dumping of waste, unregulated informal service providers.

Data Collection

A mixed-methodology approach was employed, combining qualitative and quantitative data collection methods. Quantitative data was gathered through sample-based surveys in households, healthcare facilities, and schools. Qualitative insights were obtained through focus group discussions (FGDs) with community members, key informant interviews (KIIs) with organizations linked to DVK, and field visits to validate data. Grey and published literature relevant to key thematic areas was also reviewed. Methodology details, including sampling for surveys, are provided in Annex 1b. Annex 1c lists the conducted KIIs and missions, while Annex 2 includes FGDs, and checklists used. Household survey data is in Annex 3, with separate surveys for schools and healthcare facilities in Annexes 4 and 5, respectively. Surveys were conducted using the mWater platform, facilitating real-time reporting and data upload to the cloud via the mWater Android app. A total of 402 households, 10 healthcare facilities, and 15 schools participated in the surveys.

4. Situational Analysis of the Enabling Environment

4.1. Dushanbe WSS Utility

The Dushanbe WSS utility was set up as a SUE 'Obu Korezi Dushanbe' or 'Dushanbe Vodokanal' under the Hukumat of Dushanbe City in September 2005 and re-registered in 2017[9]. It operates under the Municipality of Dushanbe and is one of Tajikistan's 74 water utilities. It functions as a commercial organization, responsible for maintaining and expanding water infrastructure without direct ownership. The utility's operations include water supply, wastewater treatment, financial management, and billing. The Managing Director, appointed by the Mayor, oversees operations independently, but there are no defined performance benchmarks for this role, and their tenure is indefinite.

4.1.1. Technical Weaknesses in DVK

1. **High Non-Revenue Water (NRW):** DVK experiences significant water losses due to leaks, theft, and metering inaccuracies, leading to inefficient operations and revenue loss.
2. **Absence of Pressure/Distribution Zones:** DVK's network lacks pressure or distribution zones, causing uneven water distribution and difficulties in managing water pressure effectively.
3. **Inconsistent Production Metering:** DVK struggles to maintain consistent and accurate metering of water production, hampering effective water resource management.
4. **High Non-Metered Consumption:** A significant portion of water consumption remains unaccounted for due to inadequate metering infrastructure, resulting in revenue loss and demand management challenges.
5. **Suboptimal Pressure Management:** Inadequate pressure management practices lead to pressure fluctuations, pipe bursts, and operational inefficiencies in water distribution.
6. **Intermittent Water Supply:** Some areas serviced by DVK experience intermittent water supply due to inconsistent power supply, causing service disruptions and customer dissatisfaction.
7. **High Energy Costs:** DVK incurs high energy costs from operating outdated equipment, contributing to financial strain and operational inefficiencies.
8. **Lack of Systematic Infrastructure Maintenance:** DVK lacks a systematic approach to infrastructure maintenance and necessary operation and maintenance equipment, leading to asset deterioration and decreased reliability.
9. **Diluted Wastewater:** Wastewater collected by DVK has low organic load due to dilution, affecting the effectiveness of wastewater treatment processes.

[9] Decree No. 379 of the Chairman of Dushanbe City dated September 20, 2005, and Decree of the Chairman of Dushanbe City No. 153 dated April 5, 2017.

10. **Partially Functioning Wastewater Treatment Plant:** DVK's wastewater treatment plant operates below capacity or faces operational challenges, resulting in inadequate treatment and potential environmental pollution.

4.2. Dushanbe Wastewater Treatment Plant: Overcoming Operational and Regulatory Challenges

DVK has the challenge of providing access to safely managed water and sanitation services, especially across the stages of the sanitation value chain related to transport, treatment and reuse as there is only one waste-treatment plant (WWTP) that is already working well below its capacity and efficiency. The capacity of the WWTP is 294,500 m3/day, a land area of 128.76 ha, and that has its operation in three stages. Currently, its actual wastewater accepted is about 220,000 m3/day and DVK is operating it. The mechanical elements, which are still functional, are the preliminary treatment elements (screens and grit removal) and some of the primary and secondary clarifiers. **The aeration basins of what was designed in the Soviet period as an Activated Sludge Plant (ASP) using diffused air are no longer functional.**

Regulatory Framework: In Dushanbe, the regulatory framework governing faecal sludge reuse in agriculture has been historically underdeveloped, mirroring broader trends across Tajikistan. While neighbouring Russian territories introduced initial regulations in the late 20th century, Tajikistan did not adopt or implement such guidelines. Despite indirect acknowledgment in Tajikistan's Water Code, specific regulatory bodies overseeing faecal sludge reuse are absent. Stakeholders advocate for clear regulations to ensure safety and environmental protection, proposing collaboration with the Ministry of Health and Social Protection of the Population (MoHSSP) to initiate licensing for faecal sludge reuse, potentially attracting interest from companies or state entities.

Desludging Truck Operators: Navigating Regulatory Ambiguity: Desludging truck operators in Dushanbe operate in a regulatory grey area, lacking clear licensing arrangements and oversight. While some licenses may have been issued by SES, details are unclear, highlighting regulatory ambiguity. Operators pay nominal fees to the WWTP but are not formally regulated or taxed on their income, indicating a gap in enforcement. Informal practices, including sludge collection and fertilizer production, occur without regulation or quality control. Previous attempts to commercialize sludge reuse faced logistical and regulatory challenges, underscoring the need for clearer guidelines and support.

Revenue Potential and Economic Viability: Despite challenges, the WWTP foresees revenue potential from faecal sludge reuse, driven by increasing agricultural demand. Informal sales of sludge-based fertilizers showcased productivity gains in various crops, affirming economic viability. The WWTP's extensive land and infrastructure suggest prospects for expanded fertilizer production and increased revenue. Proper regulations, equipment, and expertise could unlock substantial revenue streams from sludge reuse, offering untapped economic opportunities. The high prices fetched by informal sales underscore the economic significance of sludge reuse for Dushanbe's development.

Health and Safety Concerns: Ensuring Environmental and Public Health: The WWTP implements mechanical, chemical, and biological treatment phases to ensure wastewater is adequately treated before discharge. However, safety concerns regarding the use of treated faecal sludge in agriculture exist, highlighting the need for comprehensive risk assessment and mitigation measures. Periodic water quality tests indicate minimal contamination in discharged water, contributing to improved river health and ecosystem sustainability. Collaboration with experts is sought to ensure safe treatment, preparation, and application of faecal sludge-based fertilizers, indicating a commitment to environmental sustainability and public health protection.

Operational Challenges and Capacity Limitations: The WWTP in Dushanbe faces operational challenges, particularly related to non-operational biological treatment facilities and key mechanical components such as aeration tanks and clarifiers. Although the treatment plant boasts an impressive capacity of 295 million litres per day (MLD), operational limitations result in an estimated efficiency of only 40 percent, significantly impacting treatment outcomes. Sanitization machines deposit sewage

directly into sludge ponds, necessitating immediate attention. Addressing these challenges requires concerted efforts from regulatory authorities, stakeholders, and technical experts to ensure the WWTP operates at its full potential, contributing to safe sanitation and environmental sustainability in Dushanbe.

4.3. Infrastructure

SUE DVK-Managed Centralized Wastewater Management Infrastructure: SUE DVK operates and maintains an extensive network spanning 700 kilometres of sewer lines across Dushanbe, aided by GIS for management and planning. Notably, storm drains fall outside the utility's jurisdiction. See annex 1a for the map depicting the current sewerage network of Dushanbe. The treatment plant produces 16,500 cubic meters of sludge annually, repurposed as fertilizer for landscaping, promoting sustainable waste management. Treatment processes encompass mechanical, biological, chemical, and sludge treatment facilities, ensuring comprehensive waste treatment.

Water Supply and Wastewater Management Challenges in Dushanbe: DVK operates four primary water production sources: two surface water intakes, Samatechnaya (SAM) and Napornaya (NAP) located in the north, and two groundwater sources, Kafarnihan-I (KAF-I) and Kafarnihan-II (KAF-II), along with Ugo-Zapodnaya (UZ) in the south. Water supply services in Dushanbe face significant challenges, including high physical water losses due to aging infrastructure, inaccurate customer registration, and inadequate billing practices. During periods of high demand, untreated surface water is directly supplied to the distribution network, heightening the risk of waterborne diseases. Only about 60 percent of Dushanbe's urban area is covered by a sewerage system, characterized by aging infrastructure, collector sections with insufficient capacity or non-functionality, and ineffective wastewater treatment due to critical infrastructure conditions and high wastewater dilution. Water availability remains an issue due to significant water losses in the distribution network (estimated at over 50 percent). System pressure is often insufficient, and summer interruptions are frequent due to decades of underinvestment and power supply disruptions affecting pumping continuity.

Wastewater Treatment Challenges: The absence of proper treatment facilities underscores the urgent need for improved sanitation infrastructure, including decentralised treatment options and public awareness campaigns on wastewater management.

Knowledge Gap in Wastewater Systems: There is a pervasive lack of understanding among households about sewage and water treatment systems, exacerbating sanitation challenges. Enhancing public education and awareness programs on wastewater management, including the importance of proper treatment and its environmental impacts, is necessary to address this knowledge gap effectively.

Water Treatment Practices: While common practices like boiling water exist, there is limited awareness of waste management and pollution prevention. Despite widespread water treatment practices, comprehensive education campaigns are needed to promote sustainable water usage practices and raise awareness about managing waste and preventing water pollution.

Infrastructure Maintenance Challenges: The high frequency of drainage network accidents, including clogs and technical issues in designs, highlights the pressing need for maintenance and modernisation of existing systems. These challenges underscore the importance of ongoing infrastructure upkeep to ensure effective sanitation services.

Rehabilitation Focus: Prioritizing the improvement of existing infrastructure before expanding sewer networks to unserved areas underpins the need for strategic planning and resource allocation. By focusing on rehabilitation, municipalities can maximize the efficiency and longevity of sanitation systems, addressing immediate needs while planning for future expansion.

Legacy Equipment and Service Delivery: The aging desludging trucks inherited from the Soviet period are a key bottleneck to service delivery with their limited capacities and maintenance issues. Despite these challenges, desludging services remain critical for maintaining sanitation standards and

protecting public health. Efforts to modernise equipment and streamline service delivery processes can improve the effectiveness and efficiency of sanitation services.

Access to Desludging Services: Limited access to desludging services, with some households ordering services every 2-3 years due to odour issues, highlights the need for improved sanitation infrastructure. Efforts to increase access to desludging services, particularly in underserved areas, are critical for promoting public health and environmental sustainability.

4.4. Regulatory Framework for Drinking Water Supply and Wastewater Disposal Services[10]

Integration of Drinking Water and Wastewater Services: Consumers in Tajikistan pay for both drinking water supply and wastewater disposal services provided by Vodokanals, highlighting the importance of public awareness about the breadth of services covered. Stringent regulatory requirements are necessary to govern wastewater disposal services and ensure safety and environmental protection.

Regulatory Constraints for the Private Sector: Tajikistan's private sector faces significant regulatory challenges in the sanitation domain due to a complex framework comprising 11 critical regulations. This complexity limits opportunities for private entities, necessitating strategic planning for inclusive WASH implementation before initiating sanitation projects.

Regulatory Attention to Non-Sewered Systems: Urgent attention is needed to address issues related to non-sewered sanitation systems, especially in rapidly growing cities like Dushanbe. The lack of information about these systems signifies a knowledge gap requiring comprehensive data collection and analysis.

Regulatory Oversight for Carwash Sites: Carwash sites in Tajikistan are subject to regulations covering sanitary protection zones, hygiene conditions, and wastewater discharge standards. However, compliance monitoring and enforcement of sanitation and hygiene requirements need improvement to mitigate environmental and health risks.

Recent Trends in Sanitation Inquiries: There is a growing interest among customers in ecologically sustainable wastewater treatment solutions, reflecting heightened awareness of environmental conservation. Additionally, there is a rising demand for user-friendly sanitation technologies to minimize system failures or maintenance issues.

Regulation of Desludging Truck Operators: Desludging truck operators are required to discharge wastewater sludge only at designated sludge beds within treatment plants. However, some operators deviate from guidelines, highlighting the need for improved regulatory oversight and operator training on compliance with safety procedures.

Regulatory Requirements for Public Toilets: Public toilets in Tajikistan are expected to comply with regulations concerning inclusiveness, safety for persons with disabilities, and sanitation standards. However, compliance is not uniform, indicating a need for improved regulatory oversight and enforcement.

Faecal Sludge Reuse Regulation: Tajikistan's regulatory framework lacks specific provisions addressing the reuse of faecal sludge, highlighting a regulatory void. Collaboration with local and international experts is needed to establish safe and practical regulations to address this gap.

Legal Framework

In urban areas, drinking water supply and wastewater disposal services are typically provided by the same entity. However, many consumers are unaware that they are paying for both services, as wastewater disposal is often included in the tariff by default. Consumer interaction with wastewater disposal services is limited and usually only occurs during emergencies or sewerage system issues. Despite the existence of various regulatory instruments, there is a need for special attention to ensure the safety and appropriate treatment of wastewater. This can be achieved by implementing technical regulations through statutory instruments.

[10] For a detailed description, please see annex 6.

1. The **Civil Code** does not contain explicit provisions regulating the sanitation area. The Law on the **Drinking Water and Water Supply** also has no provisions regarding wastewater disposal.
2. **Water Code of Tajikistan:** Covers various regulations related to wastewater management, including allocation of areas for wastewater discharge, setting standards for wastewater quality, obligations of water users, prohibitions on discharging wastewater into certain water bodies, and requirements for industries utilizing water bodies.
3. **Law on Concerning the Provisions for the Public Sanitary and Epidemiological Safety (8.12.2003, № 49):** Sets criteria for water body and human health safety, specifying requirements for water body protection, contamination prevention, and maximum allowable concentration rates of harmful substances and discharge rates of chemicals, biological substances, and microorganisms into water bodies.
4. **Law on the Environmental Impact Assessment (April 2022, 2003, under № 20):** Aims to prevent negative consequences of project implementation by assessing potential impacts on human health, natural resources, environment, and ecological safety.
5. **Law on the Production and Consumer Waste (May 10, 2002, under № 44):** Regulates relations related to waste generation, collection, storage, usage, transport, decontamination, and disposal, aiming to prevent negative impacts on the environment and human health.
6. **Law on the Protection of Consumers Rights:** Specifies consumer rights to goods/services safe for life, health, and environment, and defines safety criteria.

Regulatory Instruments:

- **Public Water Supply and Sewer Usage Rules**: Defines sanitation system, sets standards for waterworks facilities operation, and mandates notification of accidents or increased wastewater discharge concentrations.
- **Rules for provision of solid and liquid domestic waste removal services (6.06.2005 № 209):** Regulate relations between consumers and service providers for waste removal services.

Sanitary Regulations and Standards (SanPins) and Construction Standards (SNiPs) in Tajikistan are regulatory documents developed by the State Sanitary and Epidemiological Surveillance Service and the Agency of Construction and Architecture, respectively. They are binding and ensure compliance with international standards. Various statutory instruments govern wastewater disposal safety, some of which date back to the Soviet era but remain valid unless they contradict Tajikistan's constitutional laws. Any inconsistencies are addressed through modification or invalidation processes.

- **Sanitary Rules for Maintenance of Territories of Populated Areas (August 5, 1988, document number 4690-88):** Governs management and maintenance of populated areas to meet sanitation standards.
- **SanPiN No. 4630-88, "Protection of Surface Water from Pollution" (1988):** Aims to protect surface water quality by regulating wastewater discharge from various sources and ensuring compliance with environmental and health standards.
- **SanPiN 2.1.4.1110-02, Zones of Sanitary Protection of Sources Water Supply and Drinking Water Pipelines:** Outlines management of wastewater to safeguard water quality and public health.
- **SaNiP 40.02-2009 Construction Code Wastewater Disposal (August 16, 2010):** Defines wastewater disposal and provides engineering standards for wastewater systems.
- **SanPiN 2.1.4.005-07, Water Quality Requirements for Non-Centralized Water Supply (March 1, 2007):** Establishes water quality requirements for decentralized water supply sources.
- **SanPiN 2.1.4.004-07, Drinking Water. Hygienic Requirements to Water Quality of Centralized Drinking Water Supply Systems. Quality Control:** Sets hygienic standards for centralized drinking water systems in Tajikistan and outlines procedures for quality control, including selecting indicators, developing safety plans, and enforcing standards.

- **SNiP 40.02-2009**: Establishes wastewater disposal rates at 350 dm3/day for urban residents and 125 dm3/day for rural areas, informing the design and construction of sewerage systems to accommodate specified disposal quantities.
- **SanPiN 2.4.1.009-13, Hygienic Requirements for Preschool Educational Institutions:** Defines sanitary norms and rules for preschool educational institutions.
- **SanPiN, "For the Collection, Neutralization, Transportation, Storage, and Disposal of Waste in Medical Institutions" (May 14, 2014):** Regulates handling of medical waste.
- **SanPiN 2.1.4.00_22. Sanitary and Epidemiological Requirements to Contamination Protection of Underground Water Bodies used in Drinking Water Supply:** Specifies measures for protecting underground water bodies used in drinking water supply.

4.5. Institutional Arrangements

The sectors of water and sanitation in Tajikistan are characterized by multiple ministries, departments, and institutions. The roles and responsibilities of these entities in many instances overlap and unevenly distributed at the national, regional and district levels. Their roles have been briefly explained in annex 7.

At the city level, Dushanbe Vodokanal (DVK) operates under the oversight and approval of the Municipality of Dushanbe, as outlined in its Charter. DVK is required to submit all development plans, programs, regulations, staffing schedules, and tariff calculations to the Municipality for approval. Additionally, DVK provides regular reports, including monthly, quarterly, semi-annual, and annual reports, detailing operational and economic performance, financial status, and investment projects.

Although DVK has management autonomy, the Municipality intervenes in key staffing decisions. Financial support from the Municipality is provided to DVK without interest, and the Municipality guarantees loans obtained by DVK from International Financial Institutions (IFIs) with the special support of Ministry of Finance.

DVK complies with all legal and regulatory requirements and submits reports on water production, sales, water losses, and current tariffs to the **Ministry of Energy and Water Resources** (MoE&WR). Annually, DVK submits a plan of technical works to the **Committee on Environmental Protection** (CEP) for approval, in exchange for a permit for water use and wastewater discharge. Similarly, **SES** has a specific role in monitoring and surveillance of water quality and waste management for the service being offered by DVK. Further, SES leads on generating health alerts, while DVK is responsible for taking necessary actions to control and mitigate environmental risks and hazards identified by SES.

However, DVK faces challenges in meeting stringent environmental requirements due to financial constraints. While there is no formal relationship with Khojagii Manziliyu Kommunali (KMK), DVK voluntarily shares information, such as fund utilization, project details, and service delivery data with KMK. For tariff regulation, DVK's performance information is shared with the **Anti-Monopoly Agency** (AMA). It's worth noting that the current tariff methodology lacks incentive mechanisms. Furthermore, DVK currently does not engage with community-based organizations (CBOs) within or outside its service area.

4.5.1. Stakeholder Analysis

Sanitation Chain									
Functional Attributes	**Behavioural Aspects-** *Hygiene Promotion*	*Toilets- HH Sanitation*	*Toilets- Educational Institutes*	*Toilets- Healthcare Facilities*	*Toilets- Public Facilities*	*Conveyance Faecal Sludge Collection/ Transport*	*Conveyance Sewerage Network*	*Treatment and Disposal of Faecal Sludge and Wastewater*	*Safe, Beneficial Use of Human Excreta*
Policy	MoHSPP	MoHSPP and MoEWR	MoES	MoHSPP	State Committee on Architecture and Construction	MoE&WR in collaboration with SCEP and MoHSPP	MoE&WR in collaboration with SCEP and MoHSPP	MoE&WR in collaboration with SCEP and MoHSPP	MoE&WR in collaboration with SCEP and MoHSPP
Regulations	AMA in collaboration with MoHSPP and SUE KMK	AMA in collaboration with MoEWR and SUE KMK	MoHSPP	MoHSSP	State Committee on Environmental Protection (SCEP)	AMA in collaboration with SUE-KMK, MoHSSP & SCEP	AMA in collaboration with SUE-KMK, MoHSSP & SCEP	AMA in collaboration with SUE-KMK, MoHSSP& SCEP	AMA in collaboration with SUE-KMK, MoHSSP& SCEP
Financing	MoF	MoF	MoF	MoF	MoF	MoF in collaboration with MoE&WR	MoF in collaboration with MoE&WR	MoF in collaboration with MoE&WR, MoHSPP & SCEP	MoF in collaboration with MoE&WR, MoHSPP &SCEP
Capacity Development	HLSC and SSESS of MoHSPP & SUE-KMK	HLSC and SSESS of MoHSPP & SUE-KMK	HLSC and SSESS of MoHSPP & SUE-KMK	HLSC and SSESS of MoHSPP & SUE-KMK	HLSC and SSESS of MoHSPP & SUE-KMK	HLSC and SSESS of MoHSPP, SUE-KMK and MoEWR	HLSC and SSESS of MoHSPP, SUE-KMK and MoEWR	HLSC and SSESS of MoHSPP, SUE-KMK and MoEWR	HLSC and SSESS of MoHSPP, SUE-KMK and MoEWR
Planning	MoE&WR in collaboration with MoHSPP	State Committee for Land Management and Geodesy	State Committee for Architecture and Construction	State Committee on Architecture and Construction	Municipality of Dushanbe in collaboration with State Committee on Architecture and Construction	State Committee on Architecture & Construction with MoE&WR & SU-KMK	State Committee on Architecture & Construction with MoE&WR & SU-KMK	State Committee on Architecture & Construction with MoE&WR & SU-KMK	State Committee on Architecture & Construction with MoE&WR & SU-KMK
Infrastructure Provision	Main Department of Geology	Main Department of Geology	Ministry of Education and Science	DVK in collaboration with Ministry of Health	DVK in collaboration with State Committee on Architecture and Construction	DVK, in collaboration with MoE&WR and State Committee on Architecture and Construction	DVK in collaboration with MoE&WR and State Committee on Architecture and Construction	DVK in collaboration with MoE&WR and State Committee on Architecture and Construction	DVK in collaboration with MoE&WR and State Committee on Architecture and Construction
Enforcement	SSESS	SSESS	SSESS	SSESS	Municipality of Dushanbe in collaboration with SCEP	AMA in collaboration with MoHSSP and SCEP	AMA in collaboration with MoHSSP and SCEP	AMA in collaboration with MoHSSP and SCEP	AMA in collaboration with MoHSSP and SCEP
Asset Management	Municipality of Dushanbe	Municipality of Dushanbe	MoES	Municipality of Dushanbe and MoHSPP	Municipality of Dushanbe	DVK in collaboration with MoE&WR and SUE-KMK	DVK in collaboration with MoE&WR and SUE-KMK	DVK in collaboration with MoE&WR and SUE-KMK	DVK in collaboration with MoE&WR and SUE-KMK
Service Delivery	DVK	DVK	DVK in collaboration with educational institutions	DVK in collaboration with healthcare facilities	DVK collaboration with Public Facilities management authorities	Service providers (private operators)	DVK	DVK	DVK
M&E	National Statistical Committee	National Statistical Committee	National Statistical Committee	National Statistical Committee through MoHSPP	National Statistical Committee in through relevant government agencies	National Statistical Committee in collaboration with MoE&WR and SUE-KMK	National Statistical Committee in collaboration with MoE&WR and SCEP	National Statistical Committee in collaboration with MoE&WR and SCEP	National Statistical Committee in collaboration with MoE&WR and SCEP

4.5.2. Institutional Challenges

The complex institutional structure of drinking water and sanitation sectors of Tajikistan is a major barrier for improvements in service delivery. The lack of delineation of responsibilities between the

regulatory functions of authorities and organizations has resulted in duplication of responsibilities, leading to poor resource management. Certain other weaknesses have also been identified:

1. **Lack of Corporate Strategy**: DVK lacks a clear long-term roadmap, making it difficult to prioritize initiatives, allocate resources efficiently, and adapt to changing circumstances effectively.
2. **Absence of Performance-based Agreement**: The absence of a formal performance-based agreement between DVK and the municipality hinders the establishment of targets, benchmarks, and accountability mechanisms for service delivery.
3. **Weak Utility Management Processes**: DVK struggles with effectively managing its operations, maintenance, and financial resources, leading to inefficiencies and suboptimal service delivery.
4. **Inadequate Management Information Systems (MIS)**: The lack of an integrated MIS impairs DVK's ability to collect, analyse, and utilize data for decision-making, hindering performance tracking and targeted interventions.
5. **Limited Use of IT**: DVK's limited adoption of IT solutions hampers efficiency and productivity across various functions, including billing, customer service, and asset management.
6. **Poor Internal Communication**: Weak internal communication within DVK can lead to silos and inefficiencies, highlighting the need for clear and effective channels to promote collaboration and knowledge sharing.
7. **Insufficient Communication with Customers and Citizens**: DVK's limited communication with customers and citizens may result in dissatisfaction and mistrust, emphasizing the importance of transparent and proactive engagement to build public trust and support.

4.6. Promoting Inclusive Sanitation

- **Affordability Barrier**: High connection fees make formal water access unaffordable for many, leading households to purchase water from informal sources, exacerbating health risks and inequities in access.
- **Subsidies for Vulnerable Groups**: Female-led households and persons with disabilities require financial support for water and sanitation services to alleviate financial burdens and ensure equitable access.
- **Menstrual Hygiene Management**: Economic challenges hinder access to menstrual hygiene products, affecting women's health and dignity, highlighting the need for affordable options.
- **Accessibility of Public Toilets**: Public toilets lack facilities for persons with disabilities, necessitating improvements for inclusivity and safety.
- **Women's Role in WASH**: Women's involvement in household WASH management should extend to community-level decision-making to enhance effectiveness and inclusivity.
- **Youth Engagement**: Educating and engaging youth in WASH promotion empowers them to drive positive change in their communities.
- **School WASH Facilities**: Equitable access to WASH facilities in schools is essential for promoting health and educational outcomes, requiring comprehensive education programs.
- **Challenges for Disabled Individuals and Gender Sensitivity**: WASH facilities often lack gender sensitivity and accessibility features, necessitating inclusive design and targeted assistance programs.
- **Community Engagement**: Limited awareness about wastewater treatment plants' environmental impact underscores the need for community awareness campaigns to improve service acceptance and participation.

4.7. Capacity Challenges and Potential in Sanitation Management

- **Data Management Challenges**: SUE DVK struggles with data collection and management, leading to billing errors and planning difficulties. Incomplete customer registration and fragmented databases exacerbate these issues, emphasizing the need for robust data systems.
- **Financial Support and Oversight**: DVK's financial operations are tied to Dushanbe's Municipality, impacting autonomy and compliance with essential standards. Financial constraints hinder meeting environmental requirements, highlighting the complex balance between autonomy, financial support, and regulatory oversight.
- **Regulatory Compliance and Reporting**: While DVK adheres to legal requirements, financial constraints hinder meeting environmental standards. Lack of incentive mechanisms in tariff methodology affects efforts to balance financial sustainability with compliance, emphasizing the need for dialogue and coordination.
- **Community Engagement and Awareness**: Limited engagement with community-based organizations reflects a gap in fostering community participation and awareness. Strengthening partnerships with CBOs is crucial for addressing local sanitation needs effectively and promoting inclusivity.
- **Private Sector Contributions**: Despite complementing public efforts, the private sector faces challenges like taxation and regulations. Streamlined policies and capacity-building initiatives can unlock the private sector's potential in addressing sanitation challenges.
- **Smart Sanitation Solutions and Waste to Energy**: Interest in smart solutions and waste-to-energy exists, but challenges like government inertia and cost recovery hinder progress. Supportive policy frameworks and partnerships can facilitate scaling up innovative solutions for sustainable urban development.
- **Data Management and Surveillance Services**: Sanitary and epidemiological surveillance services struggle with manual reporting and limited testing capabilities. Strengthening capacity through technology and collaboration can improve data accuracy and inform public health interventions.
- **Consumer Rights and Advocacy**: The Consumers Union faces challenges in understanding sanitation-related charges and tariff setting. Empowering consumers through education and grievance mechanisms can enhance accountability and service quality.
- **Challenges and Potential**: Despite operational deficiencies, there's potential for improvement in treatment efficiency and regulatory frameworks. Comprehensive strategies and robust regulations are essential for enhancing the sanitation landscape effectively.

4.8. Financing

The current state of Dushanbe Vodokanal reflects similar challenges faced by other State-Owned Enterprises in Tajikistan. Key issues include:

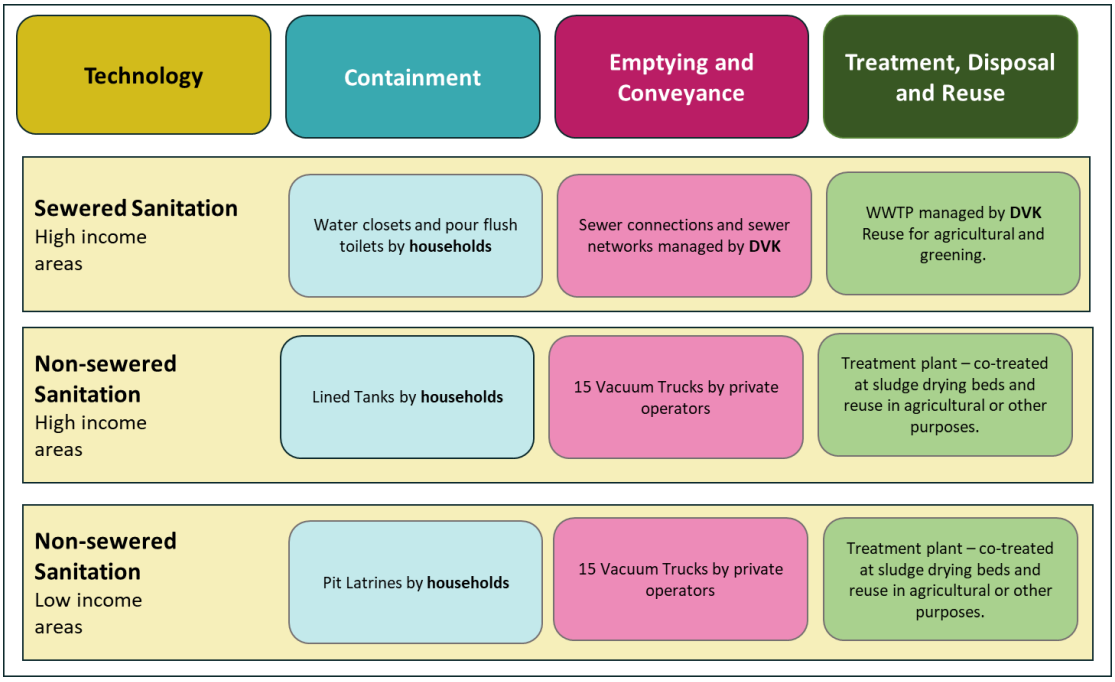
1. **Weak Corporate Governance**: DVK's governance and financial accountability are deficient, evidenced by low-cost coverage, high foreign currency debt servicing, lack of qualified staff, underdeveloped planning, incomplete customer database, absence of a centralized service centre, and outdated financial management systems.
2. **Limited Accountability**: Accountability primarily focuses on financial reporting, neglecting broader governance and operational aspects, which undermines transparency and inhibits effective problem-solving.
3. **Poor Business and Financial Planning**: DVK lacks comprehensive planning processes, hindering strategic objective setting, resource allocation, long-term financial sustainability, and anticipation of future challenges and opportunities.

4. **Incomplete Computerized Financial Management**: Outdated financial systems lead to inefficiencies in reporting, budgeting, and decision-making, with manual errors, processing delays, and challenges in generating accurate financial insights.
5. **Fragmented Internal Controls**: Weak internal controls increase risks of fraud, mismanagement, and inefficiencies in revenue generation and resource utilization, impacting asset safeguarding and financial performance optimization.
6. **Low Working Ratio and High Operating Cost-to-Capital Ratio (OCCR)[11]:** DVK faces potential liquidity issues due to low working capital ratios, hindering its ability to meet short-term financial obligations. Moreover, a high operating cost-to-capital ratio suggests inefficiencies in cost management and resource allocation, impacting financial sustainability.
7. **Inadequate Inventory Management and Procurement Procedures**: Lack of effective inventory management and procurement processes results in cost control challenges, inventory level management issues, delays in resource availability, and risks of corruption or mismanagement.
8. **Lack of Long-Term Tariff Strategy**: Absence of autonomy hampers DVK's ability to adopt a strategic tariff approach, leading to ad-hoc adjustments, customer uncertainty, revenue forecasting difficulties, and challenges in meeting operational and investment needs.
9. **Low Billing and Collection Rates**: Challenges in billing and collecting fees lead to low revenue generation, financial instability, and hindered ability to cover operational costs and invest in infrastructure upgrades.

5. Sanitation Service Chain

5.1. Overview of Public and Private Actors involved in Service Delivery at Each Stage of the Chain

Figure 3: Service Delivery Actors along the Sanitation Service Chain in Dushanbe



[11] Working Ratio assesses the operational efficiency of service providers by reviewing total operating revenues against related operating expenses, excluding depreciation and financial charges.
OCCR measures the ability of the utility to recover operating costs with current operating revenues.

5.2. Sanitation Service Ladder for Dushanbe

Sanitation Ladder	What it means	% of Population in Dushanbe at this Level
Safely Managed	Use of improved facilities that are not shared with other households and where excreta are safely disposed of in situ or removed and treated offsite. In the Dushanbe context, this includes proportion of population connected to sewers, and with wastewater is safely treated (13%), and FS safely contained, transported, and treated at the WWT (8%).	21%[12]
Basic	Use of improved facilities which are not shared with other households. The survey found that majority of Dushanbe used improved facilities: pour flush pits connected to soak-pits, and pit latrines with slabs. None of the respondents shared a facility with another household.	78%
Limited	Use of improved facilities shared between two or more households. None of the respondents shared a facility with another household.	0%
Unimproved	Use of pit latrines without a slab or platform, hanging latrines or bucket latrines. In Dushanbe, this included a small minority using pit latrines without slabs.	<1%
Open Defecation	Disposal of human faeces in fields, forests, bushes, open bodies of water, beaches, and other open spaces or with solid waste. None of the respondents practiced open defecation.	0%

5.3. Stakeholder Challenges, Opportunities, and Market Dynamics[13]

Stakeholder	Challenges	Opportunities	External Risks
SUE DVK	1. Pipe capacity enhancement needed. 2. Drainage maintenance urgency. 3. Innovative tree root pipe solutions. 4. Efficient data management essential. 5. Accurate demographic data crucial. 6. Resource constraints impact waste treatment. 7. Billing challenges affect equity.	1. Expand sewerage for revenue. 2. Optimize with GIS tech. 3. Compliance attracts investment. 4. Improve billing transparency. 5. Citizen engagement for waste management. 6. Mobilize sectors for marketing.	1. Climate risk to infrastructure. 2. Resource scarcity hampers maintenance. 3. Tech reliance risks efficiency. 4. Geopolitical disruptions affect supplies. 5. Socioeconomic instability impacts revenue. 6. Regulatory changes increase costs. 7. Geographic barriers limit expansion.
Ministry of Energy and Water Resources	1. Reliance on DVK data raises uncertainty. 2. Limited oversight challenges regulation. 3. Municipality control affects DVK staffing.	1. National Water Sector Program guides water and sanitation. 2. MoF aids DVK in securing IFI loans.	1. Municipal staffing control risks political influence. 2. External funding reliance poses economic risks. 3. DVK non-compliance pressures Ministry action.

[12] This assumes that despite the largely non-functional wastewater treatment plant, some wastewater is still treated safely. The functionality of the WWTP was estimated at about 30%, but this could be much lower. A more conservative estimate would be 0% for safely managed and 99% for basic.

[13] An annex (8) featuring an intricately detailed comparative table has been included.

Ministry of Finance	1. Vague fund allocation hampers WASH initiatives. 2. Absence of disaggregated budget data. 3. Lack of targeted investment policy hinders private sector engagement. 4. External assistance needed for investment policy. 5. Development partner collaboration complicates policy alignment.	1. MoF can improve financial oversight for transparency. 2. MoF can develop investment policies for private sector engagement. 3. MoF can collaborate for external expertise and resources. 4. Climate finance exploration for WASH.	1. Tajikistan's economy vulnerable to global shifts. 2. Economic fluctuations affect sanitation investments. 3. Political resource allocation hampers market interventions.
Antimonopoly Services	1. Tariff method outdated, affects fair pricing. 2. High water loss rates hinder management. 3. Absence of connection fee threatens sustainability. 4. Combined billing raises fairness concerns.	1. International engagement enhances tariff regulation. 2. Targeted subsidies improve access. 3. Regulatory leverage ensures standards. 4. Capacity building boosts oversight.	1. Political meddling undermines regulation. 2. Economic instability affects affordability. 3. Technology disruption risks reliability.
Sanitary and Epidemiological Service	1. Data deficiency hinders SES intervention. 2. Manual reporting delays response. 3. Limited analysis compromises safety. 4. Outdated rules hinder oversight.	1. Data collaboration boosts sanitation. 2. Tech integration enhances waste management. 3. Institutes ensure sustainable infrastructure. 4. Integrate WASH data for health alerts.	1. Political risks affect enforcement. 2. Climate change impacts water quality. 3. Overlap of roles with MoEWR. 4. Health crises strain management.
State Committee on Environmental Protection	1. Climate adaptation needed. 2. Limited testing capacity. 3. Combatting E. coli contamination. 4. Plastic waste management challenges.	1. Tech partnerships for waste management. 2. Community-led water monitoring. 3. Climate-resilient infrastructure. 4. Methane emission control funding.	1. Resource constraints hinder effectiveness. 2. Regulatory uncertainty demands adaptability. 3. Pandemics strain sanitation efforts. 4. Climate resilience costly but vital.
State Committee on Architecture and Construction	1. Innovative solutions for high-rise communities. 2. Strengthen oversight for sanitation standards. 3. Overcome implementation challenges for infrastructure. 4. Bridge technical expertise gap for sustainability.	1. Innovative water management for high-rises. 2. Decentralized wastewater treatment for reuse. 3. Strengthening expertise for infrastructure. 4. Bridging technical gaps for sanitation.	1. Financial risks due to budget constraints. 2. Policy changes impact infrastructure. 3. Market volatility hinders development. 4. External risks to sanitation projects.
Main Department of Geology	1. Unregistered boreholes pose sustainability and contamination risks. 2. Supervision shift introduces organizational coordination complexities.	1. Strengthen monitoring for better decisions. 2. Use stable data for robust governance.	1. Secure funding for monitoring. 2. Adapt to policy shifts for coordination.

Administration of Dushanbe	1. Full tariff collection critical for infrastructure. 2. Challenges in private toilet management. 3. Uniform safety standards needed.	1. Innovative financing for sustainability. 2. Urban development integration for efficiency. 3. Inclusive planning for equity.	1. Regulatory uncertainty affects planning. 2. Financial instability risks service levels. 3. Lack of hygiene standards in public toilets.
Consumers Union	1. Sanitation charge ambiguity hampers CU. 2. Water meter grievances demand awareness. 3. CU seeks provider accountability.	1. CU advocates legislative reform. 2. Engagement empowers informed consumers. 3. Civic program improves sanitation inclusivity	1. Regulatory constraints hinder CU's advocacy. 2. Funding dependence risks sustainability
Republican Healthy Lifestyle Centre	1. Infrastructure demands collaboration and investment. 2. Awareness gaps risk outreach effectiveness.	1. Network expansion for advocacy. 2. Data-driven health alerts.	1. Resource constraints pose risks. 2. Policy changes may disrupt operations.
Service Providers/ Private Sector	1. Regulatory hurdles impede private sector. 2. Limited opportunities due to strict regulations. 3. Slow adoption of smart sanitation. 4. Need for early incentives. 5. Dependency on government subsidies. 6. Lack of affordable credits.	1. Private sector boosts waste management. 2. Import role in sanitation materials. 3. Collaboration in construction projects. 4. Private sector in waste-to-energy. 5. Urbanization drives sanitation demand. 6. Health awareness spurs product demand.	1. Weather events disrupt sanitation. 2. Resource scarcity hampers projects. 3. Political interests deter investment. 4. Economic downturn affects affordability.

5.4. Shit Flow Diagram of Dushanbe

The development of the SFD for Dushanbe has taken into account several key factors to precisely illustrate the sanitation situation and potential risks.

1. Vulnerability of the Aquifer

Due to the lack of specific data on rock type and groundwater table levels, a precautionary approach was taken. It was assumed that weathered basement rock, common in Tajikistan, comprises the unsaturated zone, with a shallow water table depth of 5-10 meters. These assumptions increase contamination risk to the aquifer due to limited natural filtration and short contaminant travel distance.

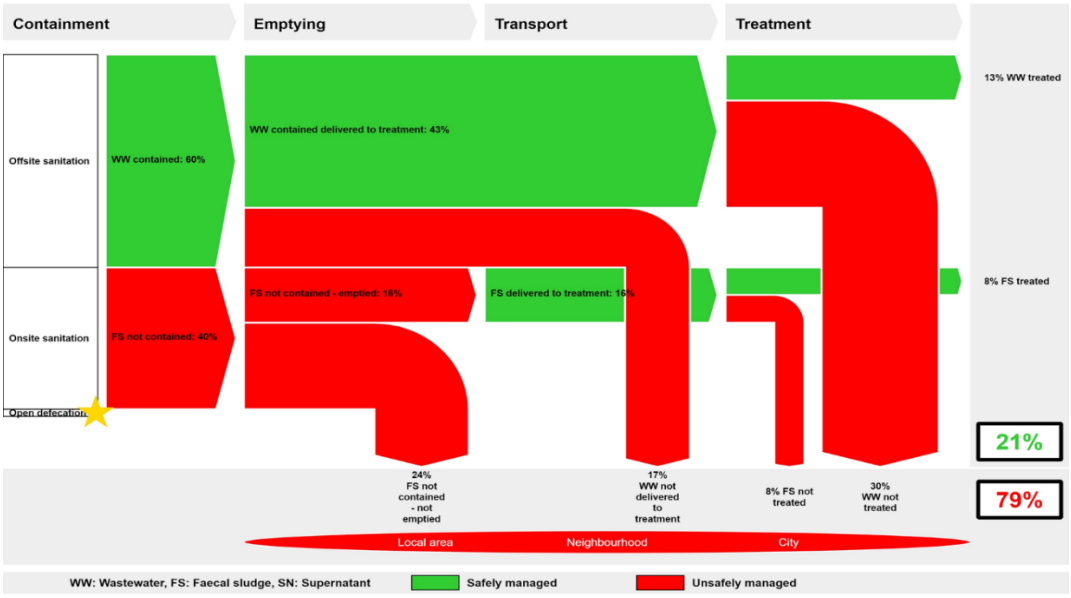
2. Lateral Separation of Sanitation Facilities and Water Sources

Less than 25 percent of sanitation facilities were within 10 meters of groundwater sources, indicating some spatial separation. However, data on uphill positioning relative to groundwater sources was unavailable. A conservative estimate assumed over 25 percent uphill positioning.

3. Water Supply

Dushanbe relies significantly (54 percent) on groundwater from Yugo Zapadnaya and Kafarnihan intakes (information provided by DVK). Proper sanitation management is crucial to minimize contamination risks. While protected boreholes offer mitigation, their effectiveness requires assessment against sanitation system risks. Further evaluation is needed to ensure borehole protections adequately address identified risks.

Figure 4: Shit-Flow Diagram of Dushanbe



Sewered Sanitation

Sewer Network Inefficiencies: Despite significant sewer network coverage in Dushanbe, inefficiencies exist, with a substantial amount of wastewater bypassing proper treatment, posing environmental and health risks. Discrepancies in customer numbers and lack of an integrated database highlight the need for improved data management practices to accurately represent the sanitation system amidst rapid urbanization.

Verification of Sewer Network Usage: Stakeholders suggest **around 60 percent sewer network usage**, supported by DVK's customer numbers. However, clear evidence is lacking, necessitating comprehensive surveys for accuracy. **Only 72.2 percent of collected wastewater reaches the treatment plant**, indicating operational inefficiencies, potentially due to leaks or unauthorized connections.

Treatment Plant Condition: Dushanbe's treatment plant is deteriorated, compromising multiple treatment stages, and resulting in disposal of untreated wastewater and reuse of untreated faecal sludge. Dushanbe Wastewater Treatment Plant employs various treatment methods including mechanical grids, sand traps, and primary settling tanks. The following are some of highlights of the state of the treatment plant:

- No Functional flow meters, and the volume of wastewater treated is estimated based on flows and channel volumes. This is inaccurate, and limits DVKs capacity to monitor treated volumes.
- The sand traps currently operate at 30 percent of their designed capacity.
- 8/24 existing primary settling tanks are operational.
- All aeration tanks are non-functional.
- The existing already overloaded ponds handle the biological treatment that inoperable aeration tanks do not perform.
- While the plant utilises chlorination for disinfection, the preceding treatment shortcomings might limit its effectiveness.
- Sludge management needs further assessment, as 10 out of the 50 existing sludge drying beds are functional, and retention time for drying of sludge was not defined.

Based on this assessment, it was estimated that only 30 percent of wastewater channelled through the treatment plant receives proper treatment, and 70 percent of the generated wastewater is disposed into the environment untreated due to the limitations in the functionality of the plant itself.

Non-Sewered Sanitation

In Dushanbe, approximately one-third of the population relies on lined tanks for non-sewered sanitation (NSS), characterized by impermeable walls and open bottoms. Various pit latrine options are used by smaller portions of the population: around 7 percent use pit latrines, 1 percent use lined pit latrines with semi-permeable walls and open bottoms, and about 6 percent use unlined pit latrines, posing higher environmental and health risks due to potential groundwater contamination. A negligible portion, less than 0.5 percent, employs lined pit latrines with effluent discharged directly to open ground or water bodies, presenting significant health and environmental hazards.

Faecal Sludge Management Challenges: Emptying frequencies vary among different non-sewered sanitation options, with lined tanks being emptied every ten years by approximately 38 percent of users. Despite reports of faecal sludge being transported to the treatment plant, the aging infrastructure of the plant, with only 1 percent functional, raises concerns. This includes the absence or non-functionality of critical equipment like flow meters and compromised settling and aeration capabilities. Additionally, the co-treatment of sludge from NSS facilities at sludge ponds poses contamination risks and limits effective sludge treatment.

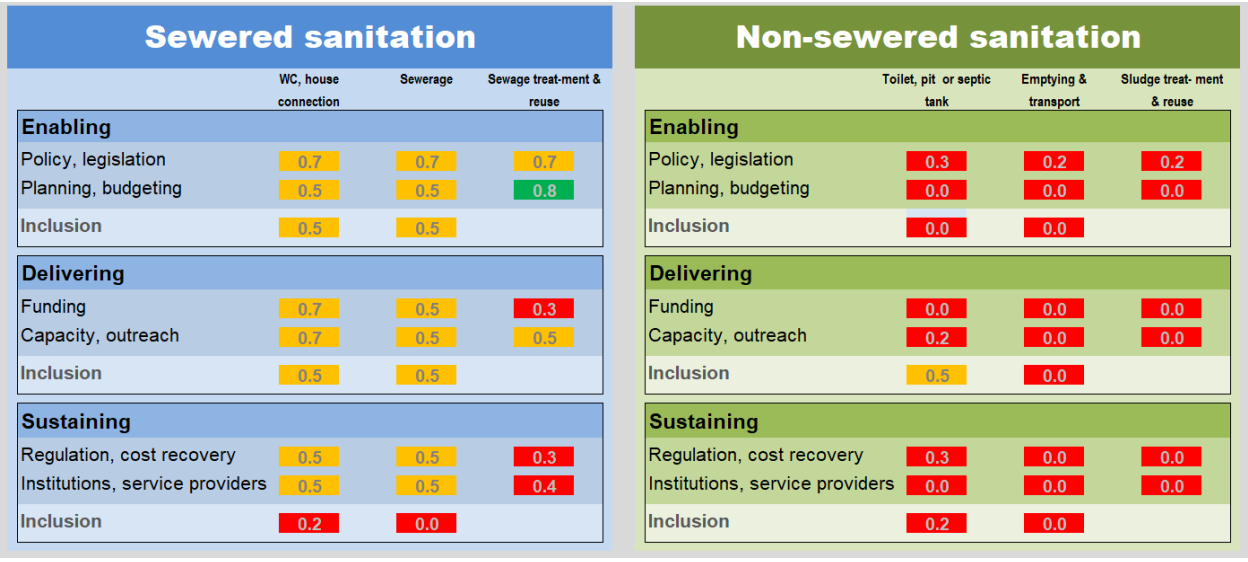
Risks of Incomplete Treatment: The absence of standard operating procedures for retention period, drying, and pathogen testing, coupled with treatment process deficiencies, suggests a high risk of incomplete sludge treatment. This increases the likelihood of pathogen survival in reused sludge, posing health hazards for agricultural use and greening activities. Moreover, the direct collection of untreated sludge from the plant for agricultural purposes bypasses any treatment, amplifying public health risks.

Calculations, assumptions, and justifications for SFD development have been added as annex 9.

5.5. Citywide Enabling Environment Monitoring through City Service Delivery Assessment Tool

City Service Delivery Assessment tool has been used to assess the enabling environment across the sanitation service chain in Dushanbe. The CSDAs for sewered and non-sewered sanitation have been developed separately, as depicted in the figure below. The tool calculates a mean value for each step of the service chain in each building block and presents it in traffic light form – green for satisfactory, yellow for improving, and red for poor. For explanation of justifications, please see annex 11.

Figure 5: CSDA Full Assessment



5.6. Insights from the Surveys: Understanding Trends, Needs, and Preferences

The following is a summary of key findings from the household (HH) survey, accompanied by a detailed analysis:[14]

- **Sanitation Facility Type:** 20.4 percent of households use flush or pour flush toilets connected to a piped sewer system, while 12.6 percent use flush or pour flush toilets connected to a septic tank. 67 percent of households predominantly use lined pit latrines with slabs.
- **Reasons for not being Connected:** 33.2 percent of respondents cited the sewer line being too far, 3.4 percent mentioned expensive connection fees, and 61.6 percent indicated that their area was not serviced.
- **Sharing of Facility:** 99.3 percent of households share their toilet facility with non-household members.
- **Inclusive Facilities:** Only 1.7 percent of households reported having supportive facilities for people with disabilities.
- **Distance between Toilets and Kitchen:** The distances between toilets and kitchens varied, with 8.0 percent less than 5 meters, 22.6 percent between 5-8 meters, 22.9 percent between 8-12 meters, 2.3 percent between 12-15 meters, 16.9 percent between 15-18 meters, 13.6 percent between 18-22 meters, and 13.6 percent greater than 25 meters.
- **Frequency of Toilet Cleaning:** 60.4 percent of households clean their toilets monthly, while 30.6 percent do so weekly.
- **Connection to Soak Pits:** 99.1 percent of septic tanks are connected to soak pits.
- **Condition of Septic Tanks:** 99.4 percent of septic tanks are reported to be in good condition and functioning.
- 83.1 percent of septic tanks are sealed on the sides but not at the bottom.
- 47.6 percent of septic tanks were constructed more than ten years ago, and 6.3 percent were constructed less than 1 year ago. *It is imperative to acknowledge that all households, constituting 100 percent of the surveyed population, possessed a single containment chamber. Consequently, it is noteworthy to classify this structure as a leach tank, given that the term "septic tank" was utilised in the household survey but may not precisely align with its technical definition.*
- **Time to fill Septic Tank:** The time taken to fill the septic tank, 82.3 percent were not aware, 27.4 percent reported 9-11 years, 12 percent reported greater than 15 years, and 9.7 percent reported less than 3 years.
- **Emptying Frequency of Septic Tanks:** 38.2 percent households indicated that their septic tank was never emptied, 21.6 percent said 10 years ago, and 6.3 percent said less than 1 year ago, typically emptied by desludging truck operators mechanically (88.8 percent).
- **Disinfection after Emptying:** 96 percent of households themselves disinfect the area around the tank after emptying, while 0.6 percent indicated disinfection not being done.
- **Disposal of Sludge:** 91.6 percent of households dispose off sludge at the treatment plant, 1.6 percent bury in a covered pit, while 1.1 percent dispose off the sludge at an uncovered pit, open ground, or waterbody.
- **Distance to Water Source:** 9.7 percent of households have a water source within 30 meters of the containment system.
- **Drinking Water Sources:** The main drinking water sources were piped into dwelling (53.7 percent) or compound (33.1 percent). The distance varied: 40 percent were greater than 40 meters, 6.7 percent less than 15 meters, and 11.1 percent between 15 and 19 meters.

[14] Due to multiple responses of some questions, the percentage of the responses may exceed 100. Please see annex 3.

- **Treatment:** 50.5 percent households experienced insufficient drinking water last month, with 72.2 percent boiling water for additional treatment.
- **Water Consumption:** 51.7 percent of households consume 50-100 litres per person per day.
- **Availability of Water:** 85.6 percent of households have water supply available all the time. 72 percent of households indicated water availability for less than 6 hours a day.
- **Solid Waste Disposal Methods:** These included service provider collection (48.7 percent), dumping sites (43.4 percent), and pit burial (6.2 percent). The cost per person per month varied: 10.8 percent paid less than 4 TJS, 5.5 percent between 4-4.3 TJS, 32.6 percent between 4.3-4.7 TJS, and 38.7 percent paid more than 6 TJS.
- **Maintenance costs of toilets** varied: 24.2 percent paid less than 10 TJS, 54.5 percent paid between 10-13 TJS, and 21.2 percent paid more than 30 TJS. The emptying cost ranged from less than 150 TJS (9.5 percent) to greater than 450 TJS (13.7 percent).
- **Water Bills:** Most households received drinking water bills only (76.2 percent). Satisfaction with sanitation services varied: 53.5 percent were unsatisfied, 38.3 percent were satisfied, and 8 percent remained unsatisfied.
- **Suggestions for Improvement:** Improvement suggestions included expanding sewer networks (64.1 percent) and upgrading old sewer lines (15.6 percent). Respondents were willing to pay more for improvements: 71 percent were willing to pay more than 20 percent, 51.2 percent would not be willing to pay more, and 13.2 percent were willing to pay more than 50 percent for sanitation improvements.

5.6.1. Tariffs for Domestic Water Supply, Sewerage and SWM

The household survey revealed several key observations regarding knowledge and awareness of tariffs in Dushanbe:

1. **Accuracy of Tariff Knowledge**: Respondents lacked precise knowledge of individual service tariffs, often recalling only a rough estimate of their total household tariff. Many were unaware that the 'Sewerage' tariff is included in the overall 'Water Bill'.
2. **Registered vs. Non-registered Residents**: Inconsistencies were found between registered residents and actual household members, impacting tariff calculations, and potentially leading to commercial losses.
3. **Metered Connections**: While many households have metered water connections, some meters were non-functional, leading to billing discrepancies.
4. **Perception of Affordability**: Some households perceived water tariffs as high, but when presented with per-person tariffs, they found them more affordable. Providing explanations about operation and maintenance costs improves understanding and acceptance of tariffs.

5.6.2. HHs with Septic Tanks

An upward trend is noticeable in the installation of flush-toilets within settlements lacking centralized sewerage connections, particularly among middle- and high-income households situated in well-landscaped areas. In these households, it's common practice for grey water from kitchens and bathrooms to be discharged into drainage networks, which also serve as channels for rainwater drainage. The following key observations summarize this trend:

1. **Misconception about Construction Model:** Households reporting to have leach tanks for flush-toilets do not have proper septic tanks. Effluent output drains into the ground through an unprotected bottom. Awareness and regulation are needed for proper construction norms and standards.
2. **Emptying Septic Tanks:** Households rarely empty their 'septic' tanks. Even after 5-7 years, tanks remain half full, with liquid draining through non-watertight or sealed bottoms. Larger tanks are seldom emptied.
3. **HHs with Two-Type Toilets:** Some households keep older pit latrines alongside flush-toilets to limit usage and reduce costs of septic emptying and operation and maintenance.

4. **Impact on Environment:** Households are generally unaware of potential environmental impacts. Further study and regulation are necessary.
5. **Penalty Regulation:** Complaints arise regarding draining outputs from sewered septic tanks to centralized drainage networks. Odour complaints occur during warmer seasons.

5.6.3. Economy of Sanitation Facilities

1. **Cost-Cutting Measures in Construction:** Many households sacrifice proper construction to cut costs, leaving the bottom of containers unprotected and omitting isolation materials for walls. This leads to drainage not only from the bottom but also through the sides of the containment.
2. **Burying Pits:** Some households bury full pits, primarily on the outskirts of Dushanbe city, benefiting from dried buried pits for agricultural purposes.
3. **Costs of Removal:** Standard costs for emptying containment systems range between 400-700 TJS, with variations based on the size of the system. Group inquiries sometimes result in discounted rates, while delayed service provision is a common complaint.
4. **Disinfection Practices:** There's widespread misunderstanding regarding the necessity of disinfection. Most households claim to practice disinfection, but the use of disinfection chemicals is rare, with basic cleaning typically performed using water and sand.
5. **Faecal-Sludge Truck Operators:** Households express satisfaction with the services provided by faecal-sludge truck operators, who utilize protective gear during emptying operations. These operators are regulated by the managers of the Wastewater Treatment Plant.
6. **Operation and Maintenance Costs:** Estimating annual operation and maintenance costs is challenging. While most households maintain their sanitation facilities, proper construction costs are often not accounted for, impacting the frequency of pit emptying without adverse environmental effects.

5.6.4. Water Supply – Alternative Access, Quality Assurance, and Metering

At the beginning of the survey implementation, DVK supplied a list of settlements and areas with limited or regime Domestic Water Supply (DWS). However, enumerators discovered that this data was somewhat outdated. Nevertheless, some of these settlements were still included in the survey to assess the impact of regime DWS access on sanitation.

1. **Hand-Pumps or Boreholes:** Many households, particularly in southern parts, outskirts, or historically underserved areas, relied on hand-pumps. Concerns arose regarding water safety and contamination, with regulation falling under the Ministry of Health and Social Protection of the Population.
2. **Daily Consumption Norms (DCN):** Reported daily consumption norms were often inaccurately estimated, especially among households without metered connections, overlooking general water use. Improved awareness was needed to assess water needs accurately.
3. **Treatment of Drinking Water:** Many households consumed untreated water, unaware of associated health hazards. Boiling water before consumption was common, but uncertainty regarding water safety persisted due to a lack of access to qualified reports on water quality from DVK.

5.6.5. Solid Waste Management (SWM)

Settlements in the Dushanbe area typically fall under the city Administration's service coverage, with installed waste collection points within buildings and designated areas. Tariffs are fixed for all these services and are detailed in annex 10 of this document However, households often express dissatisfaction due to various issues, including:

- Designated waste collection points are often far away.
- Poor maintenance of waste collection points.
- Irregular emptying of bins, leading to overflow and larger dumping sites.

- Common improper disposal of waste in ditches, drainages, and nearby rivers.
- Complaints of bad smells during warmer seasons from unsanctioned waste dumps.

SWM Service Costs

Households pay for SWM services, but those further from the city centre complain about distant collection points, affecting sanitation. Additional costs are incurred by households in the outskirts for waste collection and delivery, with private individuals offering services at 4-5 TJS per sack of waste. On average, private households pay around 20 TJS per month per household.

Willingness to Pay More

Many households express a willingness to pay more for improved services if their complaints are addressed.

5.6.6. Exploring Public Awareness and Responses to Wastewater Treatment Plant Upgrades

Willingness to Pay for Improved WWTP Functionality

Households initially showed a reluctance to pay more for sewerage services, citing zero willingness to pay. However, when provided with details about the WWTP's potential environmental impact, attitudes shifted. Responses changed to at least 20 percent willingness to pay more, highlighting the importance of raising awareness about the plant's functionality and environmental impact.

Impact on Surrounding Settlements

Settlements near the WWTP, such as Gulbutta, Korvon, and Giprozem, report intensified bad odours, stench, and smell in recent years. This has led to decreased real estate values and unpleasant living conditions, with the stench detectable up to 3-5 kilometres southwest of the treatment plant.

Data Transparency Concerns

There is a lack of open and transparent data regarding the poor functioning of the Treatment Plant and its environmental impact. This hampers resource mobilization efforts and undermines cooperation from the population in recognizing the need for improved tariffs. Despite reports indicating deteriorating water quality, comprehensive and accessible data on the WWTP's performance are lacking.

5.6.7. Faecal Sludge Re-Use

During the CWIS Team Mission in Dushanbe, it was noted that faecal sludge undergoes some biological treatment for agricultural purposes. However, this practice lacks legal regulation and adherence to safety norms, being carried out without established treatment facilities. Despite its informal nature, stakeholders acknowledge its persistence due to the high costs of fertilizers and the absence of locally produced materials.

City Authorities' Reuse Initiative

Informally, city authorities systematically utilize treated faecal sludge (dried form) for city greening initiatives, contributing to its reuse.

Legal Regulation

The Committee for Environmental Protection confirmed the existence of certain legal acts regulating reuse during the Soviet era. However, due to complex treatment requirements, enforcement of these regulations is currently unfeasible.

Reuse by Farming Communities

Informal reports suggest that farming communities collect faecal sludge (dried form) after some biological treatment, albeit at a cost. However, this practice lacks formal regulation and reporting mechanisms.

Contents of Buried Pits

Households with larger land plots report using the contents of buried pit latrines for agricultural purposes without adequate knowledge of health hazards or proper treatment methods. Traditional reuse practices exist but require further assessment and educational awareness.

5.6.8. Satisfaction and Willingness to Pay

Most households find tariffs for drinking water supply, sewerage, and solid waste management affordable. However, there's a perception issue regarding cumulative tariffs per household versus per person per month tariffs. Well-constructed and maintained sanitation facilities indicate households have covered initial costs, with reported operation and maintenance costs remaining minimal.

Satisfaction

Households connected to drinking water supply and sewerage generally express satisfaction. Dissatisfaction arises from limitations such as regime drinking water supply, lack of sewerage connection, poor infrastructure, and faulty pumps. Issues with solid waste management services, unclean surroundings, poorly maintained drainage networks, and bad odours are highlighted by dissatisfied households.

Willingness to Pay

Most households exhibit discipline in tariff payment, though sometimes with delays. Payment frequencies vary from quarterly to semi-annually or annually.

Readiness to Share Investment Costs

Households not connected to centralized sewerage networks are willing to share costs of connection, as are those in areas with regime drinking water supply. They're prepared to share, in part or fully, the costs of any improvements.

Readiness to Pay Increased Tariffs

These same households are willing to pay improved tariffs for sewerage services once connected, accepting at least a 20 percent increase. Many households experiencing distant waste collection points express willingness to pay improved tariffs for solid waste management services. Sewered households may also agree to up to a 20 percent sewerage tariff increase if the Wastewater Treatment Plant functionality improves.

General Sanitation Conditions in Settlements

Private households in unplanned settlements express dissatisfaction with dirty surroundings, wasted drainage networks, and bad odours.

5.6.9. Population Growth and Compact Settlements

In some private household settlements, standard premise sizes have decreased over time due to population growth. Previously, households occupied between 0.10 to 0.06 hectares of land, but now typically less than 0.04 hectares. Emerging families within households lead to additional toilets being constructed within the original premises, resulting in compact settlements facing issues like bad odours from the increased number of toilets. Moreover, in landscaped households, there are instances of multiple 'septic' installations. The reduced premise size also leads to decreased distances between pit latrines and dwelling compounds.

5.6.10. Support to Persons with Disabilities (PWDs)

As reported by enumerators, surveyed households generally have limited knowledge about providing suitable conveniences in sanitation facilities for people with disabilities. Among the few households with disabled members, only basic accommodations such as seats installed in pit latrines, movable buckets, and some hand-bars are observed, often without much attention to spacing. Surveyed households appear unaware of the diversity of elements available for accessibility in general, partly because such options are not widely offered in the market. To promote accessibility for PWDs, there is a need for awareness-raising and marketing efforts not only in private household latrines but also in public places and amenities.

5.6.11. Key Findings of Sanitation Survey in Schools of Dushanbe

A sanitation survey was conducted in 16 schools of Dushanbe to determine overall situation of sanitation and allied services from the perspective of access, coverage, and inclusion. Below is summary of key findings from the survey.

1. Majority of facilities in schools were pit-latrines (53 percent) followed by flush toilets connected with pipes sewer systems (47 percent) and most of these pit latrines were not emptied when full (53 percent).
2. All schools had appropriate anal cleansing materials available in toilet facilities (100 percent).
3. Accessibility of toilets for smaller children was reported in 53 percent of schools, and none of the schools have accessible latrines for people living with disabilities specifically with limited mobility and visually impaired.
4. All schools had piped water supply. Most schools (53 percent) have piped water in the compound, while 47 percent have it inside the building.
5. Toilets in schools did not have adequate lighting as only Half (53 percent) of the schools had working lights in all toilets, while 40 percent had none, and 7 percent had it in some toilets only.
6. All Schools had handwashing facilities. However, only 3/5th of schools (60 percent) had both soap and water available for handwashing, and 2/5th of schools (40 percent) had water only.
7. There was lack of any proper mechanisms or designated way for disposal of menstrual waste management in all schools. Bins were generally unavailable for menstrual health management in girls' toilets. Most schools (60 percent) lacked the covered bins for menstrual hygiene products in girls' toilets, with 40 percent had uncovered bins.
8. In girls' toilets, the most common situation was to have water but no soap (47 percent) for menstrual hygiene management. Only 40 percent had both water and soap, and 13 percent had no water at all.

5.6.12. Key Findings of Sanitation Survey in Health Care Facilities of Dushanbe

A sanitation survey was conducted in 10 Health Care Facilities of Dushanbe to determine overall situation of sanitation and allied services from the perspective of access, coverage, and inclusion. Below is summary of key findings from the survey.

1. All healthcare facilities surveyed in Dushanbe have toilets connected to piped sewer systems.
2. All HCFs reportedly have toilets available for outpatients, ensuring basic sanitation access for visitors to the healthcare centres.
3. Only 50 percent of HCF have staff sharing toilets with outpatients which can be inconvenient and raise hygiene concerns for staff, especially during busy periods. Dedicated staff toilets could promote better hygiene practices and staff well-being.
4. No healthcare facilities in the survey had toilets equipped with menstrual hygiene facilities. This creates challenges for female staff and patients within the healthcare setting. Providing menstrual hygiene facilities, such as bins with disposal options and proper washing facilities is essential for dignity and hygiene management for women and girls.
5. This is a critical gap in accessibility. No facilities have toilets designed for people with disabilities or limited mobility. This exclusion prevents a segment of the population from accessing proper sanitation within healthcare environments. Accessible toilets with grab bars, wider stalls, and lower sinks are crucial for ensuring everyone has a dignified and safe experience using sanitation facilities.

6. Risk Assessment and Investment Opportunities

6.1.1. Context and Background

Dushanbe Population:

Total population of 1.2 million people, 200,000 households, 6 people per households.

Containment:

40 percent non-sewered (480,000 people, 80,000 households), with 33 percent 'septic tanks' (single chamber cesspools with permeable bottom), 1 percent using lined pit latrines, 6 percent unlined pit latrines. Refer to detailed calculation sheet for SFD (Annex 9).

Emptying:

15 vacuum trucks operated by private companies, free / open market (no delegated areas), all apparently deliver to the treatment plant (no indiscriminate dumping, except minimal disposal into nearby manholes). All of the existing 15 desludging trucks are the inherited legacy of state-owned company during the Soviet Period that used to provide formally services for the DVK and the City Administration. Following the break-up of the Soviet Union, all of those trucks were handed over to private individuals operating to date. All the trucks are generally identical of 1984-1990 years of release (country of origin: Soviet Union) and are very old. The vehicle containers (cistern) capacity ranges between 3.2-3.6m3 and are equipped with pipes of up to 10-15 meters. When extra length of pipes is needed, truckers inquire from each other. Each operator collects sludge 5 – 10 times per month. Estimated total 180 m^3. Charges depend on distance from household to treatment plant, accessibility of pit, etc., USD 20 – 50 per emptying.

Treatment:

All done at one treatment plant with low functionality. Sludge dumped in sludge drying beds with no monitoring and no specific area for safe dumping. Operators pay in cash a dumping fee on arrival of approximately USD 0.5 - 1. No records were seen / made available. Treatment facility receives 3 – 4 trucks each day, mainly or only in the summer months; in the winter there is no emptying being reported.

Reuse:

There are informal sales of biosolids (dried sludge) as fertiliser by DVK employees to mainly non-agricultural customers.

Water Supply:

54% of the water extracted by DVK comes from groundwater, expected to be deep water sources, the remaining from surface water sources. There are 4 main water supply points. JMP data and other studies indicates the contamination of water, but it is not clear whether this contamination is only from either from surface water or groundwater supplies. According to our survey, 16 percent of non-sewered households self-supply water. A water quality assessment of Dushanbe is highly desirable to ascertain the ladder of water safety in the city.

6.1.2. Risk Management with Investments

A risk-based approach is proposed to prioritise investments in sanitation, maximising the impact of the investments being made, with a focus on **public health**, the **environment, and inclusivity**. Based on the data collected, five key risks need to be considered with suggested investment cases to mitigate the risks identified.

Key Risk	1. **Faecal sludge not safely contained in unlined tanks potentially contaminating groundwater or disposed of into surface drains**
Probability	**High -** 40% of the population use on-site systems, 100 percent of which are considered unlined, and some connect the effluent to the surface drains.
Impact	**High -** 16% of non-sewered households self-supply water from shallow sources, with a local hydrogeology that does not sufficiently mitigate the impact of effluent from unlined septic tanks; and nearly all households reported boiling drinking water in HH survey
Investment Priority	**High -** Based on probability and impact
Context	Most households use an unlined septic tank, some connected to a surface drain. It is unclear what CapEx (capital expenditure) costs are, however, it costs approximately

	36 – 64 USD per load to empty a septic tank, which varies depending on the size of the system and the distance to the treatment site. Some households empty every 2 – 3 years, some have not emptied even more than five years. The design of most septic tanks is not according to regulations but are rather designed to minimise CapEx and OpEx (operational expenditure) costs. It is important to note that there is no evidence that more frequent or regular emptying (i.e., scheduled emptying) would be able to address the risk of groundwater contamination.
Investment Case	**Invest in Protecting Public Health:** To address the immediate risk to the health of communities accessing water through shallow wells likely contaminated by faecal waste from poorly designed septic tanks, it is proposed that investments be made in the water and hygiene markets. It is proposed that investments be made in: a) Raising awareness among households self-supplying water about the risks of unsafe water, the potential solutions, and how to access them, b) Assessing the market available to self-supply households to monitor and treat their water prior to consumption, and the potential options to address any market failures, and c) Assessing the market for safe bottled water services available to self-supply households, and the potential options to address any market failures. **Invest in Exploring New Business Models:** Households are seeking solutions that can offer better value compared to regulation septic tanks (both CapEx and OpEx), and that are 'easy' to manage and do not 'create problems' (e.g., don't clog, don't smell, etc.). Considering the non-sewered population, it is proposed that two business models be explored: a) Prefab septic tanks and soakaways for individual households, and b) Small sewage treatment systems for apartment buildings (e.g., DEWATS) – USD 50,000 – 100,000 for 25 households. Hence USD 2500 to 4000 USD or 25,000 to 40,000 TJS for each household. It is proposed that an investment be made in 'market shaping' to support key local businesses (e.g., existing builders / masons, engineering firms, emptying operators, etc.) in building demand for, and ensuring g improved supply of, better products. **Invest in Strengthening Enforcement of Regulations:** It is proposed that investments be made into the enabling environment by improving approaches to informing key stakeholders about, and enforcing regulations for the construction of new septic tanks or the self-supply of water. As part of this process, it is proposed that local authorities be supported and trained on implementing district-level sanitation safety plans to help identify key areas to prioritise the implementation of awareness raising and regulatory enforcement measures.
Key Risk	**2. Faecal sludge unsafely emptied from non-sewered systems**
Probability	**High –** 40% of the population use onsite systems, unsafe practices (e.g., no PPE, no disinfection) were consistently reported
Impact	**High** – Households only empty every 2 to 3 years, and some have not emptied for 5+ years
Investment Priority	**High -** Based on probability and impact
Context	For all intents and purposes, the vacuum truck operators' market does not appear to have significant 'failures. There are 15 vacuum truck operators who are reported to be consistently safely disposing of the waste at the treatment site (or in some exceptional cases into the sewers), paying their dumping fees, and charging affordable fees for nearly all households, with reports of special discounts and collective emptying to make fees more affordable to the poorest. There was no evidence of informal dumping or manual emptying. However, there have been consistent reports of low quality of

	service at household level, which pose a small risk to public health, and could reduce customer satisfaction and willingness to pay. Addressing this is important, however, it is also important to note that, based our assessment, these vacuum truck operators are not considered very profitable. As such, introducing stringent regulations to increase service quality could have negative consequences. For instance, operators could fall into informality to avoid regulations, or could increasing costs to recover the additional cost of the regulatory requirements, thus reducing the inclusivity of the service.
Investment Case	**Invest in Professionalising Vacuum Truck Operators:** To increase the quality of service while minimising the impact on what is in general a well-balanced market, investment is proposed into a 'light touch' approach to professionalising vacuum truck operators. This would include: 1. identifying and providing a package of one-time support to vacuum truck operators (e.g., upgrading equipment, training, etc.), 2. developing and providing training to operators on guidelines for professional emptying services (e.g., PPE use, disinfection, road safety, etc.), and 3. simply communicating these guidelines and minimum service quality through a public campaign targeting non-sewered customers to increase their expectations of the service.
Key Risk	**3. Wastewater unsafely disposed of into surface water bodies**
Probability	**High** – Wastewater from 17% of households not delivered to treatment sites
Impact	**Unknown-** It is unclear where the wastewater is disposed of
Investment Priority	**Unknown**
Investment Case	**Invest in Estimating and Recovering OpEx Costs:** An assessment of the cost of operating and maintaining DVK's sewerage network is beyond the scope of this assignment but should be analysed as part of the 5-year strategic action plan to support DVK on its journey towards full cost recovery. As part of that assessment, potential approaches to improving cost recovery should be considered, including but not limited to a mix of the following: a) increasing efficiencies (e.g., reduced NRW, using solar to reduce energy costs), b) improving revenue collection (e.g., updating water bills to ensure they reflect the number of users or metering connections), c) restructuring / changing tariffs, tariff structures, and / or subsidies, and d) considering the potential for innovative finance (e.g., carbon credits).
Key Risk	**4. Wastewater unsafely treated prior to disposal into surface water bodies**
Probability	**High:** Wastewater from 30% of households, or 50% of all sewerage, is not safely treated prior to disposal
Impact	**Medium:** it is assumed that the untreated wastewater is disposed of in surface water bodies that, if used, are treated prior to consumption
Investment Priority	**Medium:** Based on probability and impact
Investment Case	**Invest in Setting Achievable Rehabilitation Commitments:** An assessment of the investment required to upgrade DVK's sewerage infrastructure (both underground pipes and treatment plants) is beyond the scope of this assignment, as a systematic physical assessment of the infrastructure would have been necessary. However, as part of the 5-year strategic action plan, support should be provided to DVK to set and start the process of delivering on a commitment of an annual rehabilitation rate for its sewerage system. A new WWTP for Dushanbe City is being envisaged outside the city. In this regard, the Government of Tajikistan initiated a "Development of the Dushanbe Wastewater Master Plan and Integrated Urban Water Resilience Plan" with

	the support of World Bank in 2023 which shall likely to be completed by end of 2024. This will provide the basis of the overall CapEx and OpEx needed for WWTP and sewerage system as this will include to determine the network across the city. Though, corresponding investments for new WWTP are significantly high, but its construction is a high priority for the, the City Government and DVK evident from the initiating of Master Plan It is estimated that approximately 60 hectares of land shall be required for a new state-of the art WWTP (without lagoons) and its future extension to a capacity of 750,000 m^3/day. The capacity of the first stage will be 500,000 m^3/day.
Key Risk	**5. Sludge from wastewater and septage unsafely treated prior to reuse**
Probability	**High:** Faecal sludge delivered to the treatment site and wastewater sludge are only partially treated
Impact	**Low:** Reuse seems focused on urban greening initiatives (e.g., trees, flowers) and cotton farming; not many reports of reuse in agriculture for human consumption
Investment Priority	**Low:** based on probability and impact
Context	**Global Lessons:** Global examples of potentially profitable reuse models of faecal sludge have required: a) co-treatment with organic waste (e.g., food waste, agricultural waste, etc.) to generate by-products such as biofuel, black soldier fly larvae, or compost, and b) tipping fees to contribute to cost recovery. Without co-treatment, DVK could use the revenue it generates from the sales of dried biosolids (~USD 450 per 10 tonne truck) and the dumping fees (USD 0.5 – 1 per truck) to partially cover its costs, however, the sales of dried biosolids are unlikely to generate a profitable business unit.
Context	**Perceived Opportunity:** a) In the FGD, a tonne of biosolids is compared to a tonne of ammonium nitrate; this is not a like-for-like comparison. When comparing different fertilisers, the primary nutrients, also known as NPK (nitrogen, phosphorus, and potassium) should be compared. A tonne of biosolids has 1.6 kg of readily available nitrogen[15], whereas a tonne of ammonium nitrates has 335 kg of readily available nitrogen[16]. As such, 1 kg of nitrogen from dried biosolids costs USD 28, whereas 1 kg of nitrogen from ammonia nitrate costs USD 1.4, making the latter 20 times cheaper. Considering the level of readily available nitrogen within 1 tonne, the cost of transporting and applying ammonium nitrate would be much cheaper than that of biosolids. b) The cost of producing safe biosolids was not shared during the FGD. While the estimated annual revenue was between USD 36,000 and 45,000, when the cost of labour, materials, testing, and depreciation are considered, a significant enough profit for DVK to consider investing in this unit on a commercial basis, especially compared to other opportunities (e.g., tariff restructuring), is unlikely.
Investment Case	1. **Invest in Improving the Safety of Biosolids in Agriculture:** Regardless of the perceived opportunity, and as demand for the biosolids already exists, there is value in supporting the sector in generating guidance on producing and reusing safe biosolids. In collaboration with a local university or expert regional institution with testing capabilities and experience in the agricultural sector, it is proposed that a project be undertaken to develop this guidance. This guidance could eventually contribute to new or updating existing regulations (e.g., GOST) on their use.

[15] https://assuredbiosolids.co.uk/wp-content/uploads/2019/01/Biosolids-Agric-Good-Practice-Guidance-January-2019.pdf
[16] https://www.britannica.com/science/ammonium-nitrate

	2. **Invest in Exploring Alternative Reuse Options:** Investments should be made in exploring alternative reuse options, such as biofuel, compost, and / or black soldier flies. This would require a thorough market assessment of each of those by-products, as well as an assessment of the source, quantity, and quality of additional organic solids to be used in the co-treatment process.

6.1.3. Success Story of Investment Case – Bottled Water

Safe Bottled Water Services by Jibu in East Africa

Jibu is a water distribution chain operating in Africa, emphasizing social relationships and communication within its franchise model. With 8 countries served, 160 franchises launched, 490 million litres distributed, and 10,000 retail points, Jibu provides safe bottled water services in East Africa. Jibu uses a franchising model and an Area Master Franchising model.

In regions like East Africa, where access to safe water and sanitation services is a challenge, initiatives like Jibu play a vital role in providing reliable drinking water sources. The social micro franchise model adopted by Jibu trains local entrepreneurs to establish a network of franchise units, ensuring permanent access to safe drinking water. Jibu offers local franchises a chance to bring clean water to underserved communities. These franchise owners buy a license to operate in a specific area and get a ready-made storefront with everything they need to sell Jibu's high-quality drinking water. Jibu charges a set price per liter of water processed to cover costs and make a profit. To become a franchise owner, the investment is between $5,000 and $10,000. For those who want to bring Jibu to a whole new region, there's the Area Master Franchise option. This requires a bigger initial investment of $250,000 to $350,000, but the Area Master Franchise gets to develop the Jibu network throughout their chosen territory.

This approach not only addresses the immediate need for clean water but also contributes to solving broader social issues within underdeveloped communities. The case of Jibu in East Africa exemplifies the significance of sustainable and accessible water services. By focusing on underserved households, Jibu explores decentralized to provide sustainable safe drinking water sources.

7. Investment Needs for CWIS /Safely Managed Sanitaiton in Dushanbe

Dushanbe has an estimated population of more than one million. We used the UNICEF/ World Bank SDG costing global tool for the rehabilitating existing infrastructure and then used best estimates for the replacing old infrastructure. We added 10 operational cost and then annual maintenance cost. Finally, we added 15 percent of overall cost for governance, reforms and capacity development. An estimated USD 290 million required for rehabilitating existing infrastructure in Dushanbe. Whereas USD 1010 million replacing old infrastructure with new technologies and systems. Thus, Dushanbe need USD 300 million minimum and USD 1000 million maximum for centralised sewerage system of safely managed sanitation. Below is summary of the calculation.

Total Population of Dushanbe 2024	1,012,794
Growth Rate Percentage	2.62%
Percentage of population with Basic Sanitation	78
Percentage of population with Limited Sanitation	1
Percentage ppopulation with Safely Manged Sanitation- JMP Ladder	21
Population in need of safely managed services as per JMP estimates	800,107

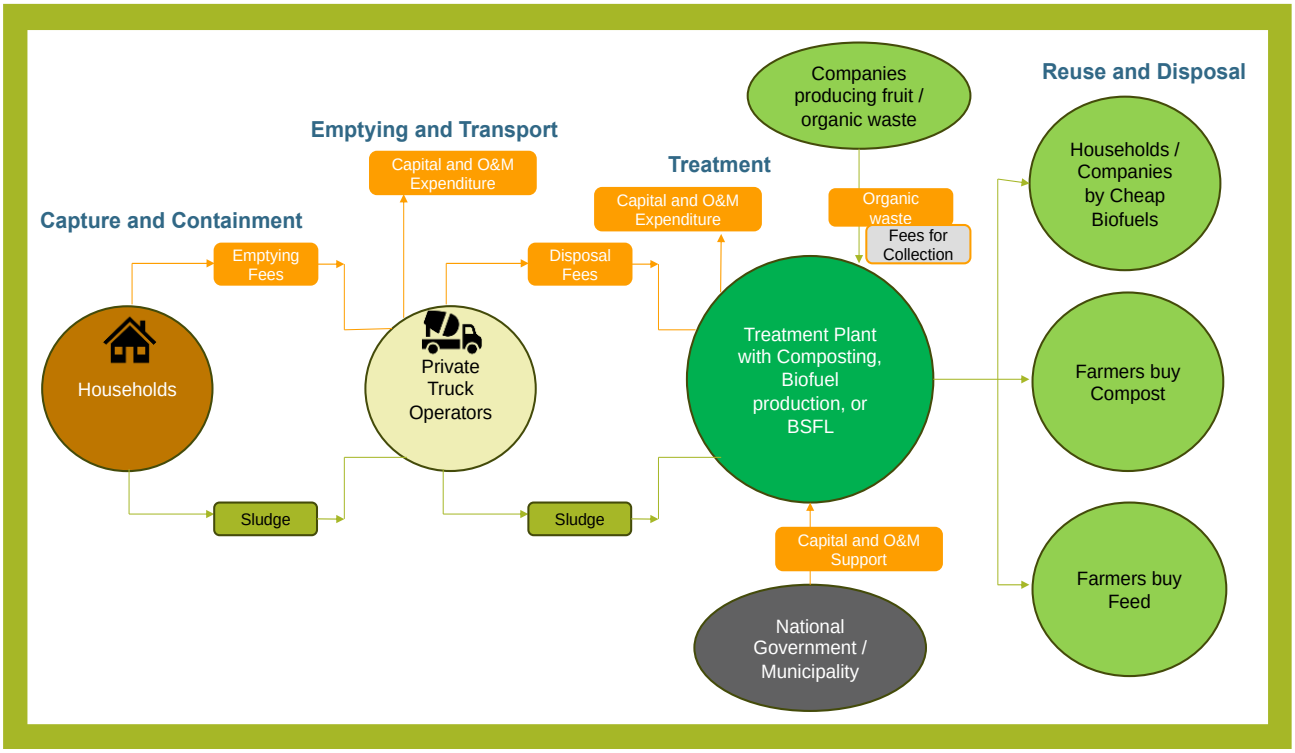
Key Interventions	**USD**		
	Only Rehabilitating	**50%- Rebabilitating and 50% new**	**All New Infrastructure**
Per capita capital costs (Capex) with sewerage as per SDG costing tool Adjusted with 5 pecent inflation from 2015 baseline	151	300	500
Per Capita Opeational cost for 10 years for sewerage	40	80	160
Per Capita Annual Maintenance Cosst for Sewerage	9	18	36
Total Capex Costs for Sewerage as per SDG Costing	120,816,196	240,032,178	360,848,374
Total Operational Costs for Sewerage as per SDG	32,004,290	64,008,581	96,012,871
Annual Total Maintenance Costs for Sewerage	7,200,965	14,401,931	21,602,896
Safely Managed with Sewerage	160,021,452	318,442,689	478,464,141
With 7.5 Percent coverage each year to reach 100 percent by 2040	252,401,633	502,224,106	878,261,250
Governance, Reforms and Capacity Building @ 15% of total cost	37860245	75333615.9	131739187.5
Required Investment for CWIS in Dushanabe	**290,261,878**	**577,557,722**	**1,010,000,438**
Per Annum Investment Need for CWIS	**19,350,792**	**38,503,848**	**67,333,363**
Per AnnumOperationg Revenues of DVK	1,000,000	1,000,000	1,000,000
Per Annum Operating Expenditures of DVK	660,000	660,000	660,000
Per Annum Net Investment avaialble from DVK p	340,000	340,000	340,000
Per Annum Sanitation Share from overall investment available from DVK	88,400	88,400	88,400
Annual Investment Needs excluding DVK share	**19,262,392**	**38,415,448**	**67,244,963**

In summary, Dushanbe needs nearly 20 million USD to 67 million USD per annum for 15 years to achieve CWIS. This underpins necessary institutional reforms to improve operational efficiency, enhanced bill collection, rationalised tariff structure, resource mobilisation from development partners and private sector including public private partnerships

8. Financial and Services Flow and Business Models in Dushanbe

8.1. Financial and Services Flow in Dushanbe

Below is suggested schematic diagram of financial and services flow of sanitation service chain in Dushanbe on which three proposed business models can be developed based on the resources and strategic guidance of national leadership.



8.2. Business Models

8.2.1. Success Story of Composting Business

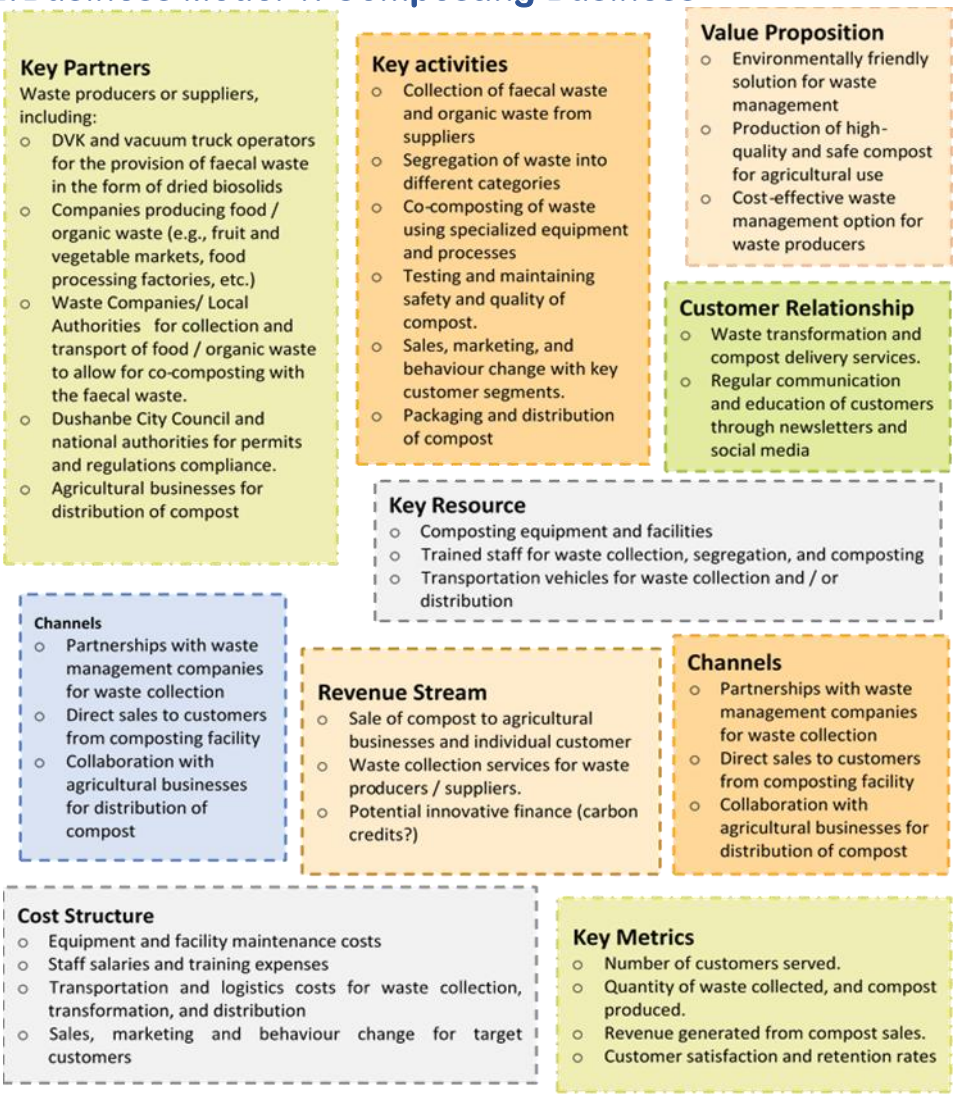
Example business model canvas for a **composting** business model that aims to provide a sustainable and environmentally friendly solution for waste management, while offering high-quality compost products to agricultural businesses and individual customers.

Composting Business by Practical Action Bangladesh

Practical Action, a non-governmental organization, has initiated a waste management project in Bangladesh, focusing on composting and faecal sludge management. Bangladesh faces significant waste management challenges, including the safe disposal of organic waste and faecal sludge. Practical Action established composting units in collaboration with local communities to convert organic waste into nutrient-rich compost. The organization launched a faecal sludge management program to safely treat and dispose of human waste. The illustration below shows Practical Action's business model for FSM and composting. The treated organic compost is used in agriculture.

Practical Action tackles sanitation challenges through their "Emptier to Entrepreneur" model. Informal waste workers join forces to form cooperatives, becoming formal businesses with improved practices and safety equipment. Municipalities lease innovative technology like "Vacutag" for safer waste collection. Treated waste is then transformed into valuable co-compost and biogas, creating a sustainable system with economic benefits for the workers and environmental advantages for the community.

8.2.2. Business Model 1: Composting Business



8.2.3. Success Story of Black Soldier Fly Larva in Kenya

Example business model canvas for a **black soldier fly** business model that aims to provide an environmentally sustainable supply of protein for animal feed and compost for farmers, while safely and sustainably managing Dushanbe's waste.

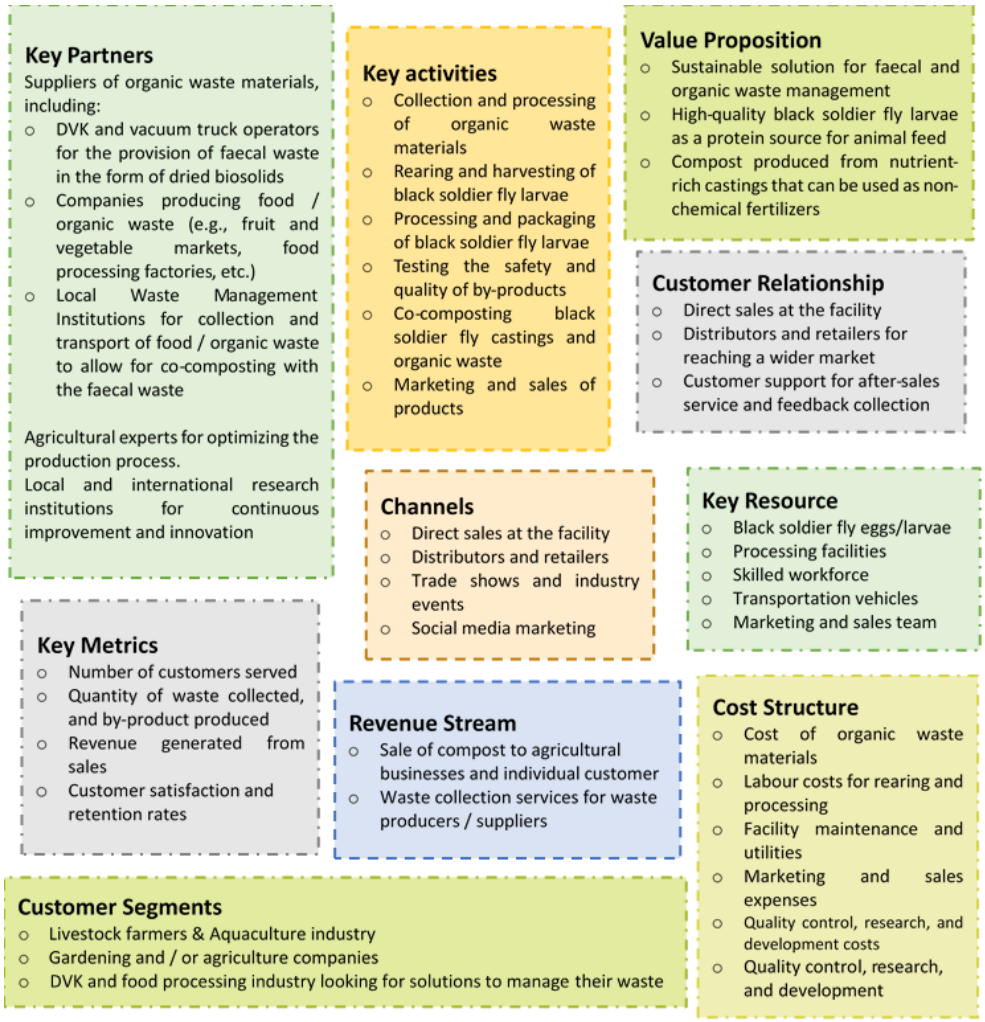
Case Study: Sanergy Black Soldier Fly Larva Business in Kenya

Kenya faces a significant challenge in FSM, particularly in densely populated informal settlements. Limited access to proper sanitation facilities creates health risks and environmental degradation. Sanergy, a social enterprise, identified a unique opportunity to address this issue. Sanergy's innovative approach leverages the power of black soldier fly larvae (BSFL) to convert organic waste into valuable resources. They install pay-per-use toilets in slums, capturing human waste that would otherwise pose sanitation and health risks. This waste is then transported to processing facilities where BSFL larvae play a starring role. These industrious creatures efficiently break down the organic matter.

The process yields a two-fold benefit. The breakdown by BSFL larvae results in nutrient-rich frass, a potent fertilizer for local farms. This organic fertilizer boosts crop yields. Furthermore, the BSFL larvae themselves become a valuable resource. They are a protein-rich source of animal feed, leading weight increase in livestock. Sanergy's model extends far beyond waste disposal. It creates a circular economy, transforming waste into resources that benefit both the environment and local communities. Improved sanitation in slums reduces health risks, while increased agricultural

productivity strengthens food security. The BSFL larvae business model fosters community resilience by creating economic opportunities and promoting sustainable practices.
Links; https://www.afrik21.africa/en/kenya-sanergy-gets-2-5-million-for-fertilizer-and-protein-from-waste/

8.2.4. Business Model 2: Black Soldier Fly Larva



8.2.5. Business Model 3: Biosolids Business

Example business model canvas for a **biosolids fuel** business model that aims to provide an environmentally sustainable supply of non-carbonised fuel for boilers, while safely and sustainably managing Dushanbe's waste.

1. Action Plans[17]

Thematic Area	Type of Sanitation	Strategic Actions		
		Short-Term (0-5 Years)	**Medium-Term (6-10 Years)**	**Long-Term (11-15 Years)**
Policy and Regulations	Sewered Sanitation	**Priority**: Medium Launch consumer education on wastewater treatment, emphasize health, environment, use multiple channels.	**Priority**: High Upgrade and expand treatment infrastructure, prioritize modern tech, collaborate for financing.	**Priority**: High Phased expansion plan for sewerage networks, prioritize high-density underserved areas, coordinate with stakeholders for accelerated implementation.
	Non-Sewered Sanitation	**Priority**: High Conduct survey on non-sewered sanitation in Dushanbe & urban areas, identify challenges, explore solutions.	**Priority**: Medium Develop urban-specific guidelines for non-sewered sanitation, focus on innovation and sustainability.	**Priority**: High Pilot innovative urban sanitation solutions in Dushanbe, focus on decentralization, eco-friendly tech, community involvement.
	Overall	**Priority**: High Review water and wastewater regulations, update standards, strengthen enforcement for safety and compliance. **Priority**: High Review current sanitation policies for climate alignment, identifying integration opportunities through a multi-stakeholder working group.	**Priority**: Medium Draft legislation for faecal sludge management (Collaborate, establish regulations for collection, treatment, and reuse). Establish interagency task force for water management to strengthen coordination. Priority: **Medium** Develop inclusive climate-resilient sanitation standards, engaging stakeholders for comprehensive coverage of sewered and non-sewered systems.	**Priority**: High Enhance interagency task force for integrated water management to foster collaboration and develop sustainable strategies for water and sanitation development. Priority: **High** Institutionalize climate-resilient regulations, enacting laws mandating adherence to standards and establishing robust monitoring and enforcement mechanisms for ongoing compliance and adaptation.
Institutional Arrangements	Sewered Sanitation	**Priority**: High Develop a comprehensive corporate strategy for	**Priority**: High	**Priority**: High Institute corporate governance reforms for DVK,

[17] The detailed versions of the Action Plans have been added as annex 12.

		Dushanbe Vodokanal, prioritizing sewered sanitation initiatives through collaboration with stakeholders.	Implement performance management for sewered sanitation within DVK.	focusing on improving sewered sanitation services through transparency, oversight, and accountability.
	Non-Sewered Sanitation	**Priority**: High Initiate community-led non-sewered sanitation pilots in underserved areas, collaborate for decentralised systems implementation.	**Priority**: High Improve coordination for non-sewered sanitation solutions, establish joint working groups for regulatory streamlining.	**Priority**: High Develop tailored regulatory framework for non-sewered sanitation, define standards, strengthen enforcement.
	Overall	**Priority**: Medium Formalize performance-based agreement between DVK and Dushanbe Municipality, define indicators, accountability for sanitation services. **Priority**: High Establish a multidisciplinary task force to assess immediate climate vulnerabilities in sanitation infrastructure and services, informing short-term adaptation strategies.	**Priority**: High Encourage collaboration for comprehensive sanitation solutions, facilitate knowledge exchange, foster partnerships for effective resource utilization. **Priority**: Medium Expand the task force's role to develop a comprehensive climate-resilient sanitation strategy, integrating climate considerations into all aspects of planning and implementation.	**Priority**: High Establish regulatory authority for sanitation, empower with oversight, enforcement, streamline coordination for accountability. **Priority**: High Institutionalize the climate-resilient sanitation task force within municipal governance, embedding climate objectives into strategic plans and strengthening institutional capacity for long-term sustainability.
Inclusion	Sewered Sanitation	**Priority**: High Assess affordability, provide subsidies for equitable sewer access, prioritize low-income households.	**Priority**: High Introduce gender-sensitive subsidies, prioritize female-led households and persons with disabilities, collaborate with relevant groups for tailored support.	**Priority**: High Institutionalize gender-inclusive sewer design standards, prioritize accessibility, safety, dignity for all users.
	Non-Sewered Sanitation	**Priority**: High Establish menstrual hygiene support programs, collaborate for distribution, raise awareness.	**Priority**: High Develop youth-led sanitation and menstrual hygiene education, empower as ambassadors for behaviour change.	**Priority**: High Expand community engagement for inclusive WASH, foster collaboration, address marginalized needs.
	Overall	**Priority**: High	**Priority**: High	**Priority**: High

		Retrofit public toilets for accessibility, prioritize vulnerable areas, ensure dignified access for all. **Priority**: High Launch targeted awareness campaigns for vulnerable communities on climate-resilient sanitation practices.	Promote women's leadership in WASH governance, provide training for advocacy and inclusion. **Priority**: Medium Expand campaigns to include capacity-building workshops, empowering communities to adapt to climate change impacts.	Advocate for disability-inclusive WASH policies, ensure universal accessibility and non-discrimination. **Priority**: High Institutionalize inclusive awareness programs within municipal plans, fostering sustained support and community-led monitoring for long-term resilience.
Capacity	Sewered Sanitation	**Priority**: High Implement data management system for DVK, focus on billing accuracy, track usage patterns for efficiency.	**Priority**: High Upgrade wastewater treatment plant infrastructure, repair biological treatment facilities, enhance efficiency.	**Priority**: Medium Implement energy-efficient measures, explore renewables like solar, biogas for WWTP sustainability.
	Non-Sewered Sanitation	**Priority**: High Collaborate for licensing oversight of desludging trucks, enhance enforcement for efficient sludge management.	**Priority**: High Develop regulations for faecal sludge management, provide training for compliance, ensure safety in agricultural reuse.	**Priority**: High Expand treatment facility capacity, invest in upgrades for efficiency, minimize pollution.
	Overall	**Priority**: High Strengthen partnerships for community participation, conduct awareness campaigns for proper sanitation practices. **Priority**: High Initiate targeted training for workers and officials on climate-resilient sanitation practices.	**Priority**: High Promote public-private collaboration, encourage private sector involvement through policies, capacity-building, investment. **Priority**: Medium Expand training to involve community members, empowering them to implement local solutions.	**Priority**: High Establish regulatory framework for sludge reuse, collaborate for guidelines aligned with best practices. **Priority**: High Institutionalize training within national frameworks, ensuring sustainability and ongoing adaptation to evolving needs.
Infrastructure	Sewered Sanitation	**Priority**: High Assess Dushanbe sewer network, prioritize repairs for aging infrastructure, improve reliability.	**Priority**: High Expand sewer network strategically, prioritize high-density areas for inclusive urban development.	**Priority**: High Implement smart sewer infrastructure for proactive monitoring, optimize maintenance, enhance performance.

	Non-Sewered Sanitation	**Priority**: High Promote desludging awareness, collaborate for access in underserved areas, improve sanitation and health.	**Priority**: High Invest in decentralised wastewater treatment, collaborate for pilot projects, scale successful models.	**Priority**: High Establish innovation hub for sanitation solutions, collaborate on technology, promote sustainability.
	Overall	**Priority**: High Upgrade water treatment facilities, modernize equipment, improve reliability to meet growing demand. **Priority**: High Assess existing infrastructure, prioritize upgrades to address vulnerabilities, and implement immediate measures for resilience against climate impacts.	**Priority**: High Modernize drainage network, upgrade systems, invest in technology for resilience, efficiency. **Priority**: Medium Develop resilient design standards for new projects, incorporating adaptive features to enhance infrastructure resilience to climate hazards.	**Priority**: High Promote integrated water management for sustainability, enhance efficiency, reuse treated wastewater. **Priority**: High Integrate climate resilience into long-term planning and investment, establish monitoring systems, and foster collaboration for sustainable infrastructure development.
Financing	Sewered Sanitation	**Priority**: High Implement comprehensive billing system, enhance accuracy, streamline collection for financial stability.	**Priority**: High Develop long-term tariff strategy, align with financial sustainability, consider cost recovery, affordability, investment needs.	**Priority**: High Strengthen internal controls in DVK, monitor financial activities, mitigate risks for sewerage services.
	Non-Sewered Sanitation	**Priority**: High Upgrade financial management for accurate reporting, efficiency, transparency in non-sewered sanitation services.	**Priority**: High Strengthen procurement for non-sewered sanitation, improve cost management, transparency, value for money.	**Priority**: High Invest in capacity building for DVK staff, enhance financial management, procurement, governance for non-sewered sanitation.
	Overall	**Priority**: High Establish corporate governance framework for DVK, ensure financial accountability, transparency, stakeholder engagement. **Priority**: High	**Priority**: High Diversify sanitation revenue sources, explore partnerships, grants, innovative financing for financial resilience. **Priority**: Medium	**Priority**: High Implement key performance indicators for sanitation services, monitor financial sustainability, operational efficiency, service quality, inform decision-making. **Priority**: High

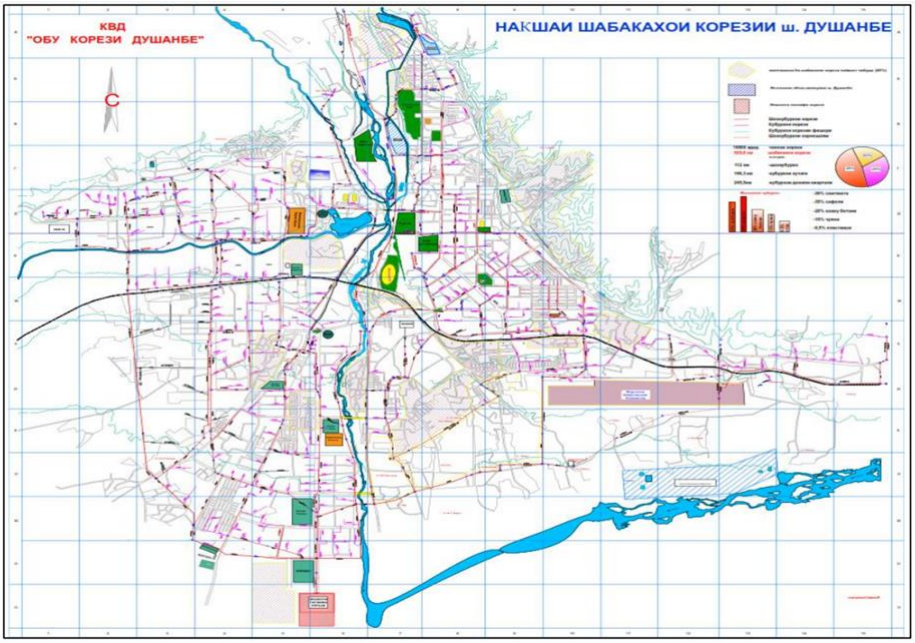
		Reallocate funding for immediate climate resilience measures in sanitation projects.	Design innovative financing mechanisms for climate-resilient sanitation projects.	Institutionalize climate-resilient sanitation financing within national and local financial frameworks.

1.1. Strategic Actions for Service Delivery and Infrastructure

Service Area	Type of Sanitation	Strategic Action		
		Short-Term (0-5 Years)	**Medium-Term (6-10 Years)**	**Long-Term (11-15 Years)**
Containment	Sewered Sanitation	Urgent sewer network assessment, prioritize high-risk areas, conduct maintenance and repairs, implement proactive measures for early issue detection.	Phased upgrade program for septic tanks and pit latrines, prioritize households with outdated systems, offer financial incentives for proper infrastructure investment.	Phased replacement of outdated septic tanks, ensure compliance, provide subsidies for household upgrades.
	Non-Sewered Sanitation	Public awareness campaign: emphasize construction standards for containment systems, impermeable walls, sealed bottoms to prevent contamination.	Regulate containment system construction, enforce design standards, offer assistance and incentives for upgrades.	Long-term phase-out strategy for unsafe containment systems, promote safer alternatives, offer subsidies for upgrades and best practices adoption.
Collection and Transport	Sewered Sanitation	Increase desludging frequency, prioritize larger systems, train operators, maintain equipment.	Expand deluding truck feet, improve response times, explore alternative disposal methods.	Invest in sewer network expansion, modernization with smart tech, decentralize treatment facilities for efficiency.
	Non-Sewered Sanitation	Establish regular desludging schedule, ensure equitable access, address service backlog.	Establish decentralized treatment, reduce reliance on central plant, promote community involvement.	Formalize regular emptying system, use vacuum trucks, coordinate stakeholders for efficiency.
Treatment	Sewered Sanitation	Emergency repairs at treatment plant, restore critical components like sand traps, settling tanks.	Invest in plant rehabilitation, upgrade aeration tanks, enhance treatment capacity for demand.	Upgrade plants, expand capacity, introduce advanced processes, monitor performance for compliance.
	Non-Sewered Sanitation	Assess sludge facilities, prioritize repairs, enhance	Pilot innovative sludge treatment tech, explore	Develop tailored decentralized treatments, like digesters, to treat sludge, reduce pollution,

		pathogen removal and efficiency.	cost-effective, sustainable alternatives.	integrate with community spaces.
Reuse	Sewered Sanitation	Assess wastewater reuse opportunities, identify sources and end-users, focus on urban agriculture, industry.	Launch pilot projects with stakeholders, monitor outcomes, inform broader reuse strategies.	Establish framework for safe wastewater reuse, develop guidelines, promote awareness.
	Non-Sewered Sanitation	Set regulatory guidelines for safe sludge handling, treatment, and reuse in agriculture.	Invest in decentralized sludge treatment, collaborate with locals for operations.	Promote innovative sludge reuse, foster entrepreneurship, establish partnerships for market exploration.
Overall		Survey sewer network connections, validate data accuracy, integrate database for improved service. Identify vulnerabilities and prioritize immediate upgrades to sanitation infrastructure to address climate risks.	• Develop regulations with clear standards and enforcement. • Invest in training for sanitation stakeholders. • Launch awareness campaign on sanitation benefits. • Develop resilient design standards for new projects, incorporating adaptive features to enhance infrastructure resilience.	• Integrate sanitation into urban policies, foster multi-sectoral coordination. • Innovate financing for sanitation, utilize public-private partnerships. • Integrate climate resilience into long-term planning and investment, establish monitoring systems, and foster collaboration for sustainable infrastructure development.

Annex 1a: Map of Existing Sewerage Network of Dushanbe



Annex 1b: Process and Methodology of Surveys

Survey implementation engaging households, schools and healthcare facilities were the important tools for primary data collection as part of the CWIS Assessment. The CWIS team embarked upon application of earlier agreed methodology for each of the surveys with pre-determined sets of questions and algorithms. For matter of expediency and convenience, survey questionnaires were designed and deployed on ***mWater*** (https://www.mwater.co/) software application, and the respective enumerators were able to download applications on mobile phones to launch the surveys.

The entire process from preparation, field testing and implementation phases included the following concrete steps, which were duly consulted with DVK and UNICEF throughout the duration:

Timeframe	Process Action
01 – 15 September 2023	Preparation of an Inception Report: including an **outline for survey** approach
19 September 2023	Presentation of an Inception Report: including an **outline for survey** approach
29 September 2023	Submission of a draft Inception Report: including an **outline for survey** approach
01 – 15 October 2023	Drafting of **detailed survey** methodology and designing questionnaires
16 – 20 October 2023	Consultations and discussions over preliminary drafts (detailed survey)
20 – 25 October 2023	**Translation** of detailed survey methodology and questionnaires (RUS, ENG)
25 – 30 October 2023	Uploading and **deployment** of draft surveys on mWater and field testing
30 October 2023	**Submission** of a draft **consolidated Methodology** (surveys and FGDs)

30 – 18 November 2024	**Comments and suggestions** to detailed Methodology received from UNICEF and DVK
18 – 24 November 2023	Preparation of **revised draft** Methodology and questionnaires (bilingual set)
24 – 30 November 2023	**Deployment of bilingual version** of surveys (RUS and ENG) on *mWater* hub
01 December 2023	**Approval of the Inception Report** from DVK and **'No Objection' from DVK** to proceed with implementation of surveys. Support letters provided seeking collaboration from target public schools and health-care facilities (HCFs)
02 – 05 December 2023	**Launch of bilingual surveys** via mWater (mobile software application)
25 November 2023 – 26 December 2023	**Mobilization of Enumerators**, induction sessions, and field testing
02 December 2023 – 04 January 2024	**Implementation of surveys**, coaching of enumerators, recording additional information.

Four enumerators were engaged in the implementation of the surveys. In prior, enumerators have undergone induction sessions about the assignments, setting up software applications on mobile phones, and going through each of the assigned questions. Logic and the algorithms were explained, and any potential deviancies addressed, scenarios of responses preliminarily addressed. Field testing of questionnaires by enumerators was an important part of the exercise, as it revealed a number of deficiencies in algorithms, formulation of questions (clarity), and feasibility (data generation). Following the field testing, the questionnaires were revised and updated again, without any critical changes to the content and objectives of the assignment. Updated questionnaires were shared with UNICEF and DVK in time before the actual launch of surveys.

Given the budget constraints, not all enumerators are engaged immediately. Considerable effort was extended to mobilize interested candidates, and time spared in training and coaching throughout the process. Enumerators were able to provide some additional data that were recorded separately. Such data will be summarized in consecutive parts of this report. Enumerators were supported by the National Coordinator (Mr. Shukhrat Igamberdyev) with guidance, navigation (mapping), targeting, coaching on questionnaire application, transportation, and competitive wages.

Prior to visits to related cluster areas, the Enumerators had the opportunity to contact community leaders (mahalla leads) and/or DVK's field officers (controllers). Upon kind request, DVK and UNICEF kindly provided the necessary lists of mahalla leads and DVK field officers with their names and contact information. For the most part contacting those was not necessary, and only in a few of the communities that was necessary. In addition, DVK provided contacts of responsible focal persons from – (a) Dushanbe city administration, (b) DVK management, (c) Sanitary and Epidemiological Surveillance Department of the MoHSPP, and (d) the Communications Department of DVK.

Implemented Sampling and Targeting

The CWIS Team applied the sampling method[18] that had been earlier agreed upon with the UNICEF CO Team and the DVK. The final sampling coverage is presented below in Table 2, with only marginal deviation from the original plan:

Table 2. Final survey sampling by category

#	Target Category	Total	Sewered or Non-Sewered*	Number	Total # of HHs in Dushanbe	Coverage** *(in %)*
1	Households (HHs)	402	Sewered	81 HHs	~200,000[19]	0.2%
			Non-sewered	321 HHs		
2	Primary and Secondary Schools	15	Sewered	8 schools	131 schools[20]	~16%
			Non-sewered	7 schools		
3	Health-Care Facilities (HCFs)	10	Sewered	10 HCFs	62 HCFs[21]	19.4%
			Non-sewered			

Notes: *Sewered – connected to centralized wastewater management/sewerage network, non-sewered – not connected to centralized wastewater management/sewerage network. **Figures are rounded.

The survey method was applied to three target categories: (1) Households (evenly scattered: urban, peri-urban, outskirts, new territories, hills, etc.), (2) Primary and Secondary Public Schools (urban and peri-urban), and (3) Health Care Facilities (urban, peri-urban, and republican). Each category included those with **sewered**[22] and those without sewered connection, i.e., **non-sewered**[23]. In total, **402 households**, **15 public schools**, and **10 health-care facilities** were surveyed.

For **households**, to the extent possible, **targeting** was guided with consideration of the following criteria:

- Targeting by the **service access level** (sewerage, drinking water supply):
  - Sewered HHs with 24-hour access to centralized DWS;
  - Sewered HHS with less than 24-hour access to centralized DWS;
  - Non-sewered HHs, but with 24-hour access to centralized DWS;
  - Non-sewered HHs, but with less than 24-hour access to centralized DWS;
  - Non-sewered HHs without access to centralized DWS (private boreholes, hand-pumps, transported water, household and/or street sandpipes);

- Targeting by the **type of dwelling** (private houses, apartment buildings):
  - Private households/houses (generally up to 4 story houses), including:

[18] Detailed Methodology submitted to UNICEF and DVK
[19] Based on DVK information, Tajikistan's population is roughly 1.2mln people, and according to DHS 2017, in average every HH is comprised of 6 individuals.
[20] Annex 2 of Detailed Methodology: List of Schools in Dushanbe city (state-budget-financed)
[21] Annex 3 of Detailed Methodology: List of Health-Care Facilities in Dushanbe city
[22] Connected to centralized wastewater/sewerage network/system
[23] Not connected to centralized wastewater/sewerage network/system

  - HHs with sanitation facility placed outside the dwelling, i.e. in the yard (generally dry pit latrine);
  - HHs with sanitation facility placed inside a dwelling (generally flushed toilet);
  - HHs with both sanitation facilities: inside and outside dwelling (dry pit latrine, flushed toilet with septic tanks)
- Households residing in apartment buildings with flushed toilets (WC), including:
  - Low-rise apartment buildings (2-4 storeys);
  - Mid-rise apartment buildings (5-9 storeys) – also includes newly constructed;
  - High-rise apartment buildings (10 and above storeys) – also includes newly constructed;
- Households residing in apartment buildings without toilets, i.e. outside apartment buildings;

- Targeting by the **type of sanitation facility**:
  - HHs with dry pit latrines only (non-sewered connection);
  - HHs with flushed toilets only (sewered connection);
  - HHs with both dry pit latrines and flushed toilets with septic tanks (non-sewered areas);
  - HHs with both dry pit latrines and flushed toilets without septic tanks (non-sewered areas);

- Targeting by **key clustered areas**:
  - HHs within the city of Dushanbe fully connected to sewerage networks;
  - HHs at the outskirts of Dushanbe but within city boundaries (partially sewered or non-sewered);
  - HHs from newly added territories to Dushanbe city (non-sewered).

Roughly similar approach to targeting was applied for **public schools** and **health-care facilities**. And for the purposes of sampling representativeness, the targeting was implemented evenly (*when justified*) across key administrative and clustered areas in Dushanbe.

Final Distribution of Respondents: by clustered areas

CWIS Team implemented the following distribution of the number of target respondents across the four districts, both for sewered and non-sewered categories. The given primary distribution is in some deviation for schools and HCFs as originally assumed category of 'non-sewered' (old information) is now categorized as 'sewered' noted during the visits. For non-sewered, areas, the DVK provided two sets of information which had been taken into account: (a) Key areas with partial or regime connections to sewerage (regime for DWS), and (b) Key areas with no sewerage connections. Both sets of information were included in earlier provided detailed Methodology.

Table 3. Distribution of survey respondents across districts of Dushanbe

#	District	Households	Schools	HCFs
1	**Ismoil Somoni**	**74**	**3**	**3**
	sewered	*15*	*1*	*3*
	non-sewered	*59*	*2*	
2	**Sino**	**119**	**5**	**3**
	sewered	*26*	*3*	*3*
	non-sewered	*93*	*2*	
3	**Firdavsi**	**121**	**4**	**2**

	sewered	*24*	*2*	*2*
	non-sewered	*97*	*2*	
4	**Shohmansur**	**88**	**3**	**2**
	sewered	*16*	*2*	*2*
	non-sewered	*72*	*1*	
	Total	**402**	**15**	**10**

The secondary distribution was then suggested to guide the enumerators for even distribution of target respondents (*HHs, schools and HCFs*) further across micro-districts, settlements/mahallas within respective 4 main districts. The target HHs, schools and HCFs, are distributed geographically in relative proportion of respective populations and degree of access to service levels. Even geographic distribution is done not only across sewered and non-sewered areas, but also across areas that are – (a) within DVK service areas (within the city), (b) outside DVK service areas (within the city), and (c) Newly territories of Dushanbe city (outside DVK service area). The CWIS Team understands that such distribution ensures better representativeness of the proposed sampling for all key interviews (HHs, schools and HCFs).

Target Households Surveyed

For target households, clustered areas were suggested with a group of micro-districts with relative proximity to each other within each of the 4 main districts of Dushanbe. The **Annexes 1 and 2** provide secondary level (more detailed) distribution for both **Sewered** and **Non-Sewered** households (HHs) by clustered areas respectively. The selected HHs are located within or outside SUE DVK's principal service areas, and specifically, the key designated characteristics of target HHs include the following:

Table 4. Key characteristics of surveyed HHs

For SEWERED HHs:	For NON-SEWERED HHs
▪ Private HHs with yards/plots; ▪ Apartments: low-, mid-, and high-rise buildings; ▪ HHs with full-time access to DWS; ▪ HHs with regime access to DWS; ▪ HHs in organized micro-districts; ▪ HHs in settlements and/or mahallas.	▪ Private HHs with yards/plots; ▪ HHs within DVK's principal service area; ▪ HHs outside DVK's principal service area; ▪ HHs within New Areas, i.e. within Dushanbe's expanded territories; ▪ HHs with regime access to DWS; ▪ HHs without centralized access to DWS.

In summary, for "**Sewered**" category HHs, the Team covered 16 clustered areas, including 56 micro districts, where enumerators interviewed 81 HHs in total. The final distribution of sewered HHs by districts is noted follows:

- Ismoil Somoni district: 4 clustered areas, including 10 micro districts (Interviewed: 15 HHs);
- Sino district: 6 clustered areas, including 23 micro districts (Interviewed: 26HHs);
- Shohmansur district: 3 clustered areas, including 6 micro districts (Interviewed: 16 HHs);
- Firdavsi district: 3 clustered areas, including 17 micro districts (Interviewed: 24 HHs).

Whereas, for "**Non-Sewered**" category HHs, the Team covered 18 clustered areas, including 68 micro districts, where enumerators interviewed 321 HHs in total. The final distribution of non-sewered HHs by districts is noted as follows:

- Ismoil Somoni district: 4 clustered areas, including 11 micro districts (Interviewed: 59 HHs);
- Sino district: 5 clustered areas, including 19 micro districts (Interviewed: 93 HHs);
- Shohmansur district: 5 clustered areas, including 22 micro districts (Interviewed: 72 HHs);
- Firdavsi district: 4 clustered areas, including 16 micro districts (Interviewed: 97 HHs).

In relation to recently added territories to Dushanbe, the survey also covered **35 new settlements** (out of 59 in total) that are now considered part of Dushanbe city. Those are marked as 'New Territories' in the category section of the distribution tables for non-sewered households.

Target Public Schools Surveyed

Table **5** below provides the final distribution of state-funded **public schools** by districts across sewered and non-sewered cluster areas. Subsequently, **Table 6** then provides the complete list of public schools visited and surveyed in Dushanbe city, with indication of the respective categories. There is no deviation from the original targeting plan in number of schools surveyed, but some deviation there is in distribution between sewered and non-sewered schools.

Table 5. Number of target schools – Distribution by districts, Sewered/Non-Sewered

#	District	Total # of schools	# of target schools	Service	
				Sewered	*Non-Sewered*
1	Ismoil Somoni	20	3	1	2
2	Sino	50	5	3	2
3	Shohmansur	28	3	2	1
4	Firdavsi	33	4	2	2
	Total	**131**	**15**	**8**	**7**

The table below provides the list of all surveyed schools, with indication of districts/mahallas, street name, and category. The category of attention were as follows: (a) sewered or non-sewered, (b) whether within or outside DVK service area, and (c) whether located within a new area in Dushanbe (expanded territories).

Table 6. List of target schools to be surveyed (includes optional)

#	SCHOOL REF	MAHALLA*	STREET NAME	CATEGORY**
A	**Ismoil Somoni district, Dushanbe city**			
1	МТМУ №11	Sariosiyo	56 Sharq Str	**Sewered**, within DVK service area, nearby non-sewered settlements
2	МТМУ №13	Khujambioi Bolo	Ahror Mukhtor Str	**Non-sewered**, within DVK service area, Edge of the city

3	МТМУ №61	'Nagorniy'	396 K. Rahimov Str	Non-sewered, outside DVK service area, Edge of the city (hillside)
B	**Sino district, Dushanbe city**			
4	МТМУ№ 86	Zarafshon	N. Makhsum Ave	**Sewered**, within DVK service area
5	МТМУ№ 90	12 mcd	29 Saadi Sherozi Str	**Sewered**, within DVK service area
6	МТМУ№ 56	Dusti	67A Jomi Str	**Sewered**, within DVK service area
7	МТМУ№ 46	Hayoti Nav	128/1 Hayoti Nav Str	**Non-sewered**, within DVK service area
8	МТУА№ 114	Chortuti Poyon	Chortuti Poyon Str	**Non-sewered**, New Area, outside DVK service area
C	**Shohmansur district, Dushanbe city**			
9	МТМУ № 35	D. Narodov	62 A. Adkhamov Str	**Sewered**, within DVK service area
10	МТМУ № 63	Karateginskaya	Karateginskaya Str	**Sewered**, near DVK service area, edge of the city (hillside)
11	МТМУ № 107	Guliston (Mavlono)	Mavlono Str	**Non-sewered**, New Area, within DVK service area, New area
D	**Firdavsi district, Dushanbe city**			
12	МТМУ №28	24 mcd	33 N. Karabaev Str	**Sewered**, within DVK service area, near non-sewered settlement
13	МТМУ №119	Choryakoron	Choryakoron	**Sewered**, near DVK service area, New area
14	МТМУ №122	Chimteppa	Chimteppa Str	**Non-sewered**, outside DVK service area, New area
15	МТМУ №75	Kushteppa	203 Guzarbogh Str	**Non-sewered**, within DVK service area, New Area

**Mahalla, micro district, village, settlement (either of those, most commonly referred to);*
***Sewered, non-sewered; DVK service area, Outside DVK service area, New areas.*

Target Healthcare Facilities Surveyed

The **Table 7** below provides the final distribution of **healthcare facilities** across districts. The subsequent **Table 8** then provides the complete list of **HCFs** visited and surveyed in Dushanbe city. As confirmed, all interviewed HCFs in Dushanbe are connected to sewerage network. However, the choice of target HCFs are guided by their relative proximity to non-sewered settlements or within the non-sewered cluster areas within Dushanbe city (DVK network). In other words, target HCFs, surveyed, are generally **within DVK service area**, but either (a) **nearby non-sewered settlements**, or (b) **within non-sewered cluster areas**.

Table 7. Number of HCFs – Distribution by districts, Sewered/Non-Sewered

#	District	Total # of HCFs	# of target HCFs	Service	
				Sewered Cluster	*Non-Sewered Cluster*
1	Ismoil Somoni	14	3	0	3

2	Sino	19	3	0	3
3	Shohmansur	14	2	0	2
4	Firdavsi	13	2	0	2
	Total	**62**	**10**	**0**	**10**

The table below provides the list of all surveyed HCFs, with indication of districts, micro-districts and mahallas, as well as with indication of key characteristics in relation to sewerage connection.

Table 8. List of target Healthcare Facilities (HCFs) to be surveyed (both selected and optional)

#	HCF Title	Address	HCF Type	Designation
A	**Ismoil Somoni district, Dushanbe**			
1	SI “City Health Centre” №8 (**SEWERED**, within DVK service area, within city sewerage network, but nearby non-sewered settlements)	Micro district **CHASHMASOR**, 186 Rakai Ave.	Polyclinic	Citywide
2	SI "Republican Clinical Centre for Mental Illness" (**SEWERED**: within DVK service area, within city sewerage network, but nearby non-sewered settlements)	Micro district **SARIOSIYO**, M. Tursunzoda Str	Clinic	Republican
3	SI “City Health Centre” №6 (**SEWERED**: within DVK service area, within city sewerage network, but nearby non-sewered settlements)	Micro district **SARIOSIYO**, 63 A. Lohuti Str.	Polyclinic	Citywide
B	**Sino district, Dushanbe**			
4	SI "Republican Scientific Oncology Centre" (**SEWERED**: within DVK service area, within city sewerage network, but nearby non-sewered settlements)	Micro district **HAYOTI NAV**, 59 Sino Street	Clinic	Republican
5	SI “City Health Centre” №7 (**SEWERED**: within DVK service area, but within non-sewered cluster)	Micro district **RAVSHANGARON**, 3 Abaya Street	Polyclinic	Citywide
6	SI "Urban Centre for Endocrine Diseases" (**SEWERED**: within DVK service area, but within non-sewered cluster)	Micro district RAVSHANGARON, 3 Abaya Street	Polyclinic	Citywide
C	**Shohmansur district, Dushanbe**			
7	SI “City Health Centre” №3 (**SEWERED**: within DVK service area, within city sewerage network, but nearby non-sewered settlements)	Micro district **SHOHMANSUR-2**, 80 S. Aini Street	Polyclinic	Citywide
8	SI "City Emergency Medical Centre"	Micro district **ROHI OHANCHIYON**,	Clinic	Citywide

	(**SEWERED**: within DVK service area, within city sewerage network, but nearby non-sewered settlements)	46 Aini Street		
D	**Firdavsi district, Dushanbe**			
9	SI "City Health Centre" №11 (**SEWERED**: within DVK service area, but within non-sewered cluster, New Area)	Micro district **HOSILOT/YUJNIY**, 14 Fuchik Street	Polyclinic	Citywide
10	SI "Rep. Clinical Centre for Skin and Sexually Transmitted Diseases" (**SEWERED**: within DVK service area, but within non-sewered cluster, New area)	Micro district **HOSILOT/YUJNIY**, 14 Fuchik Street	Clinic	Citywide
	Total HCFs interviewed in Dushanbe city:	**10 HCFs**		

Deviations in Targeting and Distribution

Generally, there had been uncritical deviations in targeting and distribution, the representativeness is followed in terms of clustered areas. The major deviations had been on the number of assumed 'non-sewered' HHs and schools that appeared to have sewered connection at the time of survey. Apparently, the information provided by DVK is outdated to some degree. It is also possible that enumerators were not able to navigate through certain clusters where border-lines of sewered and non-sewered settlements were drawn. For easy reference to names and relative proximities, the enumerators were recommended to benefit from some of the following online mapping tools (but not limited to):

- https://u-karty.ru/tajikistan/dushanbe.html
- https://google.com/maps
- https://yandex.ru/maps/10318/dushanbe/

The distribution of target KIIs was originally prepared based on the following key information provided by the SUE Dushanbevodokanal (SUE DVK):

- DVK Map – "Wastewater Network of Dushanbe city", M1:5000 (*with indication of service areas, sewerage collectors, wastewater collection network, wastewater collection network not operated by, and areas not covering by urban sewerage network*).
- DVK information – "Settlements/mahallas/micro-districts (Private HHs) with regime access to DWS" (*with indication of the number of hours with access to DWS, status of connectivity to centralized sewerage network, possibility of connection to sewerage network, those under rehabilitation by development partner projects, and those categorized as 'through faecal sludge pump'*).

Annex 1c: Details of Mission

Visiting Mission Members:

Mr. Niaz Ullah Khan, Team Lead and Urban WASH Expert (AWF Pvt Ltd)
Ms. Manahal Fatima, Project Manager (AWF Pvt Ltd)

Mr. Khuzwayo Tembo, CWIS/Urban WASH Specialist and Engineer (AGUA Consult)

Local Mission Support Team:

Mr. Shukhrat Igamberdyev, National WASH and Research Coordinator (AWF Pvt Ltd)
Ms. Nazokat Isaeva, Gender and Social Inclusion Expert (AWF Pvt Ltd)
Mr. Bakhtiyor Umarov, WASH Engineer (AWF Pvt Ltd)
Mr. Dilshod Ibrohimov, WASH Consultant, UNICEF

TIME	DESCRIPTION	STATUS / VENUE
Wednesday, September 27, 2023		
Friday, September 29, 2023		
09:30 – 10:30	**Mr. Orkhan Aliev, International Consultant, UNICEF:** **Private sector mapping for WASH in Tajikistan, private businesses involved in sanitation, wastewater management, etc.* Participants: Mr. Ammar Orakzai, Chief, Water, Sanitation and Hygiene (WASH) Mr. Niaz Ullah Khan, International Consultant, UNICEF Mr. Shukhrat Igamberdyev, National Consultant, UNICEF	REGUS Co-Working Zoom Platform (online)
11:00 – 12:00	**Ministry of Health and Social Protection of the Population of the RT:** Mr. Navruz Djafarov, Head of Department for SES and Emergency Medical Aid, MoHSPP. Participants: Mr. Ammar Orakzai, Chief, Water, Sanitation and Hygiene (WASH) Mr. Niaz Ullah Khan, International Consultant, UNICEF Mr. Shukhrat Igamberdyev, National Consultant, UNICEF	MoHSPP, Dushanbe
Monday, October 2, 2023		
11:00 – 12:30	**Briefing with UNICEF Team:** mission program, workshop agenda, strategy. Mr. Ammar Orakzai, Chief, Water, Sanitation and Hygiene (WASH) Mr. Ruslan Ziganshin, National Program Officer (WASH) Mr. Rauf Yuldashev, WASH Officer/Engineer Mr. Anvar Khasanov, WASH Consultant/Engineer Mr. Sheroz Bakiev, WASH Consultant/Engineer Ms. Mumina Abdulvohidzoda, WASH Officer/Climate Use, Youth Engagement, Behavior Change (UN Volunteer) Mission Team Members: Mr. Niaz Ullah Khan, Team Lead and Urban WASH Expert (AWF Pvt Ltd) Ms. Manahal Fatima, Project Manager (AWF Pvt Ltd) Mr. Shukhrat Igamberdyev, National Focal Point (AWF Pvt Ltd) Ms. Nazokat Isaeva, Gender and Social Inclusion Expert (AWF Pvt Ltd) Mr. Bakhtiyor Umarov, WASH Engineer (AWF Pvt Ltd)	In-person, UNICEF Country Office, Dushanbe

	Accompanied by: Mr. Dilshod Ibrohimov, UNICEF WASH Consultant Contacts: dibrohimov@unicef.org, +992 118 085 005	
13:30 – 15:00	**CWIS Team Meeting:** Discussion of the program, list of stakeholders/KIIs, review of HH survey methodology, FGDs, data collection methods Mission Team Members: Mr. Niaz Ullah Khan, Team Lead and Urban WASH Expert (AWF Pvt Ltd) Ms. Manahal Fatima, Project Manager (AWF Pvt Ltd) Mr. Shukhrat Igamberdyev, National Focal Point (AWF Pvt Ltd) Ms. Nazokat Isaeva, Gender and Social Inclusion Expert (AWF Pvt Ltd) Mr. Bakhtiyor Umarov, WASH Engineer (AWF Pvt Ltd) Accompanied by: Mr. Dilshod Ibrohimov, UNICEF WASH Consultant Contacts: dibrohimov@unicef.org, +992 118 085 005	In-person, UNICEF Country Office, Dushanbe
15:30 – 17:30	**State Unitary Enterprise "Dushanbevodokanal" (SUE DVK):** Mr. Saymurod Kalandarov, Deputy General Director, Chief Engineer, SUE DVK Mr. Sunnatullo Safarov, Head of Production and Technical Department, SUE DVK Mr. Jamshed Murodov, Deputy Head of Production and Technical Department, SUE DVK **General overview on sanitation, wastewater management, discussion of site visit planned during the first half of the next day.* Mission Team Members: Mr. Niaz Ullah Khan, Team Lead and Urban WASH Expert (AWF Pvt Ltd) Ms. Manahal Fatima, Project Manager (AWF Pvt Ltd) Mr. Shukhrat Igamberdyev, National Focal Point (AWF Pvt Ltd) Ms. Nazokat Isaeva, Gender and Social Inclusion Expert (AWF Pvt Ltd) Mr. Bakhtiyor Umarov, WASH Engineer (AWF Pvt Ltd) Accompanied by: Mr. Dilshod Ibrohimov, UNICEF WASH Consultant Contacts: dibrohimov@unicef.org, +992 118 085 005	DVK Office in Dushanbe
Tuesday, October 3, 2023		
09:00 – 10:30	**Meeting with Sanitary and Epidemiological Surveillance Services in Dushanbe:** Mr. Pirnazar Shodmonov, SES Specialist Contacts: +992 918 825 443, spirnazar@mail.ru Mission Team Members: Mr. Niaz Ullah Khan, Team Lead and Urban WASH Expert (AWF Pvt Ltd) Ms. Manahal Fatima, Project Manager (AWF Pvt Ltd) Mr. Shukhrat Igamberdyev, National Focal Point (AWF Pvt Ltd) Ms. Nazokat Isaeva, Gender and Social Inclusion Expert (AWF Pvt Ltd)	SES, Dushanbe (near DVK)

	Mr. Bakhtiyor Umarov, WASH Engineer (AWF Pvt Ltd) Accompanied by: Mr. Dilshod Ibrohimov, UNICEF WASH Consultant Contacts: dibrohimov@unicef.org, +992 118 085 005	
10:15 – 10:45	**Customer Relations Department of SUE DVK:** Ms. Zukhro Safarzoda / +992 93 602 8808 Mission Team Member: Ms. Nazokat Isaeva, Gender and Social Inclusion Expert (AWF Pvt Ltd)	DVK, Dushanbe
11:00 – 12:30	**Consumers Union of Tajikistan (Public Organization):** Mr. Ilkhom Abidov, Executive Director Mr. Faridun Shoimbekov, Deputy Executive Director Contacts: +992 93 577 80 10, www.istemol.tj, consumers.tj@gmail.com Mission Team Members: Mr. Niaz Ullah Khan, Team Lead and Urban WASH Expert (AWF Pvt Ltd) Ms. Manahal Fatima, Project Manager (AWF Pvt Ltd) Mr. Shukhrat Igamberdyev, National Focal Point (AWF Pvt Ltd) Mr. Bakhtiyor Umarov, WASH Engineer (AWF Pvt Ltd) Accompanied by: Mr. Dilshod Ibrohimov, UNICEF WASH Consultant Contacts: dibrohimov@unicef.org, +992 118 085 005	CUT, Dushanbe
14:30 – 15:30	**Republican Healthy Life-Style Centre (RHLSC)** of the Ministry of Health and Social Protection of the Population of the RT: Ms. Parvina Mukhtarova, Director of RHLSC Mr. Rustam Muhammadzoda, Deputy Director of RHLSC Ms. Mavluda Zokirova, Head of Department for Educational and Awareness Programs Mission Team Members: Mr. Niaz Ullah Khan, Team Lead and Urban WASH Expert (AWF Pvt Ltd) Ms. Manahal Fatima, Project Manager (AWF Pvt Ltd) Mr. Shukhrat Igamberdyev, National Focal Point (AWF Pvt Ltd) Mr. Bakhtiyor Umarov, WASH Engineer (AWF Pvt Ltd) Accompanied by: Mr. Dilshod Ibrohimov, UNICEF WASH Consultant Contacts: dibrohimov@unicef.org, +992 118 085 005	RHLSC, Dushanbe
16:00 – 17:15	**Project Implementation Group (PIG)** for AF-DWSSP and DWSSP Projects funded by the **Asian Development Bank** (ADB) + **Department for Projects Implementation (DPI) under the SUE DVK** for DWSS Project funded by the **World Bank** (WB) Mr. Ravshan Akhmedov, Director of PIG for ADB-funded DWSSP / Contacts: +992 900 18 7777	SUE DVK (4th floor), Dushanbe

	Mr. Firuz Davlatov, Institutional Development Specialist, PIG for ADB-funded DWSSP Mr. Rajabali Khudoydodov, GIS Specialist, WB-funded DWSSP, DPI under the DVK Mr. Fayzali Dovudov, Chief Engineer, WB-funded DWSSP, Department for Projects Implementation under the SUE DVK <u>Mission Team Members:</u> Mr. Niaz Ullah Khan, Team Lead and Urban WASH Expert (AWF Pvt Ltd) Ms. Manahal Fatima, Project Manager (AWF Pvt Ltd) Mr. Shukhrat Igamberdyev, National Focal Point (AWF Pvt Ltd) Mr. Bakhtiyor Umarov, WASH Engineer (AWF Pvt Ltd) Accompanied by: Mr. Dilshod Ibrohimov, UNICEF WASH Consultant Contacts: dibrohimov@unicef.org, +992 118 085 005	
17:30 – 18:30	**Tajik Technical University named after Osimi:** Mr. Iftikhor Kalandarbekov, Docent of Department for Hydrotechnical Facilities and Protection of Water Resources / Contacts: +992 88 779 0004 Mr. Amirsho Murodov, Docent of Department for Hydrotechnical Facilities and Protection of Water Resources **capacity building, research & development, methodological approaches in sanitation* <u>Mission Team Members:</u> Mr. Niaz Ullah Khan, Team Lead and Urban WASH Expert (AWF Pvt Ltd) Mr. Shukhrat Igamberdyev, National Focal Point (AWF Pvt Ltd) Mr. Bakhtiyor Umarov, WASH Engineer (AWF Pvt Ltd)	REGUS, Dushanbe
Wednesday, October 4, 2023		
09:00 - 10:30	**State Unitary Enterprise "Khojagii Manziliyu Kommunali" (SUE KMK):** Mr. Rajabali Rasulzoda, Deputy General Director, SUE KMK Mr. Musokhon Mirzoev, Head of Department for drinking water supply, wastewater management and energy, SUE KMK Mr. Ahliddin Khojaev, Head of Department for Housing and Communal Services Management, SUE KMK Mr. Muhammadjon Islomov, Chief Specialist, Department for International Economic Relations and Planning, SUE KMK Mr. Mustafoi Rahimzoda, Head of Department for analysis, control and supervision, SUE KMK <u>Participating Mission Members:</u> Mr. Niaz Ullah Khan, Team Lead and Urban WASH Expert (AWF Pvt Ltd) Ms. Manahal Fatima, Project Manager (AWF Pvt Ltd) Mr. Khuzwayo Tembo, CWIS/Urban WASH Specialist and Engineer (AGUA Consult) Mr. Shukhrat Igamberdyev, National Focal Point (AWF Pvt Ltd)	KMK Head Office, Dushanbe

	Ms. Nazokat Isaeva, Gender and Social Inclusion Expert (AWF Pvt Ltd) Mr. Bakhtiyor Umarov, WASH Engineer (AWF Pvt Ltd) Accompanied by: Mr. Dilshod Ibrohimov, UNICEF WASH Consultant Contacts: dibrohimov@unicef.org, +992 118 085 005	
11:00 – 12:30	**Hukumat/Administration of Dushanbe City (Municipality):** Mr. Muhiddin Farhodzoda, Chief Specialist of Department of Construction and Communal Services of the Mayor's Office of Dushanbe city. Participating Mission Members: Mr. Niaz Ullah Khan, Team Lead and Urban WASH Expert (AWF Pvt Ltd) Ms. Manahal Fatima, Project Manager (AWF Pvt Ltd) Mr. Khuzwayo Tembo, CWIS/Urban WASH Specialist and Engineer (AGUA Consult) Mr. Shukhrat Igamberdyev, National Focal Point (AWF Pvt Ltd) Ms. Nazokat Isaeva, Gender and Social Inclusion Expert (AWF Pvt Ltd) Mr. Bakhtiyor Umarov, WASH Engineer (AWF Pvt Ltd) Accompanied by: Mr. Dilshod Ibrohimov, UNICEF WASH Consultant Contacts: dibrohimov@unicef.org, +992 118 085 005	City Administration
14:30 – 15:30	**Ministry of Finance of the RT:** Mr. Jamshed Sattorzoda, Head of Department for Investments, MoF Mr. Faridun Oqilzoda, Chief Specialist, Department for Investments, MoF Participating Mission Members: Mr. Niaz Ullah Khan, Team Lead and Urban WASH Expert (AWF Pvt Ltd) Mr. Shukhrat Igamberdyev, National Focal Point (AWF Pvt Ltd)	MoF, Dushanbe
16:00 – 17:00	**CWIS Team Discussion** – Program for the following day, approach to implementation of site visits, HH sanitation facility visits, private sector interviews, and splitting mission members for Dushanbe City Environmental Protection Department Participating Mission Members: Mr. Niaz Ullah Khan, Team Lead and Urban WASH Expert (AWF Pvt Ltd) Mr. Shukhrat Igamberdyev, National Focal Point (AWF Pvt Ltd) Ms. Nazokat Isaeva, Gender and Social Inclusion Expert (AWF Pvt Ltd) Mr. Bakhtiyor Umarov, WASH Engineer (AWF Pvt Ltd) Accompanied by: Mr. Dilshod Ibrohimov, UNICEF WASH Consultant Contacts: dibrohimov@unicef.org, +992 118 085 005	Dushanbe
Thursday, October 5, 2023		
09:00 – 15:30	**Site Visit to SUE DVK**-managed centralized **wastewater management infrastructure system**, followed by a visit to centralized **Wastewater Treatment Facility** (Gulbutta).	System components within

	+ Meeting with Private Businesses providing sanitation services (at DVK Treatment Facility): *Faecal sludge removal, transportation, discharge to Treatment Facilities + **Visit to HH sanitation systems:** within and in the outskirts of Dushanbe *Approach to be consulted with DVK colleagues during the meeting scheduled on the first day of the Mission. Accompanied by: Representatives from SUE DVK, Mr. Dilshod Ibrohimov	and around Dushanbe city
15:30 – 17:00	**Engineers of SUE DVK – Group Discussions** Accompanied by: Mr. Dilshod Ibrohimov	SUE DVK, Dushanbe
16:00 – 17:30 (Team splits in two groups)	**Dushanbe City's Ecological Department / Committee for Environmental Protection under the GoRT** Mr. Abdusalom Kurbonov, +992 777 13 10 02 Deputy Chief of Ecological Department (Dushanbe)	Dushanbe (Zarafshon)
Friday, October 6, 2023		
08:30 – 10:00	**Committee for Environmental Protection under the GoRT:** Department for Environmental Monitoring, Department for Special Water Use Mr. Mirsaid Rakhimov, Head of the Department of State Control on Water Resources Protection, CoEP / Contacts: +992 93 585 93 86 Mr. Isfandiyor Shukurov, Head of Department for Monitoring, Ecological Policy, Hydro-Meteorology and Cadaster, CoEP	CoEP, Dushanbe
10:00 – 11:00	**Main Department of Geology under the GoRT:** Mr. Kholzoda Islomiddin, Deputy Director	MDG, Dushanbe
11:30 – 12:30	**Antimonopoly Agency under the Government of the RT:** Mr. Habib Abdullozoda, Head of Department for Regulation of Natural Monopolies / Accompanied by the representative from the Consumer Rights Protection Department. Contacts: habib-02@mail.ru, +992 918 16 11 06	AMA, Dushanbe
13:00 – 14:30 (Team splits in two groups)	**Committee for Architecture and Construction** under the GoRT Participating Mission Members: Mr. Khuzwayo Tembo, CWIS/Urban WASH Specialist and Engineer (AGUA Consult) Ms. Manahal Fatima, Project Manager (AWF Pvt Ltd) Ms. Nazokat Isaeva, Gender and Social Inclusion Expert (AWF Pvt Ltd) Mr. Bakhtiyor Umarov, WASH Engineer (AWF Pvt Ltd) Accompanied by: Mr. Dilshod Ibrohimov, UNICEF WASH Consultant Contacts: dibrohimov@unicef.org, +992 118 085 005	CAC, Dushanbe

14:00 – 15:30	**World Bank Tajikistan:** Ms. Farzona Mukhitdinova, Water Resources Management Specialist. Mr. Rustam Faiziev, WASH Engineer Ms. Kimiyo Samieva Contacts: fmukhitdinova@worldbank.org, +992 900 72 77 07	WB Office, Dushanbe

Annex 2: List of FGDs and Checklists

List of FGDs/ (Additional KIIs) and Observational Visits

Category	Number	Additional Details
Carwash sites	8	Through the period of 25th - 28th February, the mission team members visited several Car Wash Businesses and interviewed representatives on the site. In total 8 Car Wash Businesses were inspected and interviewed jointly with Field Officers from the SUE DVK in two districts of Dushanbe city (Sino and Shohmansur). The overall approach had been straightforward to check with the sites on any requirements imposed upon them by regulatory agencies on sanitation and hygiene, check generally the type of infrastructure applied, the way drainage is put in place, connections to sewerage systems, and or autonomous septic systems.
Civil and WASH Engineers	4	Key informant interviews and focus group discussions with a group of Engineers from SUE DVK and other independent engineers were conducted. The discussions were held on the 26th February 2024 in Dushanbe. The key focus issues were the infrastructure models, implementation aspects, norms and standards, enforcement, and gaps.
Wastewater Treatment Plan, Desludging Truck Operators, Farming Communities, and DVK	9	Following the preliminary consultations held between 02-06 October, 2023, the CWIS local team members conducted additional consultations for more detailed discussions and inquiries with the following individuals on the 27th February 2024: Director, Wastewater Treatment Plant, SUE DVK, and his colleagues from Plan, (b) Chief Engineer, SUE DVK and his team of Engineers, and (c) 7 private desludging truck operators on-site nearby WWTP
HHs near WWTP	8	The team conducted focus group discussions during the CWIS Team visits to Households residing nearby Wastewater Treatment Plant of Dushanbe city. In total 8 households living in Gulbutta settlement were visited. The HHs were interviewed during the principal HH survey process. Immediately after survey process, the CWIS Team followed with a brief discussion to reflect some of the additional information focused generally on WASH, living convenience nearby WWTP, any potential health impact and inclusivity. Discussions were held with the Heads of respective households on the 15th December 2023.
Homeowners' Association	1	Key informant interview the Head of the Homeowners' Association (Condominium) were conducted to discuss the overall quality of services provided, any business opportunities by the Association, and level of satisfaction by the members. The discussions were held on the 27th February 2024, with head of Homeowners' Association, Ismoil Somoni district.

Nursing Home for Elderly and PWDs in Dushanbe		Key informant interviews and focus group discussions were conducted with the Nursing Home for Elderly and PWDs in Dushanbe, i.e. – the State Institution "Territorial Social Support Centre for Pensioners and PWDs of Dushanbe city". The team consulted the representatives of the institutions, inspected the sanitation facilities to review the aspects of inclusiveness in accessing sanitation services within the institution, and elsewhere. Following the preliminary consultations held between 02-06 October, 2023 the CWIS local team members conducted additional consultations for more detailed discussions and inquiries on 28th February 2024.
Public toilets	20	Key informant interviews and focus group discussions were conducted during the CWIS mission and data collection process during the period of October 2023 – February 2024. It is a collection of records and data gathered during that process for the attention of CWIS team members towards the development of business models. Following the preliminary consultations held between 02-06 October, 2023 the CWIS local team members conducted additional consultations for more detailed discussions and inquiries with the following individuals during the period of 23-29 February 2024, with the representatives from private service providers, SUE DVK and City Administration. During the same period, the CWIS Team members have visited a number of 'public toilets', and where feasible conducted interviews and inspected the sites on aspects of sanitation, sewerage, service provision, access and inclusivity.
Public Organization for Blinds of the RT in Dushanbe city / a.k.a. Blind Union of Tajikistan	1	Key informant interview was conducted with the Public Organization for Blinds of the RT in Dushanbe city, and held a discussion with its director and members of staff on the 29th February 2024 (11:30-12-30). The team members also inspected the sanitation facilities to review the aspects of inclusiveness in accessing sanitation services within the entity, and elsewhere.
Dormitories of the Tajik State National University, and the Tajik Technical University in Dushanbe city	2	Key informant interviews were conducted with the following student dormitories for youth and young adults in Dushanbe city, namely: (1) Tajik State National University, and (2) Tajik Technical University in Dushanbe city. Discussions were held with the Directors of the given institutions on the 28th February 2024. The team members also inspected the sanitation facilities to review the aspects of inclusiveness in accessing sanitation services within the entities (indoors and outdoors).
The State Secondary Educational Institution "Boarding School #1 for Orphans and Homeless Children of the city of Dushanbe", and Public Institution "Special	2	Key informant interviews and focus group discussions were conducted with the following two schools for orphans, homeless children, and persons with disabilities in Dushanbe city: (1) The State Secondary Educational Institution "Boarding School #1 for Orphans and Homeless Children of the city of Dushanbe", and (2) Public Institution "Special Vocational Lyceum for Persons with Disabilities". Discussions were held with the Directors of the given institutions on the 29th February 2024.

Vocational Lyceum for Persons with Disabilities"		
Gender and Social Inclusions (NGOs, private sector organizations.	6	To gather data regarding the aspects of gender and social inclusion (GESI) aspects, FGDs were carried out in 4 district locations. The aim was to investigate their motivations to use and connect to the sanitation facilities, their perspectives on the user's involvement in WASH activities, the accessibility and acceptability of facilities, and the benefit for their families and neighbourhoods. The FGDs aimed to investigate beneficiaries' knowledge and personal experience of using on-site and off-site sanitation facilities, and their maintenance, as well as to score user satisfaction with the service. Social aspects and inclusion were part of the discussions, including KIIs. The methodology included individual interviews and meetings with the community representatives and members of organizations (women-led, organizations of youth development, social institutions – universities and schools). Private sector organizations (small business holders) were interviewed based on service delivery, including access to sanitation markets by women and groups/people with low mobility. Special attention was paid to the group of people with disabilities, families with disabled members and women in shelters. In addition, the personal visits were paid to dormitories and university campuses.

Checklists for FGDs

Dushanbe City Administration/Authorities (Public Toilets)

* Access to services, public toilets maintenance and accessibility, O&M, public safety.

1. What is the total no. of public toilets in city?
2. How you decide the location of public toilets?
3. Do you provide all toilet and bathroom facilities in every toilet complex, or it differs from place to place?
4. Do you have separate section for male and female? (Yes/No) If No, why?
5. Do you have any provisions for persons with disabilities?
6. Are men's urinals and seats separate?
7. What is the requirement of seats for men's toilets?
8. What is the requirement of number of urinals in men's toilets?
9. What is the requirement of seats for women's toilets?
10. Is a regular water supply ensured in public toilets? What is the source of this water supply?
11. What is the flushing system (Flush/Pour Flush)?
12. What is the quantity of water used monthly?
13. What is the average number of users of public toilets per day?
14. Are there any user charges for public toilets?
15. Who is responsible to clean these toilets?
16. What is the frequency of cleaning public toilets?
17. Are toilets and bathroom connected to same outlet? If yes, connected? / If No, connected to? (Septic Tanks/ Sewerage Network/ Toilet Bathroom)
18. If Septic Tank, outlet pipe connected to? (Soak Pits/Drains)
19. What are the details of Septic Tank (such as construction, Size, Material etc.)?

20. What is the frequency of desludging?
21. Please explain the process of desludging.
22. What is the status of the desludging trucks ownership (i.e., own, private rented/contracts)?
23. Any official designated place for disposal of sludge (Yes/No). If yes, what is the place? If "No", where is the sludge disposed to?
24. Is there any reuse of the sludge?

Masons (Private Businesses)

** Local production of sanitation facility items, construction of sanitation facilities, sale of sanitation products*

1. What type of toilet facilities are you mostly asked to construct (in home, outside, septic tanks, pit latrines, etc.)?
2. Describe how you construct septic tanks (sealed all sides, sealed bottom)?
3. Describe how you construct pit latrines (sealed all sides, sealed bottom)?
4. What training have you received, if any, on the construction of such facilities (formal training, apprenticeship, etc.)?
5. How often do you get requests to construct?
6. What is the most common type of sanitation facility you are asked to construct?
7. At what depth do you find the water table during construction in the dry and in the rainy seasons (state if never reach water table)?
8. What is the disposal method for the most common type of facility that you construct (e.g., open drain, to soak-away, to nearby water body)?
9. What is the average cost of constructing each of the different facilities you construct for an average family?

Homeowners' Associations (Condominiums)

** Access to services, sanitary conditions, services provision, and satisfaction*

[Communal and Housing Service Providers (for apartment buildings, state-managed and community managed), Mahalla Leads (for settlements with private HHs)]

Inclusivity-related questions:

** People with disabilities, youth, women and girls, gender, safety, and equity considerations.*

1. To what degree HHs take into account the needs of people with disabilities in the use of sanitation facilities?
2. Has the WASH infrastructure been designed to be accessible and responsive to the needs of persons with disabilities?
3. Has there been implemented any WASH awareness campaigns in your community? (hand-washing, hygiene promotion, sanitation)
4. Are there any obstacles to safe and equitable access to WASH services in your community? How are they addressed?
5. What is the quality of WASH services provided in your area? (drinking water supply, sewerage, waste management, faecal sludge removal, drainage maintenance, etc.)?

6. Are there any safety issues in using sanitation facilities amongst the vulnerable residents (PWD, girls, youth, etc.)?

Other questions:

(HHs residing in apartment buildings (sewered), HHs residing in mahallas and settlements, i.e. private HHs, sewered and non-sewered)

1. **Defining Sanitation:** How do you understand sanitation?
2. **Operation & Maintenance:** How are sanitation facilities managed and maintained within condominium complexes in Dushanbe? How often do you encounter blockages in sanitation pipes? What do you think of sanitation infrastructure conditions in your building/area? How the HHs deal with repairs, who covers the costs of repairs? What measures are in place to ensure the cleanliness and functionality of shared sanitation facilities?
3. **Community Participation:** What measures are in place to ensure the cleanliness and functionality of shared sanitation facilities? Are there any collective initiatives or programs aimed at improving sanitation practices in your area?
4. **Satisfaction Perceptions:** How satisfied are you with the WASH services provided in your building/apartment/area?
5. **Passing surface water bodies (rivers, canals, ditches, etc.):** If any irrigation canals or surface water bodies nearby your area, what do you think of its surrounding conditions in terms of sanitation? Is it protected from any solid wastes, sewerage, greywater from HHs?
6. **Drainage:** Are you satisfied with drainage network conditions in your mahalla?
7. **Smell/Odours:** Do you experience any bad smell/odour coming out of sanitation facilities, pipes, networks in your area?
8. **Government or NGO Support:** Have government agencies or I/NGOs provided support for sanitation in your community?
9. **Needed Improvements:** What improvements or additions to sanitation infrastructure would you like to see in your community?
10. **Health and Safety Issues:** Has anyone in the community experienced health issues related to poor sanitation? What do you think are the main health benefits of improved sanitation? Any safety risks and considerations amongst the vulnerable members of the community?
11. **Solid Waste Management:** How is solid waste managed in your community? Are you satisfied with waste management services provided in your area/building? How often wastes are removed? Do wastes overfill quickly? Who maintains solid waste management infrastructure in your building/area?
12. **Faecal Sludge Management (Private HHs):** How is human waste managed in your community? What is the general process of desludging? Please describe. What is the typical frequency of desludging in your community? How satisfied are HHs with desludging services in the area? Do HHs re-use 'treated' sludge in their land plots?
13. **Septic Tanks Construct (Private HHs):** What are the details of Septic Tanks (such as construction, size, material, etc.)? How common are septic tanks in your community? What is the outlet of such septic tanks?
14. **Types of Sanitation Facilities (Private HHs):** Please describe what types of sanitation facilities are there in your community? Pit latrines, septic tanks? What is the typical toilet construct in your area? Does everyone have toilets and bathrooms together in your area?

Civil and WASH Engineers (Infrastructure Models)

** Implementation aspects (norms and standards, enforcements, gaps)*

1. **Infrastructure Development:** What are the key considerations in designing and implementing inclusive sanitation infrastructure projects in Tajikistan? How do you assess the suitability and sustainability of sanitation solutions for different communities?
2. **Challenges and Innovations:** What are the major challenges faced by civil and WASH engineers in promoting inclusive sanitation in Tajikistan? Are there any innovative approaches or technologies being explored to address these challenges?
3. **Regulations:** How the established norms and standards related to sanitation facilities are implemented in the city? How the enforcement mechanisms work? Are there any gaps in that regard? How the current market conditions relate to sanitation issues being addressed?
4. **Common Trends:** What are the most recent trends in sanitation inquiries from clients with regards to sanitation facility designs, septic tanks, pit latrines, etc.? Frequently reported problems with O&M, service delivery across the sanitation value chain?
5. **Community Engagement and Capacity Building:** How do civil and WASH engineers engage with local communities during sanitation projects? What efforts are made to build local capacity in sanitation planning, implementation, and maintenance?
6. **Sanitation Expertise:** Is sanitation expertise being developed amongst practitioners, masons, and professionals that engage in designing, constructing and service provisions across the entire sanitation value chain? Are there are designated sanitation professionals with sole expertise in any of the stages of sanitation services value chain?

Farming Communities (Private Businesses)

** Reuse of 'treated' faecal sludge*

1. **Faecal Sludge Utilization Practices:** Can you describe the methods used by farming communities in your area to reuse faecal sludge for agricultural purposes? What crops or agricultural activities commonly benefit from faecal sludge application?
2. **Cooperation with Wastewater Treatment Plant (WWTP):** What kind of arrangement do you have with the WWTP? How often did you inquire or received 'treated' faecal sludge from the WWTP for agricultural purposes? What is the price system for such product (faecal sludge)?
3. **Benefits and Challenges:** What are the perceived benefits and potential risks associated with the use of faecal sludge in agriculture? Have there been any notable successes or challenges in implementing faecal sludge reuse practices? What is the commercial benefit from the use of treated faecal sludge in crops productivity in your farm?
4. **Health and Safety:** What safety measures do you practice to avoid any direct contact with the reuse material (faecal sludge) being applied in agriculture? How informed are farmers about the safety and proper handling of faecal sludge for agricultural use?
5. **Norms and Regulations:** Are you aware of any instructions, guidelines, norms, and regulations regarding preparation of fertilization products from faecal sludge? Are you implementing any of that guidance?
6. **Knowledge and Awareness:** Are there any training or awareness programs available to promote safe faecal sludge reuse practices?

Desludging Truck Operators and Manual Workers (Private Businesses)
** Faecal sludge removal, transport, and discharge*

1. **Occupational Challenges:** What are the main challenges faced by desludging truck operators and manual workers in Tajikistan? How do you perceive the safety and health risks associated with desludging operations? Can you describe the typical work process involved in desludging and waste disposal?
2. **Infrastructure and Equipment:** What are the existing infrastructure and equipment used for desludging operations in Tajikistan? Are there any gaps or limitations in terms of equipment availability or functionality?
3. **Regulatory Environment:** What are the regulatory frameworks governing desludging operations in Tajikistan? How do these regulations impact your work, particularly in terms of licensing, permits, and compliance?
4. **Community Engagement:** How do you interact with local communities during desludging activities? What are the community perceptions and attitudes towards desludging services?
5. **Pricing Mechanisms:** What pricing mechanisms do you apply in your service delivery? Any discounting mechanisms? What kind of engagement do you practice with the Wastewater Treatment Plant? Any issues in that regard? How do you negotiate your price arrangements with the private HHs?
6. **Inclusivity:** Do you consider any special pro-poor discounts for worse-off HHs living in the city? Who are eligible for such discounts? (poor, women, PWDs, HHs with orphan members?
7. **Service Delivery:** What challenges do you encounter in your daily routine while providing services to communities? Do you see any potential for growth and upgrades in your occupation of faecal sludge removal and transporting? Did you have any special inquiries that you were not able to deliver? What generally are those additional inquiries?
8. **Health and Safety:** What safety measures do you apply in your work? Any health issues you have encountered in your occupation? What safety kits and clothes do you use? Are those accessible in the market?

Car-Wash Facilities (Private Businesses)
** Access to services, wastewater management, sanitary conditions, use of chemicals, autonomous treatment, impact to the environment.*

1. **Sanitation Practices:** How are sanitation and wastewater management typically addressed at car wash sites in the city? Are there specific measures in place to prevent environmental contamination from car wash effluents?
2. **Infrastructure and Drainage Systems:** What types of drainage systems are commonly used at car wash sites? Are there any challenges or shortcomings in the existing drainage infrastructure? Have you put in place any containment systems that filter hazardous materials from wastewater produced at your facility? Or is the produced wastewater directly drained to centralized sewerage system? What water treatment equipment do you use at your site? Do you practice recycling of used water?
3. **Regulatory Compliance:** What regulatory requirements govern the operation of car wash sites in terms of sanitation and wastewater management? How do car wash operators ensure compliance

with these regulations? Is your site locations in compliance with sanitary protection zone requirements? (i.e. within acceptable distance from HH residences, typically 50m) Who implements regulatory compliance monitoring for your site? Is your wastewater contents checked/analysed/monitored by any of the responsible regulatory agencies?

4. **Health and Safety:** What safety kits and clothes do your staff members use to protect themselves from any hazardous materials coming out of vehicles during wash services? Have there been any health issues linked to sanitation amongst your staff? What have been the causes of such health impact? Is the lighting and ventilation adequate at your site?
5. **Cleaning Reagents/Chemicals:** What kind of cleaning materials do you typically apply in your wash services for vehicles?
6. **Solid Waste Management:** How the solid wastes managed at your site? Who collects them? Are you satisfied with solid waste management services provided for your site?

Checklists for KIIs
KII with DVK

Date:
Name of Respondent:
Position:

1. Describe the sanitation services provided by DVK in Dushanbe.
2. What percentage of the population is connected to the sewer network?
3. Is DVK client's data gender segregated?
4. What are the types of sewer networks existing in Dushanbe?
5. Is any wastewater channelled in open drains?
6. What is the state of the existing sewers in Dushanbe?
7. What are some of the challenges with managing the sewer network in Dushanbe?
8. Are there any challenges related to rainfall, flooding, and climate change?
9. Are there any challenges related to COVID-19?
10. What is the state of the existing treatment plants in Dushanbe?
11. What is the design capacity of the treatment plants?
12. What is the current capacity of operation?
13. What is the total sewage received per day?
14. What is the sewage treated per day?
15. How much wastewater is received at the treatment plant in KL/D?
16. Where is the treated waste disposed?
17. What percentage of wastewater discharged is considered to meet the treatment standards?
18. What are the main challenges related to adequate treatment of wastewater?
19. Is any wastewater or sludge from the treatment plants reused? By who?
20. What methods are used for end-use or disposal of the wastewater?
21. What percentage of the transported wastewater has a further end-use?
22. Describe how households that do not have access to sewers manage their waste.
23. Does DVK have any specific considerations for low-income households?
24. Does DVK have operate any vacuum trucks in Dushanbe?
25. Are there any private operators providing emptying services in Dushanbe? How many?
26. What are the challenges for households not connected to the sewer networks?

27. What percentage of the population is practising open defecation?
28. Please share your current plan for investing in the rehabilitation and / or extension of the sewerage infrastructure. If no plan, please provide your best estimate on costs.
29. What are the existing tariffs for each water and sanitation (describe value and structure) for households, businesses, etc.?
30. Do sanitation tariffs cover non-sewered sanitation services?
31. During the last 5 year, what targeted measures and instruments (e.g., financing mechanisms, tariff schemes, subsidies) have been implemented in order to ensure that the most disadvantaged access water, sanitation and hygiene services in an affordable way?
32. Describe the current process for getting a household connection to sewers.
33. Is there a connection fee to the sewerage system? If so, how much.
34. Is there a dumping fee for waste disposed of at the WWTP?
35. Are there any disabled people among your clients/subscribers?
36. What kind of subsidies does DVK have for disabled clients? Do you have any technologies/systems for disabled people?
37. Do you subsidise resettled communities / clients?

KII with City Authority/ Administration

Date:
Name of Respondent:
Position:

1. What role does the city authority play in relation to sewered sanitation?
2. What role does the city authority play in relation to non-sewered sanitation?
3. Describe the sanitation challenges faced in Dushanbe.
4. What is the average household size in Dushanbe?
5. How many public toilets do you have in the city?
6. Are these located in public areas only or also used in residential areas by households?
7. Are these public toilets connected to the sewer network?
8. If not, how is the waste from these facilities managed?
9. Can you describe their current condition?
10. Describe, if any, the type of partnerships you have with the private sector to construct and / or operate these public toilets.
11. Describe the structure and value of the tariff (if any) for the public toilets (e.g., does it vary by area, is it fixed or variable, etc.)?
12. Can you describe or share documentation about the city's investment plan for public toilets? If none, can you describe the size and estimate the cost of (a) constructing and (b) rehabilitating an average public toilet?
13. What is the sanitation situation for institutions in the city (i.e., commercial areas, industrial areas, restaurants, hotels)?
14. Are there any settlement areas of the city that are unplanned or slums?
15. What is the sanitation situation in these areas historically and currently?
16. Are there any plans to reduce inequity in these areas?

17. How does the city authority support resettled communities/minorities in relation to their access to sanitation?
18. How does the city administration support people with disabilities (i.e., their application for subsidies water/sanitation service provision fees)?

KII with City Authority – Public Toilets

Date:
Name of Respondent:
Position:

25. What is the total no. of public toilets in city?
26. How you decide the location of public toilets?
27. Do you provide all toilet and bathroom facilities in every toilet complex, or it differs from place to place?
28. Do you have separate section for male and female? (Yes/No) If No, why?
29. Are men's urinals and seats separate?
30. What is the requirement of seats for men's toilets?
31. What is the requirement of number of urinals in men's toilets?
32. What is the requirement of seats for women's toilets?
33. Is a regular water supply ensured in public toilets? What is the source of this water supply?
34. What is the flushing system (Flush/Pour Flush)?
35. What is the quantity of water used monthly?
36. What is the average number of users of public toilets per day?
37. Are there any user charges for public toilets?
38. Who is responsible to clean these toilets?
39. What is the frequency of cleaning public toilets?
40. Are toilets and bathroom connected to same outlet? If yes, connected to?/ If No, connected to? (Septic Tanks/ Sewerage Network/ Toilet Bathroom)
41. If Septic Tank, outlet pipe connected to? (Soak Pits/Drains)
42. What are the details of Septic Tank (such as construction, Size, Material etc.)?
43. What is the frequency of desludging?
44. Please explain the process of desludging.
45. What is the status of the desludging trucks ownership (i.e., own, private rented/contract
46. Any official designated place for disposal of sludge (Yes/No). If yes, what is the place? If no, where is the sludge disposed to?
47. Is there any reuse of the sludge?

KII with Ministries/ Departments:

Date:
Name of Respondent:
Position:

1. How is sanitation defined for Dushanbe?

2. Can you provide an overview of the existing sanitation infrastructure in Dushanbe?
3. What are the main sanitation challenges and gaps that need to be addressed?
4. What are the gaps in current priorities and policies related to sanitation and public health?
5. Are there opportunities for public-private partnerships or external funding for sanitation improvements?
6. Are there ongoing efforts to involve local communities and civil society organizations in sanitation projects?
7. Do you have data on sanitation coverage, access, and health outcomes in Dushanbe and the surrounding areas?
8. How frequently is sanitation infrastructure assessed and monitored for functionality and sustainability?
9. What steps are being taken to ensure that sanitation initiatives are inclusive and benefit all residents, including vulnerable or marginalised groups?
10. Are there plans to address gender-specific sanitation needs?
11. How is solid waste and wastewater managed within Dushanbe?
12. Are there upcoming sanitation infrastructure projects or upgrades planned?
13. How can stakeholders collaborate to ensure these projects are implemented effectively and inclusively?
14. Are there any initiatives in place to raise public awareness about the importance of sanitation and hygiene?
15. Are there plans for educational campaigns in schools and communities?
16. What are the existing sanitation regulations and standards, and how are they enforced?
17. Are there opportunities to revise or update regulations to align with current needs and best practices?
18. How are climate change and extreme weather events considered in sanitation planning and infrastructure design?
19. Are there measures in place to ensure sanitation systems are resilient to climate-related challenges?
20. Have health impact assessments been conducted to understand the link between sanitation and public health outcomes?
21. During the last 5 years what measures (ranging from legal, policy, regulatory, budgetary to training) have been implemented to address gender inequalities in accessing safe water and sanitation?
22. What are the concrete steps taken and the observed impacts?
23. During the last 5 year, what targeted measures and instruments (e.g., financing mechanisms, tariff schemes, subsidies) have been implemented in order to ensure that the most disadvantaged access water, sanitation and hygiene services in an affordable way?
24. Who are the target groups of these measures and instruments?
25. What format do those measures and instruments exist (e.g., national legislation, policy, regulation of service provision, affordability standards)?
26. Are there plans to measure and improve health outcomes related to sanitation?
27. How are sanitation initiatives monitored and evaluated for their effectiveness and impact?
28. How can local communities actively participate in shaping and implementing sanitation initiatives?
29. Are there mechanisms for community feedback and input?

30. Please provide information on the three dimensions of accountability: clear roles and responsibility of actors; the guarantee of individuals to hold actors accountable by requesting explanations and information ("answerability"); and remedial or corrective actions for lack of compliance with performance standards ("enforceability")

KIIs with Development Partners

Date:
Name of Respondent:
Position:

1. What are your organization's main goals and priorities when it comes to sanitation and public health in Tajikistan?
2. How does your organization envision contributing to citywide inclusive sanitation efforts?
3. Are there ongoing partnerships or collaborations with other development organizations or government agencies in Tajikistan related to sanitation?
4. How can we ensure coordination and avoid duplication of efforts?
5. What funding and resources are available to support citywide inclusive sanitation initiatives in Dushanbe?
6. Are there specific funding streams or grants that local stakeholders can access?
7. Can your organization provide technical expertise, training, or capacity-building support for local stakeholders involved in sanitation projects?
8. Are there opportunities for knowledge exchange and skill development?
9. Do you have access to relevant data, research, or studies related to sanitation in Tajikistan that can inform project planning and decision-making?
10. How does your organization prioritise inclusivity and equity in sanitation projects?
11. Do you have any gender-sensitive specific programs, policies, methodologies in your sanitation projects/activities?
12. Are there specific strategies for addressing the needs of vulnerable or marginalized groups?
13. How do your organization's sanitation initiatives align with Tajikistan's national development priorities and strategies?
14. Is there close collaboration with government ministries to ensure alignment?
15. What monitoring and evaluation mechanisms does your organization use to assess the effectiveness and impact of sanitation projects?
16. How can sanitation initiatives be designed and implemented to ensure long-term sustainability and lasting impact in Tajikistan?
17. How can local communities be actively engaged and take ownership of sanitation projects?
18. Are there community-based approaches that have been successful in other projects?
19. Are there eco-friendly sanitation technologies or practices that can be promoted?
20. Does your organization have experience in designing and implementing public awareness campaigns related to sanitation and hygiene?
21. Are there innovative approaches to promoting behaviour change in sanitation practices?
22. Are there any successful citywide sanitation initiatives or best practices from other regions or countries that could be adapted for Tajikistan?
23. Can sanitation projects be designed to be climate-resilient?

24. What are some key lessons learned from past sanitation initiatives?
25. What is the expected timeline for sanitation projects and the different phases involved?
26. How can local stakeholders align their efforts with project schedules?

Checklist on Disability Inclusion and Accessibility in WASH Programs

Program stage	Disability inclusion considerations	Response Yes/No	Comment
All stages	Do you have a disability inclusion focal point for the program?		
Situation analysis	Have data been collected/or planned to be collected during situation analyses and program planning on the barriers, needs and priorities of persons with disabilities?		
	If data are not available on the WASH needs and barriers of persons with disabilities, has this been identified as an information gap and actions put in place to address it?		
	Have persons with disabilities been consulted and involved in the planning process (e.g., has an OPD been engaged in the process)?		
	Has budget been allocated to cover the participation of persons with disabilities in situation analysis and planning?		
Implementation	Were persons with disabilities involved in WASH infrastructure activities, including in community consultations,		

	assessments, accessibility audits, maintenance, etc.?		
	Has infrastructure been designed to be accessible and responsive to the needs of persons with different types of disabilities?		
	Has hygiene and handwashing information been produced in at least? two different formats (such as written and audio/visuals)?		
	Do you have a signed partnership agreement or contract with an organization or consultant that specializes in disability inclusion and accessibility?		
	Has budget been allocated for disability-related activities?		
	Have you facilitated the participation of women and men with disabilities in management committees and positions of responsibility to support improved functioning of water /sanitation committees, water systems and hygiene promotion?		
	Are obstacles to safe and equitable access to WASH services? promptly addressed?		
	Have you collected data disaggregated by age, sex, and disability on the access, the use and the quality of WASH services and facilities?		

	Do you regularly monitor the access and use of WASH facilities or services by persons with disabilities, through spot checks and discussions with the communities?		
	Do you monitor the construction of infrastructure to ensure it meets accessibility standards?		

Annex 3: HH Survey

HH Survery .pdf

Annex 4: School Survey

Schools survey_29102023.pdf

Annex 5: Survey for HCFs

HCF Survey_29102023.pdf

Annex 6: Details of Regulatory Framework for Drinking Water Supply and Wastewater Disposal Services

Integration of Drinking Water and Wastewater Services: Consumers in Tajikistan often pay for both drinking water supply and wastewater disposal services provided by vodokanals. This integrated approach ensures comprehensive water management, but many consumers are unaware of breadth of services covered with their paid tariffs. The integration emphasises the importance of public awareness regarding the scope of services provided by vodokanals. Additionally, stringent regulatory and statutory requirements should be implemented to govern wastewater disposal services, ensuring safety and environmental protection. Specific technical regulations should be in place for the treatment and decontamination of utility and domestic waste.

Regulatory Constraints for the Private Sector: Tajikistan's private sector encounters significant regulatory challenges, navigating a complex framework comprising 11 critical regulations. This complexity poses

hurdles to private entities operating in the sanitation domain, limiting opportunities for involvement in sanitation projects. A careful consideration and strategic planning around inclusive WASH implementation framework should be developed before initiating any sanitation-related ventures.

Regulatory Attention to Non-Sewered Systems: Urgent attention is needed to address issues related to non-sewered sanitation systems, especially in Dushanbe and other large cities experiencing population growth. Implementing widespread sewered systems may be challenging, necessitating alternative solutions for sanitation infrastructure. The lack of information about non-sewered sanitation systems in Dushanbe signifies a knowledge gap that requires immediate attention, emphasising the need for comprehensive data collection and analysis.

Regulatory Oversight for Carwash Sites: Carwash sites in Tajikistan are subject to regulations from various authorities, covering aspects such as sanitary protection zones, hygiene conditions, and wastewater discharge standards. However, compliance monitoring and enforcement of sanitation and hygiene requirements at carwash sites require urgent actions to overcome environmental and health risks.

Recent Trends in Sanitation Inquiries: A growing interest among customers in ecologically sustainable and efficient wastewater treatment solutions, reflecting a heightened awareness of environmental conservation in sanitation practices. Additionally, there is a rising demand for user-friendly sanitation technologies that minimize the risk of system failures or maintenance issues.

Regulation of Desludging Truck Operators: Desludging truck operators in Tajikistan are required to discharge wastewater sludge only at designated sludge beds within wastewater treatment plants. However, there are instances when some operators discharged at unauthorized locations, deviating from regulatory guidelines. Regulatory oversight of desludging operations is limited, with operators receiving minimal training or guidance on compliance with sanitary safety procedures.

Regulatory Requirements for Public Toilets: Public toilets in Tajikistan are expected to comply with regulations concerning inclusiveness, safety for persons with disabilities, and sanitation standards. However, compliance to these regulations is not uniform across the public toilets highlighting the need for improved regulatory oversight and enforcement.

Faecal Sludge Reuse Regulation: Tajikistan's regulatory framework lacks specific provisions addressing the reuse of faecal sludge. These are indirect acknowledgment in the Water Code but without explicit guidelines. A need for establishment of safe and practical regulations through collaboration with local and international experts is being called for addressing the regulatory void left by previous Soviet-era regulations.

Drinking water supply and wastewater disposal services are often treated as one because both services are rendered by one provider. In turn, consumers paying to vodokanal for their services in cities often do not know that they are also paying for water disposal services, as they are usually included in the tariff by default. Moreover, a consumer’s interaction with water disposal and further treatment services is often very limited, and happens only when there are accidents or a clogging of the sewerage system. Though a wide range of regulatory instruments exist, a special attention is required to issues of wastewater disposal safety and appropriate treatment by in placing technical regulation through statutory instruments.

The Civil Code does not contain explicit provisions regulating the sanitation area. The Law on the **Drinking Water and Water Supply** also has no provisions regarding wastewater disposal. The **Water Code** of Tajikistan outlines various regulations concerning wastewater management. According to Article 17, the authority in charge of overseeing industry and mining is empowered to allocate specific areas for the discharge of wastewater resulting from mining activities. Article 25 emphasizes the importance of setting standards to limit the impact of substances and microorganisms in wastewater discharged into water bodies. Water users, as per Article 56, are obliged to take measures to cease the discharge of wastewater containing pollutants into water bodies and maintain accurate records of water usage and wastewater discharge. Prohibitions are stated in Article 64 against discharging wastewater into water bodies designated for medical or health purposes. Article 67 allows the use of wastewater for land irrigation but necessitates coordination with the environmental protection authority. Article 68 requires industries utilizing water bodies to adhere to technological norms, reduce water consumption, and halt wastewater discharges through improved production technology. Lastly, Article 74 mandates obtaining special permission for wastewater discharge into water bodies, prohibits discharge into bodies designated for drinking water, and establishes conditions aligned with environmental protection regulations to ensure responsible wastewater management.

Law on **Concerning the Provisions for the Public Sanitary and Epidemiological Safety** (as of 8.12.2003, № 49), article 17, sets criteria for the safety of water bodies and human health or life. It specifies sanitary and epidemiological requirements for water bodies, their protection, prevention of contamination and clogging. The article also sets maximum allowable concentration rates of harmful substances and maximum allowable discharge rates of chemicals, biological substances, and microorganisms into water bodies. Article 21 specifies sanitary and epidemiological requirements for the collection, usage, decontamination, transportation, storge, and disposal of industrial and domestic waste. In line with the provisions of this law, the collection, usage, decontamination, transportation, storage, disposal, and utilization of industrial and domestic waste are subject to terms and methods safe for human health and the environment.

The main purpose of the Law on the **Environmental Impact Assessment** (as of April 2022, 2003, under № 20) is to prevent any potential negative consequences of project implementation. Careful review of the projects can prevent unfavourable impacts on human health, natural resources, the environment, or the ecological safety of society. The review of the projects assesses any potential damage while carrying out managerial and economic activities to support natural environment forecasting.

The Law on the **Production and Consumer Waste** (as of May 10, 2002, under № 44) regulates relations arising from the generation, collection, storage, usage, transport, decontamination, and disposal of waste. It sets requirements for state control, management, and supervision of waste handling. The law also helps prevent negative impacts on both industrial and consumer waste on the environment and human health, and the integration of waste into additional source material for economic turnover.

Article 8 of **Law on the Protection of Consumers Rights** indicates that a consumer has the right to goods (works, services) subject to set rules of their usage, storage, transportation, ant utilization, safe for the life and health of a consumer, not harmful to the environment nor damaging to the property of consumers. This Law fixes the responsibility of a provider to ensure quality and safety, as well as with

Sanitary Regulations and Standards (SanPiNs). **The Law also gives a definition of safety, indicating "Goods should be safe for the life, health of a consumer, environment and inflict damage to the property of the owner."**

According to provision 34 of **Public Water Supply and Sewer Usage Rules**, prior to operation, waterworks facilities are subject to flushing and decontamination until water quality test results for bacteriological indicators are achieved in accordance with requirements established by the State Sanitary and Epidemiological Surveillance Services (SES). The Rules define sanitation system as a set of engineering structures for collection and disposal of wastewater beyond the boundaries of populated areas or individual facilities; as well as for purification and decontamination of wastewater and wastewater sludge before their utilisation or discharge into water bodies – receiving water.

Currently in Tajikistan, no wastewater metering instruments are used for domestic consumers and payment for services is calculated using established standards. These standards state that the quantity of wastewater received is considered to be equal to the quantity of drinking water supplied. The provision 114 indicates that through records should be kept and regional offices of SES and structural units of the Environment Protection Committee should be notified of any accidents at sewerage facilities and increased concentration of wastewater discharge to sewer systems which pose hazard to public health. Further, the company that has a sanitation system shall submit, whenever possible, final standard wastewater analysis to structural units of the Environment Protection Committee for approval. According to the Rules, provision 106, a public utility company has the right, without prior approval of local executive authorities or prior notification of the customer, to cease or restrict the wastewater collection, if it does not affect the sanitation services to other customers in the following cases (other than scheduled maintenance works):

- Poor engineering conditions of sanitation facilities served by or under the economic control of a customer; failure to meet requirements of the public utility company assumed by the customer for the elimination of misuses detected by representatives of the company.
- Failure to fulfil obligations before a public utility company on the development, reconstruction or replacement of networks and structures of sanitation systems.
- When unauthorized facilities and structures are detected, for the connection of a customer to sanitation systems or networks being served by or under the economic control of a customer, and when a customer has not concluded or extended a contract with the public utility company.
- Failure of a customer to pay a bill within the established timeframes.
- When a customer denies a connection of sub-customers who have received an authorization from the company for connecting to the sanitation systems under the economic control of the customer.

Rules for **provision of solid and liquid domestic waste removal services**, adopted by the Decree of the Government of the Republic of Tajikistan from 6.06.2005 № 209, regulate relations between consumers and executors in the sphere of rendering services on solid and liquid domestic waste removal. The basic concepts specify that the waste includes also faecal wastes from non-centralized sewerage system.

Both Sanitary Regulations and Standards in Tajikistan – by State Sanitary and Epidemiological Surveillance Service under MoHSPP and SNiPs (Construction Standards) – by Agency of Construction and Architecture

are of a regulatory nature and binding for the area, and they do not contradict the statutory provisions of the laws of the Republic of Tajikistan. These are industry documents and have been developed based on international standards. Several statutory instruments of different levels regulate various aspects of wastewater disposal safety. A few of these regulatory and statutory instruments have endured from Soviet times and are still considered valid if they do not contradict the constitutional laws of Tajikistan. If they do, they have been either modified or being considered invalidated.

"Sanitary Rules for **Maintenance of Territories of Populated Areas**", approved by the Chief State Physician of the USSR on August 5, 1988, under the document number 4690-88, sets forth regulations governing the management and maintenance of populated areas to ensure sanitation standards are met. Specifically, it outlines the organization of a rational system for the collection, temporary storage, regular removal of solid and liquid domestic waste, and the cleaning of territories. Section 2.3 of the SanPiN document addresses the collection of liquid waste, with a specific focus on the requirements for the location of yard latrines.

SanPiN No. 4630-88, "**Protection of Surface Water from Pollution**", approved in 1988 by the Main Sanitary and Epidemiological Department of the Ministry of Health of the USSR. Overall, the SanPin aims to protect surface water quality by regulating the discharge of wastewater from various sources and ensuring compliance with established environmental and health standards. The standards outline strict regulations aimed at safeguarding surface water from pollution. It prohibits the discharge of wastewater containing unidentified substances, encourages the use of efficient technologies for wastewater treatment and recycling, and mandates the proper purification of industrial, household, and domestic wastewater. Exceptions for discharge are permitted only under special technical and economic justifications while adhering to specified standards. Discharge points must be strategically located downstream from settlements to prevent contamination of water sources, with considerations for potential reverse flows. The rules stress the importance of research to establish permissible concentration levels for pollutants in the absence of defined standards. Dilution factors are calculated based on water flow rates and hydrological conditions. Special provisions are made for low-water years, requiring consultation with sanitary authorities. Ultimately, permits are required for wastewater disposal, contingent upon meeting prescribed conditions. These regulations underline a commitment to preserving water quality and environmental health through systematic control and management of wastewater discharge.

SanPiN 2.1.4.1110-02, "**Zones of Sanitary Protection of Sources Water Supply and Drinking Water Pipelines**" has been developed based on Federal Law "On the Sanitary and Epidemiological Welfare of the Population" dated March 30, 1999. The regulation outlines the proper management of wastewater to safeguard water quality and public health. Firstly, buildings must be equipped with a sewerage system that directs wastewater either to the nearest domestic or industrial sewerage system or to local treatment facilities. Secondly, any discharge of wastewater into the environment, including from activities such as bathing, washing clothes, or watering livestock, is strictly prohibited. Thirdly, measures are in place to prevent the disposal of wastewater in areas that could contaminate water supply sources or their tributaries, ensuring compliance with hygienic standards. Lastly, regulations govern the allocation of land for new constructions and changes in industrial technologies to mitigate the risk of water contamination from wastewater, thereby safeguarding water resources. Adopted by the Decree of the Government of

the Republic of Tajikistan from 2.06.2011 № 279, item no. 5 describes the procedure for storing liquid waste in non-sewered households.

SNiP 40.02-2009 **Construction Code Wastewater Disposal. Outdoor Networks and Structures** was developed on the basis of SNiP 2.04.03-85 “Wastewater Disposal. Outdoor Networks and Structures” and introduced changes and amendments in accordance with legislation of the Republic of Tajikistan. SNiP was approved by the order of the Director of the Agency for Construction and Architecture on August 16, 2010 and registered by the Ministry of Justice on April 1, 2011 under No 604. On ratification of this SNiP, the previous SNiP was nullified. This SNiP contains clarifications and engineering standards on wastewater disposal. SNiP defines wastewater disposal as a set of engineering structures (pipelines, pump stations, treatment facilities and sanitary fixtures, standpipes etc.) that provide for the reception, collection, and disposal of wastewater from the territories of populated areas, industrial enterprises, and other facilities, as well as wastewater treatment and decontamination before utilisation or discharge into a water body. This is the only definition of the term recorded in the legislation of Tajikistan.

SanPiN 2.1.4.005-07, **Water Quality Requirements for Non-Centralized Water Supply**, approved on March 1 2007, were prepared on the basis of Article 17 of the Law of the Republic of Tajikistan “On Ensuring the Sanitary and Epidemiological Safety of the Population” dated December 8, 2003 No. 49. The primary objective of these standards is to prevent and address water contamination originating from decentralized water supply sources intended for both public and individual use.

SanPiN 2.1.4.004-07, "**Drinking Water. Hygienic Requirements to Water Quality of Centralized Drinking Water Supply Systems. Quality Control**" provides guidelines for organizations, enterprises, and entities responsible for operating centralized drinking water supply systems and ensuring the quality of drinking water. These guidelines are also relevant for sanitary and epidemiological service agencies overseeing public water supply systems. The main objective is to implement quality control measures for centralized drinking water systems and to ensure compliance with SanPiN requirements. The guidelines cover legal foundations, procedures for selecting quality indicators, development of water safety plans, methods for controlling pollutant levels, decision-making processes for modifying treatment schemes, and enforcement measures. Additionally, they address situations where regional standards may apply and provide recommendations for laboratory operations conducting water quality assessments.

SNiP 40.02-2009 specifies wastewater disposal rates (specific average daily wastewater disposal), specifying that 350 dm^3/ day for urban residents (per resident) and 125 dm^3/ day for rural populated areas. This rate is employed in the design, construction, and reconstruction of sewerage and water disposal systems. Consequently, the system should be capable of receiving the specified quantity of water for disposal.

SanPiN 2.4.1.009-13, "**Hygienic Requirements for Preschool Educational Institutions**" were developed in accordance with Articles 5, 25 and 38 of the Law of the Republic of Tajikistan "On ensuring sanitary and epidemiological safety of the population" and define sanitary norms and rules, sanitary and hygienic requirements for preschool educational institutions. The regulations stipulate that preschool educational institutions must be equipped with water supply, sewerage, and hot water systems, ensuring compliance with sanitary drinking water standards. Water consumption norms are established, with specific requirements for different age groups regarding plumbing equipment and facilities. Adequate provisions

for hot water supply and functional plumbing fixtures are mandated, along with separate facilities for boys and girls in senior preparatory groups. Additionally, provisions for staff sanitation are required if a staff room with a bathroom is unavailable.

SanPin, "**For the Collection, Neutralization, Transportation, Storage, and Disposal of Waste in Medical Institutions**", approved on May 14, 2014, has been devised for individuals and legal entities whose activities are related to the handling of medical waste. Article 42 states that the disposal of organic and pathological waste, including placental pits and landfills, must consider sociological, cultural, religious, and aesthetic norms. Placental pits, effective in resource-limited settings, should be carefully located to prevent groundwater contamination. Natural decay and seepage help reduce waste volume and inactivate pathogens. Pathological waste disposal in landfills requires careful management to prevent contact with other wastes and prompt covering with soil. Thus, water contamination risks must be mitigated during waste disposal processes.

SanPiN 2.1.4.00_22, "**Sanitary and Epidemiological Requirements to Contamination Protection of Underground Water Bodies used in Drinking Water Supply**", outline measures for the sanitary protection of underground water bodies from activities that negatively impact their quality. These measures include careful selection of activity locations, modernisation of wastewater treatment methods, and adherence to sanitary standards during facility operation. Preventive measures at the design stage aim to forecast potential pollution and implement preventive actions. Additionally, operating facilities must comply with maintenance requirements, deploy modern technologies to reduce harmful substances in wastewater, and adhere to hygienic standards in various industries, including agriculture and mineral extraction. Specific measures had been defined for drilling wells to prevent contamination, including the use of approved chemical agents and containment systems. Proper disposal of drilling sludge and waste materials is mandated, and activities that could pollute underground water bodies, such as irrigation with wastewater, are prohibited.

Annex 7: Institutional Arrangements of Sanitation Sector in Tajikistan

- The **Ministry of Energy and Water Resources** (MoE&WR) is responsible for national policy and planning in the water sector, but operational responsibility for water delivery to the urban municipal and commercial sectors is with the local city authorities.
- The **Ministry of Finance** allocates public funds to sector agencies.
- **Antimonopoly Agency** (AMA) – Sets norms and standards, verifies implementation, and resolves disputes related to prices, expenses, government subsidies, and changes in tariffs for water and wastewater.
- Ministry of Health is responsible for quality control through the **Sanitary and Epidemiological Service** (SES). SES Monitors water quality standards and is involved in permitting processes for water use and wastewater discharge.
- The **Healthy Lifestyle Centres** (HLSCs) are responsible for sensitization and awareness raising regarding hygiene and sanitation among the population to prevent the spread of diseases.
- **State Committee on Environmental Protection** (SCEP) develops government policies on environmental management and control, including water permits and licensing.

- **State Committee on Architecture and Construction** conducts state expertise of design documentation for water construction projects, establishes construction norms and standards, and approves water drilling projects.
- **State Committee for Land Management and Geodesy** issues land use permits and construction certificates for water sector projects. A member of the Working Group for preparation of State Program for Drinking Water Supply and Sanitation.
- **Main Department of Geology** works with SCEP on groundwater resources and maintenance, monitoring abstraction and quality control. The department plays a crucial role in managing Dushanbe's underground water resources. Its monitoring infrastructure, comprising 15 reservoirs and 74 boreholes, provides essential data for assessing water resource health and sustainability. This system aids in understanding groundwater levels, quality, and potential risks to the city's water supply.
- The **National Statistical Committee** leads on data collection for reporting on social sectors with particular emphasis on SDGs including WASH indicators.
- **Water Users Associations** are the non-commercial organizations focused on irrigation, regulated by the Agency for Land Reclamation and Irrigation. They coordinate water distribution for irrigation, collect fees, and resolve disputes.
- **Service providers** (such as providers of mobile services in drinking water provision or disposal of sewage/sludge from cesspools/septic tanks). Independent private operators play a vital role in faecal sludge disposal, paying nominal fees for disposal services. Dushanbe benefits from approximately 10-12 operational vacuum trucks, essential for faecal sludge disposal.

Annex 8: Stakeholder Challenges, Opportunities, and Market Dynamics

Stakeholder(s)	Challenges	Opportunities	External Risks
SUE DVK	- The presence of narrow pipes presents a significant obstacle to effective sewerage, underscoring the critical need for infrastructure improvements to enhance the overall sanitation system. - The high frequency of accidents, such as clogs, occurring on drainage networks emphasizes the urgent requirement for maintenance and	- The planned sewerage expansion presents an opportunity for SUE DVK to increase its service coverage and reach households currently not connected to centralized systems, thereby expanding its customer base and revenue streams. - Investing in innovative solutions to address infrastructure challenges, such as implementing GIS for better data management and predictive maintenance systems for addressing	- Climate change-related events such as extreme weather conditions, floods, or droughts can damage sanitation infrastructure, disrupt service delivery, and increase operational costs for SUE DVK. - Limited funding, access to raw materials, and skilled labour may hinder SUE DVK's ability to implement infrastructure projects and maintain existing systems, potentially affecting service reliability and quality.

	modernization of existing systems. - Instances of damage caused by tree roots infiltrating pipes highlight the necessity for innovative solutions and designs aimed at preventing such technical issues from occurring. - With the expansion of mauhallas and associated difficulties in data collection, efficient data management systems become imperative to inform effective planning and decision-making processes. - Challenges stemming from underreported household sizes underscore the importance of accurate demographic data to facilitate the effective estimation of waste generation and management requirements. - The existence of treatment gaps for chemical waste, attributable to resource constraints, raises concerns regarding the comprehensiveness of wastewater treatment efforts. The absence of separate bills for water and sanitation services, coupled with a lack of differentiation based on gender, ability, or other parameters, underscores	drainage network issues, can enhance operational efficiency and service delivery. - Ensuring compliance with regulatory requirements for infrastructure expansion projects can enhance SUE DVK's reputation and credibility, potentially attracting more investment and partnerships for future initiatives. - Addressing billing and differentiation challenges can lead to more transparent and efficient billing practices, increasing customer satisfaction and revenue collection for SUE DVK.	- Reliance on new technologies or software systems for data management and service delivery may pose risks such as technical failures, cybersecurity threats, or compatibility issues, affecting SUE DVK's operational efficiency and reputation. - Given Tajikistan's location in a politically sensitive region, any escalation of geopolitical tensions or conflicts with neighbouring countries could disrupt the supply chain for essential materials, affecting SUE DVK's operations and project timelines. - Economic downturns or social unrest could lead to decreased government funding for sanitation projects and decreased ability for households to pay for sanitation services, affecting SUE DVK's revenue and operational capacity. - Changes in environmental regulations or international agreements related to water and sanitation could impose new compliance requirements or standards on SUE DVK, requiring investments in technology upgrades or infrastructure modifications to remain compliant. - Tajikistan's rugged terrain and remote rural areas present logistical challenges for sanitation service delivery. Inaccessibility due to mountainous landscapes, inadequate road infrastructure, and geographical isolation can hinder the extension of sanitation

	the necessity for transparent billing practices and the consideration of diverse user needs in billing systems. This poses a significant challenge to ensuring equitable access to sanitation services for all segments of the population.		services to marginalized communities, exacerbating disparities in access to clean water and sanitation facilities.
Ministry of Energy and Water Resources	- The Ministry relies on DVK's reports for water production, sales, and losses. Any inaccuracies or inconsistencies in these reports could hinder the Ministry's ability to effectively monitor and regulate the water sector. - While DVK submits plans, programs, and reports to the Municipality, the Ministry may have limited direct oversight over DVK's day-to-day operations. This could pose challenges in ensuring compliance with national water regulations and standards. - The Municipality intervenes in key staffing decisions at DVK, which may affect the quality and efficiency of the workforce. The Ministry may face challenges in ensuring that DVK employs qualified personnel to effectively manage water resources.	- DVK receives financial support from the Municipality and guarantees loans from International Financial Institutions (IFIs). The Ministry can leverage this financial support to fund water sector projects and initiatives aimed at improving water resource management and service delivery.	- The Municipality's intervention in DVK's staffing decisions may result in political interference in the water sector. This could undermine the Ministry's efforts to maintain regulatory independence and ensure effective water governance. - DVK's reliance on financial support from the Municipality and loans from IFIs may expose the water sector to financial risks. Economic downturns or changes in government priorities could impact the availability of funding for water sector projects, affecting the Ministry's ability to implement its initiatives. - If DVK fails to comply with legal and regulatory requirements, it could pose risks to water quality, service delivery, and public health. The Ministry may face external pressure to address any regulatory breaches and mitigate potential negative impacts on the water sector.
Ministry of Finance	The allocation of funds for drinking water, sanitation, and hygiene initiatives faces a significant hurdle as the	- MoF can capitalize on opportunities to strengthen its financial oversight role concerning water and sanitation budgets. By	- Tajikistan's economy, heavily reliant on remittances, commodity exports, and external aid, is susceptible to economic shocks and fluctuations in global markets.

	expenditure category is not segregated. The absence of a dedicated investment policy tailored to attract private investors to the water and sanitation sector poses a notable challenge. Existing incentives for private sector involvement are broad and lack specificity to encourage targeted investment in this vital sector. Despite recognizing the pressing need for a targeted investment policy in the water and sanitation sector, the committee faces a significant obstacle in the form of limited internal capacity and resources to develop such a framework independently. Consequently, the committee is compelled to seek support from development partners to collaborate on formulating this policy. However, reliance on external assistance introduces complexities such as differing agendas, priorities, and timelines among partner organizations. Thus, navigating these diverse interests and aligning them towards a cohesive and effective investment policy becomes a daunting challenge for the committee.	implementing improved tracking and reporting mechanisms, the MoF can ensure more transparent and accountable budget allocation processes. - There is an opportunity for the MoF to facilitate private sector engagement in the water and sanitation sector by developing targeted investment policies. By collaborating with development partners, the MoF can create incentives that attract private investors, leading to increased investment in critical WASH infrastructure and services. - Collaborating with development partners presents an opportunity for the MoF to leverage external expertise and resources in formulating investment policies. By working together, the MoF and development partners can create a comprehensive framework that addresses the specific needs and challenges of the water and sanitation sector in Tajikistan.	Economic downturns, currency devaluations, or changes in donor priorities can impact government budgets, donor funding for sanitation projects, and private sector investments in the sanitation sector.

Antimonopoly Agency	- The current tariff calculation method relies on outdated data, leading to tariffs that may not accurately reflect current consumption patterns and system losses. The lack of regular tariff adjustments poses a challenge for the Antimonopoly Agency in ensuring fair and transparent pricing for water and sanitation services. - The reported 60% water loss in the system highlights a significant challenge in managing water resources efficiently. Malfunctioning water meters contribute to inaccurate accountability, making it difficult for the Antimonopoly Agency to monitor and regulate water usage effectively. - The absence of a water connection fee raises concerns about the long-term financial sustainability of water supply services. The Antimonopoly Agency recognizes the unfairness in applying the same tariff to both sewered and non-sewered connections, indicating a need for a more nuanced and equitable fee structure. - The combined billing for water and wastewater, may	- Collaborating with international organizations like UNICEF and ADB presents an opportunity for the AMA to enhance its tariff regulation programs and structures. Leveraging external expertise can help develop innovative tariff methodologies that align with international standards and best practices. - AMA's focus on providing subsidies to vulnerable groups aligns with inclusive practices in social welfare. Expanding and improving subsidy programs presents an opportunity for the AMA to enhance access to essential water and sanitation services for underserved communities, thereby promoting social equity and inclusivity. - The AMA's regulatory authority can be leveraged to ensure that infrastructure planning and implementation, as overseen by the Committee for Architecture and Construction, adhere to regulatory standards and promote efficiency, sustainability, and inclusivity in service delivery. - Recognizing the technical expertise gap in designing and implementing appropriate infrastructure, AMA can invest in capacity building initiatives to enhance regulatory oversight and ensure compliance with technical	- Political instability and changes in regulatory frameworks pose a significant risk to the AMA's ability to maintain consistency and effectiveness in tariff regulation and subsidy programs. Uncertainty in regulatory policies could deter private investment and disrupt service delivery. - Economic volatility and financial constraints can affect the affordability of water and sanitation services for consumers and the financial viability of service providers. - Technological disruption and cybersecurity threats pose risks to the integrity and reliability of water supply and sanitation systems.

	not accurately reflect actual usage. The assumption that water entering a household is equivalent to wastewater leaving raises questions about the fairness and accuracy of billing methods, presenting a challenge for the Antimonopoly Agency to ensure transparent and equitable billing practices.	standards, thereby promoting the efficiency and effectiveness of sanitation service delivery.	
Sanitary and Epidemiological Service	- The lack of comprehensive data on newly connected areas poses a challenge for SES in understanding sanitation needs and risks in expanding regions. Without adequate information, SES may struggle to implement targeted interventions and ensure effective service delivery. - SES faces challenges in data management, including the absence of electronic systems and reliance on manual reporting. This hinders comprehensive decision-making and trend identification, limiting SES's ability to respond swiftly to emerging sanitation issues. - Capacity constraints for bacteriological analysis limit SES's ability to thoroughly assess water safety. - SES encounters challenges in regulating private businesses, particularly due to outdated regulations that may not address	- Collaborating with MoH can provide an opportunity for SES to leverage health data and correlate poor sanitation with health issues effectively. By conducting regular meetings and immediate reporting of disease outbreaks, SES can adopt a proactive approach to sanitation management. - Recommending technology integration early in project planning presents an opportunity for SES to enhance waste management strategies. By leveraging innovative waste management technologies, SES can improve sanitation practices and address sanitation challenges more efficiently. - Engaging design institutes in understanding and implementing effective waste management practices offers an opportunity for SES to enhance sanitation infrastructure development. By providing guidance on appropriate technologies, SES can ensure the	- Political and regulatory instability pose external risks to SES's ability to enforce sanitation regulations effectively. Changes in government policies or regulations may impact SES's mandate and hinder its ability to address sanitation challenges adequately. - Climate change and environmental degradation pose external risks to water quality and sanitation infrastructure. Increasing frequency and intensity of extreme weather events may exacerbate sanitation challenges, leading to contamination of water sources and health hazards. - Public health emergencies and disease outbreaks, such as pandemics or epidemics, pose external risks to SES's sanitation management efforts. Rapid spread of waterborne diseases can overwhelm SES's capacity to respond effectively, leading to increased health risks in the population.

	contemporary concerns adequately.	implementation of sustainable sanitation solutions.	
State Committee on Environmental Protection	- Adapting to the impact of climate change on water resources presents a significant challenge for the Committee. Changes in precipitation patterns, increased frequency of extreme weather events, and rising temperatures may affect water availability and quality, requiring proactive measures to mitigate risks. - Addressing *E. coli* contamination and other forms of pollution in water resources poses a significant challenge. The diverse sources of pollution, including inadequate sewer connections and direct waste discharge into rivers, necessitate comprehensive pollution control measures and water quality management strategies. - Effectively managing plastic waste in water resources requires overcoming logistical and infrastructural challenges. Despite awareness campaigns and community engagement initiatives, inadequate solid waste management practices in nearby districts continue to contribute to plastic pollution, posing challenges for the Committee.	- Exploring innovative solutions, such as the use of advanced technologies for plastic waste collection and recycling, presents an opportunity for the Committee to enhance its plastic waste management efforts. Collaboration with technology providers and research institutions can facilitate the adoption of sustainable practices. - Strengthening community engagement in water quality monitoring can empower local residents to actively participate in safeguarding water resources. Establishing community-led monitoring programs and providing training on water quality testing methods can enhance data collection and promote environmental stewardship. - Integrating climate resilience considerations into water management practices presents an opportunity for the Committee to enhance the adaptive capacity of Dushanbe's water infrastructure. Implementing nature-based solutions, such as green infrastructure and watershed restoration projects, can improve water resource sustainability in the face of climate change.	- Resource constraints and funding uncertainty pose external risks to the Committee's ability to implement effective environmental protection measures. Dependence on external funding sources and fluctuations in financial support may impact the Committee's capacity to address sanitation challenges and mitigate environmental risks. - Policy and regulatory changes at the national or regional level may introduce uncertainty and complexity into environmental protection efforts. Changes in environmental legislation or regulatory frameworks could affect the Committee's mandate, requiring adaptation to new requirements and compliance obligations. - Public health emergencies, such as disease outbreaks or pandemics, pose external risks to the Committee's sanitation management efforts. Increased pressure on water resources and sanitation infrastructure during health crises may strain the Committee's capacity to maintain water quality standards and address sanitation challenges effectively.

State Committee on Architecture and Construction	The trend towards high-rise buildings in Dushanbe poses challenges for the Committee in terms of adapting water, sanitation, and hygiene systems to meet the needs of densely populated vertical communities. Ensuring adequate water supply, wastewater management, and sanitation infrastructure for high-rise buildings requires innovative design solutions and engineering expertise. - The absence of clear monitoring and regulation at the household level regarding sanitation facilities presents challenges for ensuring compliance with sanitation standards. Without effective oversight, households may construct inadequate or non-compliant sanitation facilities, compromising public health and environmental sustainability. - Despite providing recommendations, the Committee faces challenges in translating suggested designs into actual implementation. Implementation gaps, driven by factors such as limited resources, conflicting priorities, and socio-economic constraints, hinder the realization of	- The trend towards high-rise buildings presents an opportunity for the Committee to develop innovative design solutions that integrate water-efficient fixtures, decentralized wastewater treatment systems, and smart technologies to optimize water and sanitation management in vertical communities. Collaboration with architects, engineers, and urban planners can facilitate the development of sustainable design strategies. - Addressing the technical expertise gap through capacity building and technical training programs presents an opportunity for the Committee to enhance its institutional capacity and improve the quality of infrastructure planning and implementation. Investing in training initiatives for staff and stakeholders can foster expertise development and promote best practices in sanitation infrastructure management.	- Budgetary constraints and funding uncertainty pose external risks to the Committee's ability to implement infrastructure rehabilitation and expansion projects. Dependence on government funding and fluctuations in financial allocations may limit the Committee's capacity to address sanitation challenges and meet infrastructure development targets. - Changes in policies or regulations related to construction standards, zoning regulations, or environmental requirements may introduce uncertainty and complexity into sanitation infrastructure projects. Adapting to new regulatory frameworks and compliance obligations may require additional resources and expertise, impacting project timelines and implementation schedules. - Market volatility and supply chain disruptions, such as fluctuations in construction material prices or shortages of skilled labour, pose external risks to infrastructure development projects. Uncertainties in material availability and cost fluctuations may affect project feasibility and budgetary planning, necessitating contingency measures and risk mitigation strategies.

	proposed infrastructure improvements, impacting the overall effectiveness of sanitation service delivery. - The current emphasis on rehabilitating existing infrastructure highlights the need for prioritizing efficiency improvements in the sanitation system. However, the acknowledgment of a technical expertise gap within the institution and the sector at large poses challenges to effectively addressing infrastructure rehabilitation needs and implementing sustainable solutions.		
Main Department of Geology	- Managing the approximately 3000 unregistered boreholes in Dushanbe poses a multifaceted challenge. The lack of oversight over these boreholes not only raises concerns about unsustainable groundwater extraction practices but also increases the risk of groundwater contamination from unregulated sources. - The recent shift in supervision responsibility from the Geology department to another department introduces challenges in organizational coordination and collaboration. Ensuring seamless communication and synergy between	- Leveraging the existing monitoring infrastructure, including reservoirs and boreholes, presents an opportunity for the Main Department of Geology to enhance its data collection and analysis capabilities. By adopting advanced technologies for groundwater monitoring and employing data-driven decision-making approaches, the department can gain deeper insights into groundwater dynamics, identify emerging trends, and proactively address issues related to groundwater quality, quantity, and sustainability. - The observation of stable groundwater quality and existing depth restrictions	- Limited funding and resource constraints present external risks to the Main Department of Geology's capacity to effectively manage groundwater resources. Insufficient financial allocations for monitoring equipment, data analysis tools, and regulatory enforcement may hamper the department's ability to address evolving water resource challenges and implement sustainable management practices. Securing adequate funding through government appropriations or external grants is essential to overcome these constraints and sustain effective groundwater management efforts. - Changes in policies or institutional dynamics, such as shifts in supervision responsibility or restructuring of government

	departments is crucial for effective water resource management. The Main Department of Geology must navigate these dynamics by fostering interdepartmental partnerships, clarifying roles and responsibilities, and establishing transparent communication channels to mitigate potential conflicts and ensure alignment in strategic initiatives.	provides a foundation for strengthening regulatory frameworks governing groundwater management. The Main Department of Geology can capitalize on this opportunity by developing comprehensive regulations that encompass groundwater extraction, usage, protection, and conservation measures. By implementing robust enforcement mechanisms and promoting stakeholder compliance, the department can ensure the sustainable utilization and preservation of groundwater resources for present and future generations.	departments, can introduce uncertainties and disruptions into groundwater management initiatives. Adapting to new policy frameworks and navigating interdepartmental coordination challenges may require the Main Department of Geology to demonstrate flexibility, resilience, and strategic foresight. Establishing clear communication channels, fostering collaborative relationships with relevant stakeholders, and actively participating in policy development processes can help mitigate risks associated with policy changes and institutional dynamics.
Administration of Dushanbe	- Achieving a 100 percent tariff collection rate poses a significant challenge. Without sufficient revenue from tariffs, the municipality may struggle to maintain and upgrade sanitation infrastructure, leading to service disruptions and deteriorating public health conditions. - The reliance on private entities to manage public toilets introduces challenges in ensuring consistent maintenance and cleanliness standards. Without direct oversight from the municipality, there may be disparities in service quality across different facilities, potentially affecting public health and sanitation standards.	- The municipality's financial autonomy and reliance on tariff revenue present an opportunity to implement innovative financing mechanisms and revenue-generating initiatives to support sanitation infrastructure development and maintenance. Exploring public-private partnerships and securing external funding sources could enhance financial sustainability. - Integration of DVK's plan with the city's master plan offers an opportunity to strategically align sanitation infrastructure development with broader urban development objectives. By prioritizing sanitation investments in line with the master plan, the municipality	- Changes in regulatory frameworks or government policies related to tariff setting, public sanitation, or infrastructure development could pose external risks to the municipality's sanitation service chain. Uncertainty regarding future regulations may impact long-term planning and investment decisions, leading to inefficiencies and delays in addressing sanitation challenges. - Economic downturns or fluctuations in funding availability could undermine the municipality's ability to finance sanitation projects and maintain service levels. Reduced financial resources may limit the municipality's capacity to address emerging sanitation issues and upgrade aging infrastructure,

	- While DVK manages occupational safety for its staff, the lack of oversight for safety standards in the private sector poses risks to sanitation workers employed by private entities managing public toilets. Ensuring uniform safety standards across all sanitation-related activities is essential to prevent workplace accidents and injuries.	can optimize resource allocation and improve service delivery efficiency. - The segregation of gender-specific data and information on vulnerable populations provides an opportunity for the municipality to develop targeted sanitation interventions tailored to the needs of marginalized groups. Utilizing this data for inclusive planning can enhance the effectiveness and equity of sanitation services in Dushanbe.	exacerbating public health risks in Dushanbe.
Consumers Union	- The lack of clarity in how sanitation charges are determined, especially without specific meters, presents a significant challenge for CU. Developing mechanisms to understand and regulate tariffs for sanitation systems is essential for ensuring transparency and fairness in billing practices. - Dealing with complaints related to water meters highlights the challenge of consumer awareness and understanding of their rights. Misunderstandings about responsibilities regarding water meter damages can lead to financial burdens on consumers. Increasing awareness about water meters and consumer rights in this regard is crucial.	- CU's focus on creating an effective legislative base for consumer protection provides an opportunity to advocate for policy changes that promote transparency, fairness, and consumer rights in sanitation services. Engaging in legal expertise and legislative advocacy can influence policy decisions in favour of consumers. - CU's initiatives to enhance public engagement and empower consumers with information about their rights and responsibilities represent an opportunity to foster a more informed and proactive consumer base. Strengthening consumer awareness through advisory boards, training programs, and information dissemination can lead to more empowered consumers demanding better sanitation services.	- Changes in government regulations or legal constraints may pose external risks to CU's advocacy efforts and ability to protect consumer rights effectively. Adverse changes in legislation or restrictive legal frameworks could hinder CU's ability to influence policy decisions and advocate for consumer-friendly regulations in the sanitation sector. - Dependency on external funding sources and limited resources may pose risks to CU's sustainability and capacity to carry out its advocacy and awareness initiatives effectively. Insufficient funding or resource constraints could impede CU's ability to address consumer complaints, conduct awareness campaigns, and engage in legal advocacy efforts.

	- CU faces challenges in holding service providers accountable for infrastructure rehabilitation and addressing consumer complaints effectively. Ensuring effective engagement with service providers and leveraging legal means to enforce accountability is essential for protecting consumer rights and improving service quality.		
Republican Healthy Lifestyle Centre	- The inclusion of new territories in Dushanbe presents challenges related to sanitation, wastewater treatment, and limited water access. Addressing these issues in rapidly urbanizing areas requires substantial infrastructure investment and coordinated efforts with relevant stakeholders. The RHLSC may face difficulties in promoting healthy lifestyles and behaviour change in environments where basic sanitation services are lacking, hindering their ability to mitigate health risks effectively. - The RHLSC's reliance on sporadic door-to-door awareness campaigns and information provided by other health-related departments may result in gaps in community outreach and education. Inadequate dissemination of health-related information,	- The strategic presence of the RHLSC in 40 health centres across Dushanbe offers an opportunity to expand their reach and influence in promoting healthy lifestyles. By leveraging this existing network, the centre can intensify its health promotion activities, including raising awareness about sanitation practices and the importance of clean water, within communities facing sanitation challenges. - The RHLSC's initiative to pilot six health programs across Dushanbe demonstrates a commitment to innovation and proactive health promotion strategies. By evaluating the effectiveness of these programs, the centre can identify successful approaches for addressing sanitation-related issues and inform future interventions aimed at improving public health outcomes in areas with sanitation deficiencies.	- Limited financial resources and inadequate infrastructure may pose external risks to the RHLSC's ability to implement effective sanitation and health promotion initiatives. Insufficient funding for sanitation infrastructure development and health education programs could hinder the centre’s capacity to address emerging health risks associated with inadequate sanitation and water access. - Changes in government policies or regulatory frameworks related to sanitation and public health could impact the RHLSC's operations and priorities. Shifting priorities or unclear regulations may disrupt the centre’s long-term planning efforts and require adaptation to new policy directives, potentially affecting the continuity and effectiveness of its sanitation-related programs.

	particularly regarding sanitation and waterborne diseases, could impede the centre's efforts to promote healthy behaviours and prevent illness in the population.		
Service Providers/ Private Sector	- The private sector in Tajikistan contends with significant regulatory constraints, facing a stringent and complex framework comprising 11 critical regulations. This complexity exacerbates the difficulty for private entities to navigate the sanitation landscape. - There are limited opportunities for the private sector in Tajikistan's sanitation domain. The strict regulatory environment may contribute to this limitation, necessitating careful consideration before initiating any projects. - The private sector's involvement in smart sanitation solutions remains limited. While the clean energy sector is experiencing growth, smart sanitation solutions have not gained significant traction. Scaling opportunities for sanitation-focused ventures are currently limited. - There is noted private sector disinterest in	- Private sector entities stand to gain from strategic investments in waste management, segregation, and recycling endeavours, thereby bolstering the enhancement of sanitation practices across Tajikistan. This avenue presents an opportunity for private entities to contribute significantly to the country's sanitation landscape. - The involvement of private entities in the import of sanitation materials and infrastructure holds promise for fortifying the development of sanitation systems in Tajikistan. By actively participating in this aspect, private stakeholders can not only facilitate infrastructure growth but also stimulate overall industry expansion. - Embracing collaboration and subcontracting in construction undertakings, particularly those geared towards sanitation improvement, offers the private sector a platform to spur innovation and foster sustained industry advancement. Through strategic partnerships, private entities can drive initiatives	- The increasing frequency and intensity of extreme weather events, such as floods and droughts, pose risks to sanitation infrastructure and operations. This can lead to disruptions in service delivery and increased maintenance costs for private sector entities. - Water scarcity and depletion of natural resources may hinder sanitation projects, particularly those reliant on water-intensive processes. Private sector entities may face challenges in securing adequate water resources for sanitation initiatives. - Uncertain political conditions may deter private sector engagement and investment in sanitation projects. - Fluctuations in economic conditions, including currency devaluation and inflation, can impact the affordability of sanitation services for households and businesses. This may affect the demand for sanitation products and services provided by the private sector.

	decentralized systems, emphasizing the need for early incentives and potential partnerships, particularly considering ongoing efforts by INGOs in decentralized wastewater systems. - Tajikistan's sanitation sector heavily relies on government subsidies, with cost recovery identified as a major issue. - Access to affordable credits and financial options remains a significant bottleneck, constraining private sector investment in sanitation initiatives.	that propel the sanitation sector towards greater efficiency and effectiveness. - The expressed enthusiasm of private sector organizations towards waste-to-energy ventures signals an alignment with Tajikistan's increasing clean energy sector. This convergence of interests presents a unique opportunity for private entities to delve into environmentally sustainable initiatives while simultaneously tapping into a growing market segment. - Rapid urbanization and population growth in Tajikistan's urban centres create demand for improved sanitation facilities and services. Private sector entities can capitalize on this trend by offering innovative sanitation solutions tailored to urban environments. - Heightened awareness of public health risks associated with inadequate sanitation practices can drive demand for sanitation solutions. Private sector entities offering hygienic and environmentally sustainable sanitation products and services stand to benefit from increased consumer demand driven by health concerns.	

Annex 9: Calculations, Assumptions, and Justifications for SFD Development

Item	Value	Assumptions / Justifications / Calculations
Population	1,233, 961	Data source DVK (utility).
Groundwater Risk Significance	Significant Risk	I. Vulnerability of the aquifer: High • Rock type in the unsaturated zone: Weathered basement – Based on assumption, and prevalent rock formation in Tajikistan. Data not provided. • Depth to groundwater table: 5 – 10 meters – Assumption. No data provided. II. Lateral Separation of containments and water sources • percentage of sanitation facilities that are located <10m from groundwater sources: Less than 25% (Based on Household Survey) • Percentage of sanitation facilities, if any, that are located uphill of groundwater source: No data provided. Worst case scenario (higher than 25%) used. III. Water Supply • Percentage of drinking water from groundwater sources: 54% (Yugo Zapadnaya Water Intake Kafarnihan) – Source: DVK Data • Water production technology used: protected boreholes.
Sanitation systems Available in Dushanbe	• No onsite container: Toilet discharges directly to centralised foul/separate sewer. • Lined tank with impermeable walls and open bottom. • Lined pit latrine with semi-permeable walls and open bottom • Unlined pit latrines	Data from household survey and DVK
Sewered Sanitation Services		

<table>
<tr><th>Item</th><th>Value</th><th>Assumptions / Justifications / Calculations</th></tr>
<tr><td>Percentage of population using sewered services</td><td>60%</td><td>It is widely accepted as fact by all stakeholders that 60% of Dushanbe population is connected to sewer networks. Although evidence of this was not very clear, DVK stated the total number of customers with access to sewered services (see cell below).</td></tr>
<tr><td>Proportion of wastewater in sewer system which is delivered to centralised treatment plant.</td><td>72.2%</td><td>

Sewer produced (SP)= 80% X Water supplied to sewered population
Water supplied to sewered population (WS)= ((number of HH with both water and sewer connection)/ (Total HH supplied with water)) x Total water supplied
(Accounting for 6296 discrepancies deducted from total number of customers (households) for water supply and sanitation) (see comment on table below from DVK)

<table>
<tr><th>#</th><th>Number of Customers</th><th>Number of Customers (Households) for Water Supply and Sanitation</th><th>Water Supply</th></tr>
<tr><td>1</td><td>247436</td><td>174251</td><td>66889</td></tr>
</table>

WS = 72% x 408 500 m3/day = 294,120 m3 / day
Therefore SP = 80% X WS = 80% x 294120 m3/day = 235,296 m3/day
Percentage of Wastewater reaching treatment plant = (volume reaching treatment plant per day (VR) /Sewer Produced (SP)) x 100%
VR (reported by DVK) = 170, 000m3/day
Percentage of Wastewater reaching Treatment plant = VR / SP x 100% = (170,000 / 235,296) x 100 % = 72.2%

Total number of customers (247436). Number of customers for water supply and sanitation (174251) is not equal to Number of customers only for water supply (66889). There is a difference of 6296. This is due to demolition of huge number of buildings which are not taken from the registration yet.
</td></tr>
<tr><td>Percentage of Wastewater Safely Treated</td><td>30%</td><td>Based on assessment of treatment plant, a maximum of 30% of the WWTP is functional.</td></tr>
</table>

Item	Value	Assumptions / Justifications / Calculations
Non-sewered sanitation services Notes. **1.** Numbers from the household survey are used only to estimate the relative proportions in the types of technologies used amongst the non-sewered population. This assumes that the sample used, 320 for non-sewered households (see Inception report for details on the sample) are representative of the population using non-sewered sanitation. **2.** Although all lined tanks in Dushanbe are referred to as septic tanks, the household survey showed that none of the tanks fit the standard definition of a septic tanks but were rather lined tanks with an open bottom. Septic tanks are designed to separate solids from liquids, typically with two chambers with a baffled separation, and are connected to a soak pit. The tanks identified in the survey all had one tank with an open bottom. **3.** Emptying: To determine the proportion of facilities emptied or not, facilities that were last emptied more than 10 years ago were classified as not emptied. Households that reported never emptying and "don't know" were also classified under not emptied.		
Total non-sewered population	**40%**	Based on DVK data on customers connected to sewer network. This 40% is partitioned into the different OSS technologies based on outcomes of the household survey.
Percentage of population using Lined Tanks with impermeable walls and open bottom (OSS – 1)	**33%**	This includes pit latrines and "septic tanks" according to the local nomenclature, which are fully lined on the sides and have an open bottom. Count = 262; represents 82% of the non-sewered population = 33% of Dushanbe
Proportion of OSS – 1 emptied	38%	Count of surveyed tanks emptied in less than 10 years: **110/262 = 42%** However, assuming that the facilities are emptied when full, and only 90% of the FS is removed from the tank, with the rest remaining in the pit after emptying, this reduces to 90% x 42 = **38%**
Proportion of OSS – 1 transported and delivered to treatment plant	100%	**Transportation:** No indiscriminate dumping of faecal sludge was reported, so it was assumed that 100% of the faecal sludge collected from pits was safely delivered to the treatment plant. Since exact proportions of faecal sludge removed from the pits (could be partial or completely emptied – and varies from site to site) is not possible to ascertain, the faecal sludge received at the treatment plant could not be used to confirm whether there was any faecal sludge disposed illegally. For this, the reports of city authorities and DVK were relied on.

Item	Value	Assumptions / Justifications / Calculations
Proportion of OSS – 1 safely treated at the plant	50%	**To reduce error, it was assumed that 50% of the faecal sludge was safely treated.** DVK reported that before FS is re-used in agriculture or disposed "its dried under the sunlight until all hazard gases are evaporated and no bad odour is left". During site visit to treatment plant, there was no clear retention period for faecal sludge, and it is difficult to ascertain the extent of treatment of the faecal sludge prior to reuse or disposal. Although the faecal sludge collected from the pits is very likely to have a high solids concentration due to some dewatering that happens onsite, the sludge likely still has a high pathogen content. It was also noted that there were no clear / standardised records of tanker deliveries to the treatment plant, and haphazard loading of drying beds without clear monitoring by the treatment plant. This could result in poor drying and increased pathogen concentrations in partly dried sludge which could be used for agricultural purposes.
Percentage of population using Lined pit latrines with semi-permeable walls and open bottom (OSS – 2)	**1%**	This includes pit latrines which are partially lined on the sides and have an open bottom. Count = 5; represents 2% of the non-sewered population = 1% of Dushanbe
Proportion of OSS – 2 emptied	18%	Emptied less than 10 years ago: count 1 – 20% of this technology. Assuming every pit is emptied when full and 90% of faecal sludge is removed from the pit – reduces this to 18%
Proportion of OSS – 2 emptied that is delivered to treatment plant.	100%	100% (see justification for OSS-1)
Proportion of OSS – 2 safely treated at the plant	50%	Treatment – 50% (see justification for OSS-1)
Percentage of population using unlined	**6%**	This includes pit latrines which are not lined on the sides and have an open bottom Count = 49; represents 15% of non-sewered population = 6% of Dushanbe

Item	Value	Assumptions / Justifications / Calculations
pit latrine (OSS – 3)		
Proportion of OSS – 3 emptied	48%	Emptied less than 10 years: count 26/49 = 53% >> assuming only 90% proportion is emptied when full >> 48%
Proportion of OSS – 3 emptied and delivered to treatment plant.	100%	100% (see OSS – 1 justification)
Proportion OSS – 3 safely treated	50%	50% (see OSS 1 Justification)
Lined pit latrine with impermeable walls and open bottom discharging to open ground or water body or "don't know where". (OSS – 4)	**0%**	Count = 3; represents 1% of non-sewered population = 0.4% of Dushanbe

Executive Summary for WWTP

The wastewater treatment plant is located in the southern part of the city of Dushanbe, at the end of N. Karabaev Avenue, along the right bank of the Dushanbinka River at the confluence of two rivers, Dushanbinka and Kafirnigan. The total area of the wastewater treatment plant is roughly 130.0 hectares. Favorable terrain ensures gravity flow of wastewater to treatment plants.

Currently operating treatment facilities consist of the following structures:

- Grid buildings with mechanized grids;
- Sand traps (horizontal and with circular movement of water);
- Primary radial settling tanks ;
- Aerotanks ;
- Secondary radial settling tanks ;
- Biological ponds ;
- Methane Tank

- Sludge ponds ;
- Sand ponds ;
- Chlorination ;
- Pumping stations pumping sludge ;
- Pumping stations pumping silt/sand ;
- Blower stations ;
- Administrative and household housings ;

1. Mechanical grids.
   Grids with rectangular rods are used to retain large floating waste. There are 3 grids installed in the building. All waste water enters the screen building.
2. Horizontal sand traps.
   Sand traps are designed to separate heavy mineral impurities (mainly sand) from wastewater and are installed in front of settling tanks.
   Horizontal sand traps with linear water movement have a rectangular shape. Flat distribution grids are installed at the water inlet into the sand trap . Sand traps operate at 30% of their designed capacity.
3. Primary radial settling tanks.
   Primary settling tanks are in front of biological wastewater treatment facilities. In a radial settling tank, wastewater moves from the centre to the periphery. A feature of the hydraulic mode of operation of a radial settling tank is that the speed of water movement varies from its maximum value in the centre of the settling tank to the minimum at the periphery. Floating substances are removed from the surface of the water in the settling tank by a suspension device placed on a rotating truss and enter a collection tray. The falling sediment is moved into the settling pit using scrapers mounted on a movable truss. The sediment is removed through a pipeline using centrifugal pumps installed in a nearby pumping station. Of the 24 existing primary settling tanks, only 8 are operational.
4. Aero tanks
   Biological wastewater treatment in aeration tanks occurs because of the vital activity of activated sludge microorganisms. The wastewater is continuously mixed and aerated until the air is saturated with oxygen.
   Due to the fact that the blower station is not working, the aeration tank does not perform its function. At this time, the aeration tank works as a settling tank.
   The air blower aeration station of the biological treatment system has failed. The existing blower station is energy-intensive; during its operation, a significant amount of electricity was consumed, and therefore the station has not been operating for a long time.
5. Biological ponds.
   Biological ponds are artificially created reservoirs for biological wastewater treatment, based on the processes that occur during self-purification of reservoirs.
   The cascade of biological ponds is more than 2 km long and 350 m wide. Biological treatment that did not take place in aeration tanks takes place in biological ponds.
6. Silt sites.
   The collected sediment is dewatered at sludge beds and transported for fertilization. Up to 15,000 m3 of sediment enters the sludge beds per year.

7. Chlorinator
   Chlorination is carried out with a solution of sodium hypochloride in front of biological ponds.

Распределительная камера/distribution chamber

Здание решеток/grid building

Механические решетки/mechanical grids %60 functional

Горизонтальные песколовки/ Horizontal sand traps %40

Первичные горизонтальные отстойники/Primary settlement ponds

Аэротенки/Airtanks non functional

Здание воздуходувной станции/airtank pumping station, non functional

Воздуходувки/airblowers

Вторичные радиальные отстойники/secondary settlement ponds

Бак с раствором хлора/Tank with chlorine

Иловые площадки/sludge ponds

Annex 10: Tariffs for Drinking Water Supply and Sewerage Services, and Solid Waste Management

Tariffs for Drinking Water Supply & Sewerage Services[24]

On the basis of Tax Code of the Republic of Tajikistan, i.e. Chapter 8, Section 36, Article 264, the Value Added Tax (VAT) have changed from 18% to 15%. Consequently, the tariffs for drinking water supply and sewerage services have been duly amended, and as of 01 January 2022 those changes came into effect within the State Unitary Enterprise "Dushanbevodokanal".

Tariffs for 'budget'[25] (public) organizations and entities for 1m^3 in TJS

Services	Without VAT (15%)	VAT (15%)	Incl. VAT (15%)
Drinking water supply	1.55	0.23	1.78
Sewerage	0.70	0.11	0.81
Total	**2.25**	**0.34**	**2.59**

Tariffs for commercial (for profit) organizations for 1m^3 in TJS

Services	Without VAT (15%)	VAT (15%)	Incl. VAT (15%)
Drinking water supply	3.75	0.56	4.31
Sewerage	1.95	0.29	2.24
Total	**5.70**	**0.86**	**6.56**

Tariffs for the population for 1m^3 in TJS *(no metered connection, in accordance with established norms)*

Services	Without VAT (15%)	VAT (15%)	Incl. VAT (15%)
Drinking water supply	0.49	0.07	0.56
Sewerage	0.17	0.03	0.20
Total	**0.66**	**0.10**	**0.76**

Tariffs for the population for 1m^3, multiplied by a coefficient of "3", in TJS *(with metered connection)*

Services	Without VAT (15%)	VAT (15%)	Incl. VAT (15%)
Drinking water supply	1.47	0.22	1.69
Sewerage	0.51	0.08	0.59
Total	**1.98**	**0.30**	**2.28**

Tariffs for households in 1-12-story buildings, per month, in TJS, per person *(in accordance with established norms)*

[24] Approved by Director of SUE Dushanbevodokanal
(Signed by) Mirzozoda E. M. / 01 January 2022

[25] Organizations and entities fully or partially financed from the state budget of the Republic of Tajikistan

Services	Volume *(in m^3)*	Without VAT (15%)	VAT (15%)	Incl. VAT (15%)
Drinking water supply	10.8	5.29	0.79	6.08
Sewerage	10.8	1.84	0.28	2.12
Total		**7.13**	**1.07**	**8.20**

Tariffs for households in buildings with more than 12 stories, per month, in TJS, per person *(in accordance with established norms)*

Services	Volume *(in m^3)*	Without VAT (15%)	VAT (15%)	Incl. VAT (15%)
Drinking water supply	14.4	7.06	1.06	8.12
Sewerage	11.4	1.94	0.29	2.23
Total		**8.99**	**1.35**	**10.34**

Tariffs for common dormitories, connected to sewerage network in Dushanbe city, in TJS, per person, per month *(in accordance with established norms)*

Services	Volume *(in m^3)*	Without VAT (15%)	VAT (15%)	Incl. VAT (15%)
Drinking water supply	9	4.41	0.66	5.07
Sewerage	9	1.53	0.23	1.76
Total		**5.94**	**0.89**	**6.83**

Tariffs for private households (private sector), connected to sewerage network in Dushanbe city, in TJS, per person, per month *(in accordance with established norms)*

Services	Volume *(in m^3)*	Without VAT (15%)	VAT (15%)	Incl. VAT (15%)
Drinking water supply	7.5	3.68	0.55	4.23
Sewerage	3	0.51	0.08	0.59
Total		**4.19**	**0.63**	**4.82**

Average consumption and payments for drinking water supply and sewerage services, per person, per month = 2.4m^3 for metered connections, in TJS

Services	Volume *(in m^3)*	Without VAT (15%)	VAT (15%)	Incl. VAT (15%)
Drinking water supply	2.4	3.53	0.53	4.06
Sewerage	2.4	1.22	0.18	1.40
Total		**4.75**	**0.71**	**5.46**

Tariffs: Solid Waste Management
endorsed and operational in each district of Dushanbe city (2023)

#	Service Category	Districts of Dushanbe city			
		Sino	*Firdavsi*	*Shohmansur*	*I. Somoni*
1	HHs living in Buildings with in-built solid waste pipes (9-16 stories)	4.20	4.10	3.90	3.90
2	HHs living in Buildings without in-built solid waste pipes	3.40	3.30	3.20	3.20
3	Private households (with yard, plot)	4.85	4.70	4.60	4.70
4	Private households, not landscaped	4.70	4.50	4.40	4.70
5	For budget organizations/entities, per $1m^3$	47.40	41.80	43.10	43.10
6	For commercial organizations/entities, per $1m^3$	66.80	65.30	53.70	53.70

**Solid waste management tariffs for the population of Dushanbe city changed in 2023 with a 10% increase.*

Annex 11: CSDA Justifications

Enabling Pillar – Policy and Legislation

Sewered Sanitation	Non-Sewered Sanitation
WC, House Connection: The Sanitary Regulations for sewerage services may provide some guidance for connections, there is currently lack of an overarching national or local comprehensive policy framework. Various SanPins exist to regulate sewerage services, providing some legislative and regulatory mechanisms. These regulations are supported by complementary codes, specifications, and schedules. A National Sanitation Strategy for Tajikistan has recently been drafted, and its key features are being integrated into National Water Sector Programme 2040. A dedicated entity for sewerage services exists in Dushanbe.	**Toilet, Pit, Septic Tank** The use of non-sewered sanitation services is not enabled by an appropriate, widely known, acknowledged, and available national or local policy framework. There is a lack of comprehensive national or local legislation and regulatory mechanisms specifically tailored to non-sewered sanitation services, despite the existence of various SanPiNs with complementary codes, specifications, and schedules. Responsibility for non-sewered sanitation service delivery is only partially assigned to institutions with somewhat defined roles, responsibilities, and mandates.
Sewerage The provision of sewerage services, including household connections, lacks support from an appropriate, widely known, acknowledged, and available national or local policy framework (Sanitation Strategy /Policy). However, responsibility for sewerage service delivery is clearly assigned to an entity with well-defined roles, responsibilities, and mandates. Additionally, there are comprehensive national and/or local legislation and regulatory mechanisms for sewerage services, backed by necessary sanitary rules codes, etc., which are widely publicized.	**Emptying and Transport** The use of non-sewered sanitation services lacks support from an appropriate, widely known, acknowledged, and available national or local policy. Responsibility for non-sewered sanitation service delivery is not clearly assigned to any institution with well-defined roles, responsibilities, and mandates. The emptying and transport are primarily handled by the private sector, which operates with limited regulations. Additionally, there is lack of existing national or local legislation and regulatory mechanisms for non-sewered sanitation, backed by necessary complementary codes, specifications, schedules, etc.

Sewerage Treatment and Reuse Though there is lack of adequate support from an appropriate, widely recognized, and readily available national or local policy framework for sewerage services, responsibility for sewerage service delivery is clearly assigned to an entity with well-defined roles, responsibilities, and mandates. However, national and/or local legislation and regulatory mechanisms are in place for sewerage services, supported by necessary sanitary rules and codes, etc., and these regulations are widely disseminated and understood.	**Sludge Treatment and Reuse** The utilisation of non-sewered sanitation services is not facilitated by an appropriate, widely recognized, and readily accessible national or local policy. The assignment of responsibility for non-sewered sanitation service delivery lacks clarity, with the emptying and transportation primarily overseen by the private sector under limited regulations. Moreover, there is a notable absence of national or local legislation and regulatory frameworks for non-sewered sanitation.

Enabling Pillar – Planning and Budgeting

Sewered Sanitation	Non-Sewered Sanitation
WC, House Connection Service levels for sewerage accessibility are specified in current approved plans, although targets are either not stated or not officially adopted. No separate budget lines for sewerage are separately defined.	**Toilet, Pit, Septic Tank** Service levels and targets for non-sewered sanitation are not specified in current approved plans, with no reference provided. Additionally, there are no annual or medium-term budget lines allocated for non-sewered sanitation, including both hardware and software components.
Sewerage Current approved plans specify service levels for sewerage accessibility, although targets are either unspecified or not officially adopted. There is a lack of separately and well-defined medium-term budget lines for sewerage.	**Emptying and Transport** Service levels and targets for non-sewered sanitation are not specified in current approved plans, with no reference provided. Additionally, there are no annual or medium-term budget lines allocated for non-sewered sanitation, including both hardware and software components.
Sewerage Treatment and Reuse Service levels and targets for the accessibility of sewerage, along with connections, are outlined in current approved plans, with clear specifications and official adoption. The budgetary framework for sewerage lacks clarity, with annual and medium-term budget lines being inadequately defined, particularly concerning software components and operational aspects.	**Sludge Treatment and Reuse** Service levels and targets for non-sewered sanitation are not specified in current approved plans (no reference provided). Additionally, there are no annual or medium-term budget lines allocated for non-sewered sanitation, including both hardware and software components.
Inclusion – WC, House Connection and Sewerage The policy, planning, and budgeting process for sanitation services include references to inclusivity, as mentioned in policy documents. However, the incorporation of inclusivity in the planning and budgeting process is either implicit or weak. The National Development Strategy underscores the importance of considering inclusivity in the formulation of plans or policies.	**Inclusion– Toilet, Pit and Septic Tank and Emptying and Transport** The policy, planning, and budgeting process for non-sewered sanitation lacks inclusion criteria, thus falling short of stakeholder agreements and definitions of inclusivity.

Delivering Pillar – Funding

Sewered Sanitation	Non-Sewered Sanitation

WC, House Connection There are a few investment plans for sewerage hardware and software, covering approximately 50 percent of the necessary components to achieve service level targets over the medium term. These include initiatives such as the Water Supply and Sanitation Program 2030 - Investment Planning Draft and targets outlined in the Corporate Business Plan by ADB. Additionally, annual funding allocations for sewerage are deemed sufficient and utilised as intended. However, there are only partially functional mechanisms for coordinating sewerage investments between donors, donors, and government, and within the government.	**Toilet, Pit, Septic Tank** There is no investment plan in place for non-sewered sanitation hardware and software to achieve service level targets over the medium term. Annual funding allocations for non-sewered sanitation are wholly inadequate and not utilized as planned. Additionally, effective coordination mechanisms for non-sewered sanitation investments between donors, donors and government, and within the government are non-existent.
Sewerage There are a few investment plans for sewerage hardware and software, covering approximately 50 percent of the necessary components to achieve service level targets over the medium term. These include initiatives such as the Water Supply and Sanitation Program 2030 - Investment Planning Draft and targets outlined in the Corporate Business Plan by ADB. However, annual funding allocations for sewerage are only partially sufficient and partially used as planned. Additionally, there are some partially functional mechanisms for coordinating sewerage investments between donors, donors and government, and within the government.	**Emptying and Transport** There is currently no investment plan established for non-sewered sanitation hardware and software to reach service level targets in the medium term. The annual funding allocated for non-sewered sanitation falls significantly short of requirements and is not utilized according to the intended plan. Moreover, there are no effective coordination mechanisms in place for non-sewered sanitation investments among donors, between donors and the government, and within the government itself.
Sewerage Treatment and Reuse There are a few investment plans for sewerage hardware and software, covering approximately 50 percent of the necessary components to achieve service level targets over the medium term. These include initiatives such as the Water Supply and Sanitation Program 2030 - Investment Planning Draft and targets outlined in the Corporate Business Plan by ADB. However, annual funding allocations for sewerage are inadequate and not entirely utilized as intended. Furthermore, effective coordination mechanisms for sewerage investments between donors, donors and government, and within the government are either absent or exist only nominally, rendering them largely ineffective.	**Sludge Treatment and Reuse** At present, there is no existing investment strategy outlined for non-sewered sanitation hardware and software to meet medium-term service level objectives. The allocated annual funding for non-sewered sanitation is considerably insufficient and deviates from the intended utilization plan. Furthermore, effective coordination mechanisms for non-sewered sanitation investments are lacking among donors, between donors and the government, and within the government's internal structure.

Delivering Pillar – Capacity and Outreach

Sewered Sanitation	**Non-Sewered Sanitation**

WC, House Connection DVK lacks adequate staffing and structural organisation, hindering its effectiveness. However, it possesses sufficient autonomy to address identified priorities. Although there are some outreach activities for promoting sewer connections, behaviour change, and community engagement, these efforts are conducted sporadically, with initiatives like the Healthy Lifestyle Centre focusing on sanitation awareness.	**Toilet, Pit, Septic Tank** Responsibility for delivering non-sewered sanitation services is not fully established. Additionally, these institutions have inadequate staffing levels to fulfil their mandates. Furthermore, while some outreach activities are conducted on an ad-hoc basis, there are limited active promotion programs for safe non-sewered sanitation, behaviour change, and community engagement, with awareness initiatives primarily facilitated through Healthy Lifestyle Centres.
Sewerage DVK lacks adequate staffing and structural organization and has only partial autonomy from city authorities. While some outreach activities promoting sewer connections, behaviour change, and community engagement are being conducted on an ad-hoc basis, there is no comprehensive programme in place.	**Emptying and Transport** Responsibility for delivering non-sewered sanitation services lacks fully established and appropriately structured institutions. Additionally, these institutions have inadequate staffing levels to fulfil their mandates. Furthermore, there are no active promotion programmes for safe non-sewered sanitation, behaviour change, or community engagement.
Sewerage Treatment and Reuse DVK is not adequately staffed. Despite this, DVK has sufficient autonomy to address identified priorities. However, there are no active programmes promoting sewer connections, behaviour change, or community engagement.	**Sludge Treatment and Reuse** The delivery of non-sewered sanitation services suffers from the absence of fully established and properly structured institutions, or those that exist are notably weak. Furthermore, these institutions have inadequate staffing levels to carry out their mandates. Moreover, there is a lack of active promotion programmes for promoting safe non-sewered sanitation, behaviour change, or community engagement.
Inclusion – WC, House Connection and Sewerage There are options available that address the needs of some poor and vulnerable people, but they are not sufficient or comprehensive. While there are funds, plans, and mechanisms to meet the needs of some poor and vulnerable people, such as loans, they do not fully support appropriate, safe, and adaptable sanitation services for all users, including women, according to the agreed definition.	**Inclusion – Toilet, Pit and Septic Tank** There are certain options in place that cater to the requirements of certain impoverished and vulnerable groups, yet they are not extensive or comprehensive. Although there are funds, plans, and mechanisms, like loans, to address the needs of select impoverished and vulnerable populations, they do not adequately support the provision of suitable, secure, and flexible sanitation services for all users, including women, as per the agreed definition.

	Inclusion – Emptying and Transport For non-sewered sanitation, the options available to address the sanitation needs of poor and vulnerable populations are significantly insufficient. Additionally, there are minimal to no funds, plans, or mechanisms in place to support the provision of suitable, safe, and adaptable sanitation services for all users, including women and vulnerable individuals, as per the agreed definition.

Sustaining Pillar – Regulation and Cost Recovery

Sewered Sanitation	**Non-Sewered Sanitation**
WC, House Connection The sewerage system O&M costs are known, but revenue covers only partial O&M expenses, falling below the optimum level. Additionally, there are institutions responsible for monitoring performance, health, and environmental standards for sewerage services, albeit partially. These include SSESS and Committee for Environment Protection, each with a partial monitoring system in place. However, while performance standards exist and are monitored, there is limited or no application of sanctions for failures to meet these standards.	**Toilet, Pit, Septic Tank** Non-sewered sanitation service providers struggle to cover their full operating costs and generate reasonable profits from user fees or local revenue due to sub-standard services or limited providers. Although there are institutions that partially monitor performance, health, and environmental standards for non-sewered sanitation, failures to meet these standards are not systematically monitored, and sanctions are not widely applied accordingly.
Sewerage The known sewerage system O&M costs are only partially covered by revenue, which falls short of the optimum level. Moreover, institutions responsible for monitoring sewerage service performance, health, and environmental standards, such as SES, the Ecological Department, and the Environment Ministry, have partial monitoring systems in operation. Despite the existence and monitoring of performance standards, there is limited or no enforcement of sanctions for failures to meet these standards.	**Non-Sewered Sanitation – Emptying and Transport** Non-sewered sanitation service providers struggle to cover their full operating costs and generate reasonable profits from user fees or local revenue due to sub-standard services or limited providers. Moreover, there is a lack of adequately staffed institutions to monitor performance, health, and environmental standards for non-sewered sanitation. Additionally, failures to meet non-sewered sanitation performance standards are not systematically monitored, and sanctions are not applied where relevant.

Sewerage Treatment and Reuse The sewerage system O&M costs are either unknown or not fully covered by revenue, which is wholly inadequate. Additionally, institutions responsible for monitoring sewerage service performance, health, and environmental standards, such as SSESS, and Committee for Environment Protection have partial monitoring systems in place. Despite the existence and monitoring of performance standards, there is limited or no application of sanctions for failures to meet these standards.	**Sludge Treatment and Reuse** Providers of non-sewered sanitation services face challenges in covering their operational expenses and achieving sustainable profits from user fees or local revenue due to inadequate services or a scarcity of providers. Furthermore, there is insufficient staffing in institutions tasked with monitoring the performance, health, and environmental compliance of non-sewered sanitation. Additionally, there is a lack of systematic monitoring and enforcement of performance standards, with little to no application of sanctions for non-compliance.

Operating and Sustaining Pillar – Institutions and Service Providers

WC, House Connection There is a lack of qualified staff for adaptive planning of sewerage rehabilitation and expansion. While there may be either a staff development program or incentives to retain workers, there is no comprehensive approach covering both aspects. The health and safety of sewerage workers are only partly protected and monitored, with DVK having specific mandates for occupational safety while the private sector is responsible for its own safety measures. Capacity-building programs are limited and implemented on an ad-hoc basis, with efforts primarily led by the World Bank in assessing and enhancing the capacity of SUE DVK through collaborations with consultants, focusing on qualifications, human resource procedures, and overall capacity improvements within DVK due to resource constraints.	**Toilet, Pit, Septic Tank** There is a lack of sufficient qualified staff to undertake adaptive planning and implementation for service expansion. Additionally, there are no active staff development programs or incentives to retain workers within these institutions. Furthermore, the health and safety of non-sewered sanitation workers is not adequately protected or monitored. Moreover, there are no ongoing programs or measures to build the capacity of private sector service providers to deliver non-sewered sanitation services, as they are either poorly organized or non-existent, and no capacity-building initiatives are being carried out.
Sewerage There is a lack of qualified staff to effectively plan for sewerage rehabilitation and expansion adaptively. While there might be either a staff development initiative or incentives to retain workers, a comprehensive approach covering both aspects is absent. Monitoring and ensuring the health and safety of sewerage workers are only partially addressed, with DVK having specific mandates for occupational safety, while the private sector is responsible for its safety measures. Capacity-building programs are sporadic and ad-hoc, with limited efforts primarily driven by the World Bank to assess and enhance SUE DVK's capacity through collaborations with consultants, focusing on qualifications, human resource procedures, and overall capacity improvements within DVK due to resource constraints.	**Emptying and Transport** Insufficiently qualified staff are available to conduct adaptive planning and implement service expansion. Additionally, there is a lack of active staff development programs or incentives to retain workers within these institutions. Moreover, the health and safety of non-sewered sanitation workers is inadequately protected and monitored. Furthermore, there are no ongoing programs or measures to enhance the capacity of private sector service providers to deliver non-sewered sanitation services, as they are either poorly organized or non-existent, with no capacity-building efforts underway.

Sewerage Treatment and Reuse There is a lack of qualified staff for adaptive planning of sewerage rehabilitation and expansion. While there may be either a staff development program or incentives to retain workers, a comprehensive approach covering both aspects is absent. The health and safety of sewerage workers are only partially protected and monitored, with DVK having a specific mandate for occupational safety, while the private sector is responsible for its own occupational safety. Additionally, ongoing programs and measures to build the capacity of the sewerage service provider are limited and implemented sporadically. The World Bank is actively engaged in assessing and improving the capacity of SUE DVK, collaborating with consultants to enhance qualifications, human resource procedures, and overall capacity within DVK. However, resource constraints hinder the establishment of specified training programs.	**Sludge Treatment and Reuse** There is inadequate qualified staff for adaptive planning and service expansion. Additionally, there are no active staff development programs or incentives to retain workers within these institutions. Moreover, the health and safety of non-sewered sanitation workers is not adequately safeguarded or monitored. Furthermore, there are no ongoing initiatives to enhance the capacity of private sector service providers in delivering non-sewered sanitation services, as they are either poorly organized or non-existent, with no capacity-building endeavours in progress.
Inclusion– WC, House Connection Sanitation services are failing to keep pace with population growth, resulting in an increasing number of people lacking access to safe sanitation. Although sanitation data is collected sporadically, it lacks comprehensive spatial coverage, particularly regarding women, poor, and vulnerable populations, as per the agreed definition. Additionally, safe sanitation services are either unavailable to many poor and vulnerable individuals or this information is not known.	**Inclusion– Toilet, Pit and Septic Tank** Sanitation services are falling behind the pace of population growth, resulting in a significant rise in the number of people lacking access to safe sanitation. Moreover, the collection of sanitation data occurs irregularly, with incomplete spatial coverage, and its utilization for planning purposes is limited. Consequently, a considerable portion of the population, especially women, the impoverished, and vulnerable groups, either lack access to safe sanitation services or their accessibility remains uncertain.
Inclusion – Sewerage Sanitation services are struggling to match the pace of population growth, resulting in a notable rise in the number of individuals lacking access to safe sanitation. Further, there is limited collection of sanitation monitoring data, particularly from women, the poor, and vulnerable groups, hindering effective planning of services. Additionally, many individuals from these marginalized groups either lack access to safe sanitation or their status remains uncertain.	**Inclusion– Emptying and Transport** Sanitation services are falling behind the rapid population growth, leading to a notable rise in individuals lacking access to safe sanitation. Furthermore, there is sporadic collection of sanitation data, including from women, the poor, and vulnerable groups, based on the agreed definition, with minimal use for planning purposes. As a result, a considerable portion of the population, particularly women and vulnerable communities, either lacks access to safe sanitation services or faces uncertainty regarding their availability.

Annex 12: Detailed Action Plans

Thematic Area	Type of Sanitation	Strategic Actions		
		Short-Term (0-5 Years)	**Medium-Term (6-10 Years)**	**Long-Term (11-15 Years)**
Policy and Regulations	Sewered Sanitation	**Priority**: Medium Launch targeted consumer education campaigns focused specifically on wastewater treatment processes and the importance of proper disposal. Increase public awareness about the implications of untreated wastewater on health and the environment. Utilise various channels such as social media, community workshops, and informational materials distributed to reach a wide audience.	**Priority**: High Invest in the upgrade and expansion of wastewater treatment infrastructure to improve treatment efficiency and capacity. Conduct comprehensive assessments to identify areas with inadequate treatment facilities or overloaded systems. Prioritise investment in modern treatment technologies and decentralised treatment plants to ensure compliance with safety and environmental standards. Collaborate with international partners and leverage financing mechanisms to support infrastructure development projects.	**Priority**: High Implement a phased expansion plan to extend sewerage network coverage to underserved areas, prioritising regions with the highest population density and sanitation needs. Coordinate efforts with local authorities, private sector partners, and community stakeholders to accelerate the implementation of sewer infrastructure projects.
	Non-Sewered Sanitation	**Priority**: High Initiate a comprehensive survey to gather data on existing non-sewered sanitation systems in Dushanbe and other rapidly growing urban areas. The survey should identify current challenges, assess population needs, and explore alternative solutions for improving	**Priority**: Medium Develop comprehensive guidelines for the design, construction, and maintenance of non-sewered sanitation systems tailored to the urban context of Dushanbe and other large cities experiencing population growth. These guidelines should incorporate innovative technologies and	**Priority**: High Launch pilot projects to test and evaluate innovative non-sewered sanitation solutions tailored to the urban context of Dushanbe. Explore options such as decentralised sanitation systems, eco-friendly sanitation technologies, and community-led sanitation initiatives to improve access to safe and

		sanitation infrastructure in areas where sewered systems may be difficult to implement.	best practices to improve sanitation access and environmental sustainability.	sustainable sanitation services.
	Overall	**Priority**: High Conduct a thorough review of existing regulatory frameworks governing drinking water supply and wastewater disposal services. Identify areas for improvement, update technical regulations for treatment and decontamination, and strengthen enforcement mechanisms to ensure compliance with safety and environmental standards. **Priority**: High Conduct a comprehensive review of existing sanitation policies and regulations to assess their alignment with climate change adaptation and mitigation goals. Identify gaps and opportunities for integrating climate-resilient standards into these frameworks. Establish a working group comprising representatives from relevant government agencies, local authorities, community organizations, and environmental	**Priority**: Medium Collaborate with local and international experts to draft legislations specifically addressing the safe and practical management of faecal sludge. Establish regulations for the collection, transportation, treatment, and reuse of faecal sludge, filling the existing regulatory void and ensuring environmental and public health protection. **Priority:** Medium Establish an interagency task force comprising relevant government ministries, regulatory bodies, local authorities, civil society organizations, and international partners to coordinate efforts for efficient water management. Develop and implement climate-resilient sanitation standards and guidelines that address the specific challenges posed by climate change, such as increased frequency and intensity of extreme weather events, rising sea levels, and	**Priority**: High Review and enhance the scope of the interagency task force to coordinate efforts for integrated water management. The task force should facilitate collaboration, share knowledge and resources, and develop holistic strategies for sustainable water and sanitation development in Tajikistan. **Priority:** High Institutionalize climate-resilient sanitation policies and regulations within the legal and regulatory framework of the municipality or jurisdiction. This may involve enacting new laws, ordinances, or bylaws that mandate adherence to climate-sensitive design standards for all sanitation infrastructure projects, whether publicly or privately funded. Establish monitoring, evaluation, and enforcement mechanisms to ensure compliance with the regulations and track progress towards climate resilience targets. Integrate climate change considerations into the periodic review and revision of

		experts to guide the development of climate-sensitive sanitation policies.	changing precipitation patterns. These standards should encompass both sewered and non-sewered sanitation systems, including wastewater treatment, solid waste management, and water conservation measures. Engage stakeholders through consultations, workshops, and public hearings to ensure broad-based support and ownership of the new regulations.	sanitation policies to adapt to evolving climate risks and uncertainties.
Institutional Arrangements	Sewered Sanitation	**Priority**: High Collaborate with relevant stakeholders to develop a comprehensive corporate strategy for Dushanbe Vodokanal that outlines long-term goals, objectives, and strategies for achieving them. This strategy should prioritize initiatives specific to sewered sanitation, such as infrastructure development, maintenance, and wastewater treatment.	**Priority**: High Within DVK, develop and implement performance management systems specifically for sewered sanitation services.	**Priority**: High Institutionalise corporate governance reforms within DVK specifically targeted at improving sewered sanitation services. Establish transparent decision-making processes, independent oversight mechanisms, and accountability structures to enhance efficiency, integrity, and stakeholder trust.
	Non-Sewered Sanitation	**Priority**: High Initiate pilot projects for community-led non-sewered sanitation solutions in areas with limited access to sewered infrastructure. Collaborate with local communities, NGOs, and relevant stakeholders to	**Priority**: High Enhance coordination among relevant ministries, departments, and institutions responsible for non-sewered sanitation solutions. Establish joint working groups to address knowledge gaps, share best practices, and streamline	**Priority**: High Develop a comprehensive regulatory framework specifically tailored for non-sewered sanitation solutions. Define standards, guidelines, and licensing requirements for alternative sanitation technologies, ensuring safety, sustainability, and

		implement decentralised sanitation systems such as dry toilets, composting toilets, or decentralised wastewater treatment facilities.	regulatory processes for alternative sanitation technologies such as septic tanks and pit latrines.	environmental compliance. Strengthen enforcement mechanisms to monitor compliance and address non-compliance effectively.
	Overall	**Priority**: Medium Negotiate and formalise a performance-based agreement between DVK and the Municipality of Dushanbe. This agreement should define specific performance indicators, service levels, and accountability mechanisms for both sewered and non-sewered sanitation services, providing a framework for monitoring and evaluating DVK's performance. **Priority**: High Form a multidisciplinary task force comprising experts in sanitation, climate change adaptation, urban planning, and community engagement. The task force's mandate is to conduct a rapid assessment of climate vulnerabilities in existing sanitation infrastructure and services, identifying immediate risks and adaptation needs. This assessment will inform short-term strategies to	**Priority**: High Promote collaboration between sewered and non-sewered sanitation sectors to ensure comprehensive and integrated sanitation solutions. Facilitate knowledge exchange, capacity building, and resource sharing between urban and rural sanitation initiatives. Foster partnerships between public, private, and civil society stakeholders to leverage expertise and resources effectively. **Priority**: Medium Expand the role of the task force to develop a comprehensive climate-resilient sanitation strategy for the community. This strategy should integrate climate considerations into all aspects of sanitation planning, design, implementation, and operation. Engage key stakeholders, including government agencies, local authorities, NGOs, and community representatives, in the development of the	**Priority**: High Establish a dedicated sector-wide regulatory authority for sanitation services to oversee both sewered and non-sewered sanitation sectors. Empower the regulatory authority with regulatory, monitoring, and enforcement powers to ensure compliance with sanitation standards, tariffs, and service quality benchmarks. Strengthen coordination between regulatory bodies to streamline regulatory processes and enhance accountability across the sanitation sector. **Priority**: High Institutionalize the climate-resilient sanitation task force within the municipal governance structure, ensuring its longevity and effectiveness. Embed climate-resilient sanitation objectives and targets into the city's strategic plans, policies, and budgets. Strengthen the capacity of relevant institutions to implement and monitor climate-resilient sanitation initiatives effectively. Foster

		enhance climate resilience.	strategy to ensure inclusivity and ownership.	collaboration and knowledge sharing among stakeholders to support continuous learning and adaptation.
Inclusion	Sewered Sanitation	**Priority**: High Conduct a comprehensive affordability assessment to identify households burdened by high connection fees. Based on the findings, implement targeted subsidies or payment assistance schemes to ensure equitable access to formal sewer connections, particularly for low-income households.	**Priority**: High Introduce gender-sensitive subsidies for water and sanitation services, prioritising female-led households, and persons with disabilities. Collaborate with women's organizations and disability rights groups to design and implement targeted support programs that address specific needs and challenges.	**Priority**: High Institutionalise gender-responsive and inclusive design standards for sewer infrastructure projects. Ensure that future developments prioritize accessibility, safety, and dignity for all users, including women, persons with disabilities, and other marginalised groups.
	Non-Sewered Sanitation	**Priority**: High Establish support programs to provide free or subsidised menstrual hygiene products to women and girls in marginalised communities. Collaborate with local NGOs and community leaders to distribute hygienic items and conduct awareness campaigns on menstrual health and hygiene.	**Priority**: High Develop educational programs and youth-led initiatives focused on promoting safe sanitation practices and menstrual hygiene management. Empower young people as WASH ambassadors in their communities, encouraging peer-to-peer learning and behaviour change campaigns.	**Priority**: High Expand community engagement initiatives to raise awareness about the importance of inclusive WASH services. Foster dialogue and collaboration between community members, local authorities, and service providers to co-create solutions that address the specific needs of marginalised populations.
	Overall	**Priority**: High Retrofit existing public toilets with accessibility features such as ramps, handrails, and signage to accommodate persons with disabilities. Prioritise locations frequented by vulnerable populations, ensuring safe and	**Priority**: High Create opportunities for women's leadership and participation in decision-making processes related to water and sanitation governance. Provide training and mentorship programs to equip women with the skills and knowledge to advocate	**Priority**: High Advocate for the development and implementation of disability-inclusive WASH policies at the national and local levels. Ensure that sanitation programs and infrastructure projects are designed and implemented in accordance with principles of

		dignified access to sanitation facilities for all community members. **Priority**: High Launch targeted awareness campaigns focused on vulnerable communities, emphasizing the links between sanitation, climate change, and community resilience. Collaborate with local community leaders, NGOs, and grassroots organizations to ensure cultural and linguistic sensitivity and maximize reach.	for inclusive WASH policies and initiatives. **Priority**: Medium Expand the awareness campaigns to include capacity-building workshops and training sessions for community members, empowering them to take proactive measures to adapt to climate change impacts. Incorporate participatory approaches that involve community members in the co-design and implementation of climate-resilient sanitation solutions tailored to their specific needs and priorities.	universal accessibility and non-discrimination, enabling full participation and equal access for all. **Priority**: High Institutionalize inclusive climate-resilient sanitation awareness programs within municipal development plans and policies, ensuring sustained support and funding. Establish community-led monitoring and feedback mechanisms to continuously assess the effectiveness of the campaigns and address emerging challenges. Foster partnerships with academia, research institutions, and international agencies to leverage expertise and resources for scaling up successful approaches and innovations.
Capacity	Sewered Sanitation	**Priority**: High Develop and implement a robust data management system for DVK to improve data collection, collation, and management. Prioritise addressing billing errors and tracking usage patterns to enhance operational efficiency and revenue generation.	**Priority**: High Invest in upgrading the infrastructure of the wastewater treatment plant to address operational challenges and increase treatment efficiency. Focus on repairing non-operational biological treatment facilities and key mechanical components to improve overall treatment outcomes.	**Priority**: Medium Implement energy-efficient measures at the wastewater treatment plant to reduce high energy costs and improve operational sustainability. Explore renewable energy options such as solar or biogas to power WWTP operations and minimise environmental impact.
	Non-Sewered Sanitation	**Priority**: High Collaborate with regulatory authorities to establish clear licensing	**Priority**: High Work with regulatory authorities to develop comprehensive regulations	**Priority**: High Expand the capacity of faecal sludge treatment facilities to accommodate growing

		arrangements and oversight mechanisms for desludging truck operators. Enhance enforcement of regulations to ensure proper and efficient faecal sludge management and minimise environmental and health risks.	for faecal sludge management, including licensing, quality control, and safety standards for faecal sludge reuse in agriculture. Provide training and capacity-building support to desludging truck operators to ensure compliance with regulations.	demand and ensure proper management of waste. Invest in infrastructure upgrades and technology innovations to enhance treatment efficiency and minimise environmental pollution.
	Overall	**Priority**: High Strengthen partnerships with community-based organizations and consumer associations to foster community participation and awareness in sanitation management. Conduct awareness campaigns to educate residents about the importance of proper sanitation practices and their role in maintaining sanitation infrastructure. **Priority**: High Initiate targeted training programs to educate sanitation workers and officials about climate-resilient practices, focusing on understanding climate impacts and implementing adaptive measures in sanitation operations.	**Priority**: High Foster collaboration between the public and private sectors to leverage resources and expertise in addressing sanitation challenges. Encourage private sector participation in sanitation management through streamlined policies, capacity-building initiatives, and investment opportunities. **Priority**: Medium Extend training initiatives to involve community members, providing workshops and certification courses to empower them in implementing climate-resilient sanitation solutions tailored to local needs.	**Priority**: High Work with relevant government agencies to establish a comprehensive regulatory framework for faecal sludge reuse in agriculture, including licensing, monitoring, and enforcement mechanisms. Collaborate with international partners and technical experts to develop guidelines and standards aligned with best practices in sanitation management. **Priority**: High Embed climate-resilient sanitation training within national and local education frameworks, forging partnerships for sustainable funding and expertise, and continually evaluating and adapting programs for long-term effectiveness and resilience.
Infrastructure	Sewered Sanitation	**Priority**: High Initiate a comprehensive assessment of the sewer network infrastructure in	**Priority**: High Develop a strategic plan for expanding the sewer network to cover unserved	**Priority**: High Implement smart infrastructure solutions, such as sensor-based monitoring

		Dushanbe to identify areas with aging infrastructure, capacity issues, and critical maintenance needs. Prioritise immediate repairs and upgrades to address high-risk areas and improve the overall reliability and functionality of the sewer system.	areas and increase access to sewerage systems. Prioritise areas with high population density and inadequate sanitation infrastructure to promote inclusive urban development and improve public health outcomes.	systems and predictive maintenance technologies, to optimise the operation and maintenance of the sewer network. Leverage data analytics and real-time monitoring to proactively identify issues, reduce downtime, and improve the overall performance and resilience of the sewer system.
	Non-Sewered Sanitation	**Priority**: High Launch awareness campaigns to promote desludging services and encourage households to schedule regular desludging of septic tanks. Collaborate with community organizations and local authorities to facilitate access to desludging services, particularly in underserved areas, to improve sanitation standards and public health.	**Priority**: High Invest in decentralised wastewater treatment options, such as community-scale treatment plants or innovative technologies, to improve sanitation infrastructure in areas without access to centralised sewer systems. Collaborate with local stakeholders and international partners to implement pilot projects and scale up successful models for sustainable sanitation management.	**Priority**: High Establish a sanitation innovation hub to foster collaboration between government agencies, research institutions, and private sector stakeholders in developing and scaling up innovative sanitation solutions. Focus on leveraging emerging technologies, such as decentralised treatment systems and resource recovery technologies, to address sanitation challenges and promote sustainable development.
	Overall	**Priority**: High Invest in upgrading water treatment facilities to improve water quality and address challenges such as physical water losses and inadequate treatment during periods of high demand. Implement measures to modernise equipment, enhance system pressure, and minimise interruptions in	**Priority**: High Modernise the drainage network infrastructure to reduce the frequency of accidents, clogs, and technical issues. Implement modern design standards, upgrade aging systems, and invest in technology-driven solutions to enhance the resilience and efficiency of the drainage network,	**Priority**: High Promote integrated water management approaches that encompass both water supply and wastewater management to optimize resource use and minimise environmental impact. Implement measures to enhance water efficiency, reuse treated wastewater for non-potable purposes, and protect water sources to ensure the long-term

		water supply to meet the growing demand for safe and reliable water services. **Priority**: High Conduct a rapid assessment of existing sanitation infrastructure to identify vulnerabilities and climate risks. Prioritize immediate upgrades and repairs to address critical weaknesses exposed to climate change impacts, such as flooding, sea-level rise, or extreme weather events. Implement short-term measures, such as retrofitting flood protection systems, installing backup power generators, and strengthening infrastructure resilience to minimize service disruptions and protect public health.	minimising disruptions and improving service delivery. **Priority**: Medium Develop and implement climate-resilient design standards for new sanitation infrastructure projects and major renovations. Incorporate adaptive features, such as elevated construction, stormwater management systems, and green infrastructure elements, to enhance resilience to climate-related hazards. Ensure that designs consider future climate projections and community needs, promoting inclusivity and sustainability in infrastructure development.	sustainability of water and sanitation services. **Priority**: High Integrate climate resilience into long-term infrastructure planning and investment strategies. Establish monitoring and early warning systems to track climate impacts on sanitation infrastructure performance and trigger proactive maintenance and upgrades as needed. Foster collaboration with stakeholders, including government agencies, utilities, private sector partners, and community groups, to mobilize resources and expertise for sustainable infrastructure development. Continuously evaluate and adapt infrastructure plans in response to evolving climate risks and changing community priorities.
Financing	Sewered Sanitation	**Priority**: High Implement a comprehensive system for billing and collection of fees for water supply and wastewater services, including updating customer databases, enhancing billing accuracy, and streamlining collection processes. This will improve revenue generation and financial	**Priority**: High Develop and adopt a long-term tariff strategy for sewerage services to ensure alignment with financial sustainability goals. This strategy should include mechanisms for regular tariff adjustments based on cost recovery principles, customer affordability considerations, and long-term investment needs.	**Priority**: High Review and strengthen internal control systems within DVK to enhance monitoring and evaluation of financial activities. Implement robust controls to mitigate risks of fraud, mismanagement, and inefficiencies in revenue generation/collection and resource utilisation for sewerage services.

		stability for sewerage services.		
	Non-Sewered Sanitation	**Priority**: High Upgrade DVK's financial management systems to ensure accurate financial reporting, budgeting, and decision-making processes for non-sewered sanitation services. Implement a centralised financial management system to improve efficiency and transparency in financial operations.	**Priority**: High Strengthen procurement procedures for non-sewered sanitation services to improve cost management, inventory control, and project implementation efficiency. Implement transparent and competitive procurement processes to mitigate risks of corruption and ensure value for money in resource allocation.	**Priority**: High Invest in capacity building initiatives for DVK staff to enhance financial management skills, procurement expertise, and governance competencies for non-sewered sanitation services. Provide training and professional development opportunities to build a skilled and knowledgeable workforce.
	Overall	**Priority**: High Establish a robust corporate governance framework for DVK, including policies and procedures for financial accountability, operational transparency, and stakeholder engagement. Strengthen governance structures and capacities to enhance overall management effectiveness and accountability. **Priority**: High Conduct a thorough review of existing sanitation project funding mechanisms to identify opportunities for reallocating resources towards urgent climate resilience measures. Prioritize immediate	**Priority**: High Explore opportunities to diversify revenue sources for sanitation services, such as public-private partnerships, grant funding, and innovative financing mechanisms. This will reduce dependence on tariff revenues and enhance financial resilience against economic fluctuations. **Priority**: Medium Collaborate with financial institutions and development partners to design innovative financing mechanisms specifically tailored to climate-resilient sanitation projects. Explore options such as green bonds, climate adaptation funds, or revolving loan facilities to mobilize additional resources for	**Priority**: High Develop and implement performance metrics and Key Performance Indicators to monitor and evaluate financial sustainability, operational efficiency, and service quality for overall sanitation services. Regularly assess performance against established targets to identify areas for improvement and inform strategic decision-making. **Priority**: High Institutionalize climate-resilient sanitation financing mechanisms within national and local financial frameworks. This involves embedding these mechanisms into budgetary processes, strategic plans, and regulatory frameworks to ensure sustained support for long-term resilience initiatives.

		actions such as infrastructure upgrades and capacity building to enhance resilience to climate change impacts.	medium-term resilience investments.	Strengthen financial management capacities and foster partnerships to promote transparency, accountability, and efficiency in resource allocation and utilization over the long run.

Actions for Service Delivery and Infrastructure

Service Area	Type of Sanitation	Strategic Action		
		Short-Term (0-5 Years)	**Medium-Term (6-10 Years)**	**Long-Term (11-15 Years)**
Containment	Sewered Sanitation	Initiate an immediate comprehensive assessment of the existing sewer network infrastructure, prioritising areas with frequent accidents and restricted load management capacity. Conduct urgent maintenance and repair work to address pipe leakages, blockages, and structural weaknesses, ensuring the integrity and functionality of the sewer system. Implement proactive measures such as CCTV inspections and flow monitoring to identify and mitigate potential issues before they escalate.	Implement a phased upgrade program for 'septic' tanks and pit latrines, prioritising households with outdated or structurally compromised systems. Provide financial incentives or subsidies for households to invest in proper containment infrastructure.	Implement a phased program for the gradual replacement of outdated and inadequate septic tanks with modern, watertight containment systems, ensuring compliance with established construction standards and regulations. Provide targeted subsidies or financing schemes to incentivise households to upgrade their sanitation infrastructure.
	Non-Sewered Sanitation	Launch a public awareness campaign to educate households on proper construction standards for containment systems, emphasising the importance of	Develop and enforce regulations for the construction of containment systems, including mandatory compliance with design standards and periodic inspections to	Implement a long-term strategy for the gradual phase-out of unlined pit latrines and other high-risk containment systems, promoting the adoption of safer and more sustainable alternatives such

		impermeable walls and sealed bottoms to prevent groundwater contamination.	ensure structural integrity. Provide technical assistance and financial incentives for households to upgrade or replace inadequate systems.	as lined tanks or improved pit latrines with impermeable walls and proper ventilation. Provide targeted subsidies or financial incentives to encourage households to upgrade their sanitation facilities and adopt best practices in containment design and construction.
Collection and Transport	Sewered Sanitation	Increase the frequency of desludging operations, especially for households with larger containment systems, to prevent overflow and unauthorised discharge. Ensure proper training and equipment maintenance for desludging truck operators.	Introduce a fleet expansion plan for desludging trucks to meet increasing demand and improve response times for service delivery. Explore the feasibility of alternative sludge disposal methods to alleviate pressure on the treatment plant.	Invest in the expansion and modernisation of the sewer network, incorporating advanced technologies such as smart sensors and predictive analytics to optimize maintenance schedules and improve operational efficiency. Implement decentralised wastewater treatment facilities in strategic locations to reduce the reliance on centralised treatment plants and minimize conveyance distances.
	Non-Sewered Sanitation	Establish a regular schedule for desludging services in areas relying on non-sewered sanitation, ensuring equitable access, and addressing backlog in emptying services.	Establish decentralised sludge treatment facilities in strategic locations to reduce reliance on the central treatment plant and improve efficiency in sludge management. Promote community engagement and participation in the operation and maintenance of these facilities.	Establish a formalised system for the regular emptying and desludging of non-sewered sanitation facilities, leveraging mechanised vacuum trucks and trained personnel to ensure safe and hygienic waste removal. Strengthen coordination between service providers, local authorities, and community stakeholders to optimise collection routes and scheduling, minimizing response times and maximizing operational efficiency.

Treatment	Sewered Sanitation	Implement emergency repairs and maintenance at the wastewater treatment plant to restore functionality to critical components such as sand traps and primary settling tanks.	Invest in rehabilitation and modernization of the wastewater treatment plant, focusing on restoring functionality to aeration tanks and enhancing treatment capacity to meet growing demand.	Upgrade and expand existing wastewater treatment plants to accommodate growing urban populations and enhance treatment capacity. Introduce advanced treatment processes such as membrane bioreactors and UV disinfection to achieve higher effluent quality standards and ensure compliance with regulatory requirements. Implement robust monitoring and quality control measures to track treatment performance and facilitate data-driven decision-making.
	Non-Sewered Sanitation	Conduct immediate assessments of sludge drying beds and treatment facilities to identify and prioritise repairs and upgrades, focusing on enhancing pathogen removal and treatment efficiency.	Pilot innovative sludge treatment technologies, such as anaerobic digestion or thermal drying, to explore cost-effective and environmentally sustainable alternatives for sludge management.	Develop decentralised treatment solutions tailored to the specific needs and constraints of non-sewered sanitation systems, such as small-scale anaerobic digesters or constructed wetlands, capable of effectively treating faecal sludge and reducing environmental pollution. Integrate treatment facilities with existing infrastructure or community spaces to enhance accessibility and promote community ownership and engagement.
Reuse	Sewered Sanitation	Conduct a rapid assessment of potential opportunities and challenges for wastewater reuse within the sewered sanitation system, focusing on identifying suitable sources of treated	Launch pilot projects to demonstrate the feasibility and benefits of wastewater reuse in collaboration with key stakeholders, including local industries, agricultural cooperatives, and municipal authorities. Monitor and	Establish a comprehensive framework for the safe and sustainable reuse of treated wastewater and sludge in agriculture, landscaping, and industrial applications. Develop guidelines and standards for the quality and

		wastewater and potential end-users, such as urban agriculture or industrial processes.	evaluate pilot outcomes to inform the development of broader reuse strategies and investment priorities.	application of reused water and sludge, addressing concerns related to pathogens, contaminants, and environmental impact. Promote public awareness and acceptance of wastewater reuse through education and outreach campaigns, highlighting the economic, environmental, and social benefits.
	Non-Sewered Sanitation	Establish basic regulatory guidelines and standards for the safe handling and reuse of faecal sludge from non-sewered sanitation facilities, outlining requirements for treatment, storage, and application in agricultural or landscaping activities.	Invest in the development of decentralised treatment infrastructure for faecal sludge from non-sewered sanitation facilities, including small-scale treatment plants or mobile treatment units, equipped with appropriate technologies for pathogen removal and nutrient recovery. Collaborate with local entrepreneurs and community-based organizations to facilitate the establishment and operation of treatment facilities.	Promote the implementation of innovative approaches for the beneficial reuse of treated faecal sludge in agriculture, energy production, and environmental remediation, fostering local entrepreneurship and economic development. Establish partnerships with agricultural cooperatives, research institutions, and industry stakeholders to explore market opportunities and develop value-added products derived from treated sludge, such as organic fertilisers or biogas.
Overall		Initiate a comprehensive survey to validate the percentage of the population connected to sewer networks and assess the accuracy of existing infrastructure data. Develop an integrated database to streamline customer	• Develop comprehensive sanitation regulations encompassing both sewered and non-sewered systems, with clear standards for containment design, desludging practices, and treatment requirements. Establish enforcement mechanisms and penalties for non-compliance to	• Mainstream sanitation considerations into broader urban development policies and strategies, emphasising the interconnectedness of sanitation with water resources management, public health, and environmental conservation. Establish multi-sectoral coordination mechanisms to facilitate

	information and improve service delivery. • Conduct a comprehensive assessment of existing sanitation infrastructure to identify vulnerabilities and climate risks. Prioritize short-term upgrades and repairs to address critical weaknesses exposed to climate change impacts, such as flooding, sea-level rise, or extreme weather events. Implement immediate measures, such as retrofitting flood protection systems, upgrading treatment facilities, and enhancing infrastructure resilience to minimize service disruptions and protect public health.	ensure adherence to regulatory standards. • Invest in training programs for sanitation stakeholders, including government officials, service providers, and community leaders, to enhance technical expertise and promote best practices in sanitation management. Collaborate with academic institutions and international partners to develop tailored training curricula and knowledge exchange initiatives. • Launch a public awareness campaign on the importance of proper sanitation practices, highlighting the health, environmental, and economic benefits of improved sanitation infrastructure. Utilise multimedia channels and community outreach activities to reach diverse audiences and encourage behaviour change. • Develop and implement climate-resilient design standards for new sanitation infrastructure projects and major renovations. Incorporate adaptive features, such as decentralized treatment systems, stormwater management, and water	collaboration across government agencies and sectors. • Develop innovative financing mechanisms for sanitation infrastructure investments, including public-private partnerships, performance-based contracts, and revolving funds. Explore opportunities for leveraging climate finance and international development assistance to mobilise additional resources for sanitation projects. • Integrate climate resilience into long-term planning and investment strategies for the entire sanitation chain. Establish monitoring and early warning systems to track climate impacts on infrastructure performance and trigger proactive maintenance and upgrades as needed. Foster collaboration with stakeholders, including government agencies, utilities, private sector partners, and community groups, to mobilize resources and expertise for sustainable infrastructure development. Continuously evaluate and adapt infrastructure plans in response to evolving climate risks and changing community priorities.

		reuse technologies, to enhance resilience to climate-related hazards. Ensure that designs consider future climate projections and community needs, promoting inclusivity and sustainability in infrastructure development.	