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Green City Action Plan (GCAP)
Dushanbe

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Cover Image © AECOM, Dushanbe, Tajikistan, November 2021.

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List of Abbreviations

Abbreviation	Description
AAL	Annual Average Loses
ADB	Asian Development Bank
AFC	Automated Fare Collection Systems
BOD	Biochemical Oxygen Demand
CapEx	Capital Expenditure
CDIA	Cities Development Initiative for Asia
CDT	Citywide Digital Twin
CEP	Committee for Environmental Protection (Tajikistan)
CHP	Combined heat and power
CNG	Compressed Natural Gas
CSO	Combined sewer overflows
CO_2	Carbon dioxide
DCA	Dushanbe City Administration (Executive Power of State Body of Dushanbe)
DEFF	Dushanbe City Chairman's Office
DGC	Departmental Green Champion
DMA	District metered area
DSC	Dushanbe Smart City
DUWSSP	ADB's Dushanbe Urban Water Supply and Sanitation Project
DVK	Dushanbevodokanal (state unitary enterprise)
EBRD	European Bank for Reconstruction and Development
EE	Energy-efficient
EFR	External Framework Report
EMS	Energy Management System
ESCO	Energy Service Company
EU	European Union
EUR	Euro
EV	Electric Vehicle
GCAP	Green City Action Plan
GDP	Gross Domestic Product
GHG	Greenhouse gas emissions
GIS	Geographic information system
Hydromet	National Agency for Hydrometeorology of Republic of Tajikistan
ICT	Information and Communications Technology
IFC	International Finance Corporation
IIED	International Institute of Environment and Development
IMP	Impact monitoring plan
INDC	Intended Nationally Determined Contribution
IT	Computers and information technology
JSC	Joint Stock Company
KPI	Key Performance Indicator
LPG	Liquefied Petroleum Gas
MDF	Main Department of Finance of Dushanbe under the Ministry of Finance of the Republic of Tajikistan
MSW	Municipal solid waste
NCCAP	National Climate Change Action Plan
NDC	Nationally Determined Contributions
NGO	Non-Government Organisation
NO_x	Nitrous oxides
OECD	Organisation for Economic Cooperation and Development
O&M	Operation and maintenance
OJSC	Open Joint Stock Company
OpEx	Operating Expense
OSCH	Open Stock Holding Company
PCP	Pre-commercial procurement
PECs	Priority Environmental Challenges
PIF	Central Asia Policy Innovation Facility
PM	Particulate matter
PMP	Progress monitoring plan Plan
PPCR	Pilot Programme for Climate Resilience
PPP	Public Private Partnership
PSR	Pressure-State-Response
PTDS	Public Transport Development Strategy
PV	Photovoltaic
PVC	Polyvinyl chloride
RDF	Refuse Derived Fuel
RES	Renewable Energy Resources
RfQ	Request for Quotation
RoT	Republic of Tajikistan
RTI	Real Time Information Systems
SCADA	Supervisory control and data acquisition
SOE	State-owned enterprise
SO_2	Sulphur dioxide
SRF	Solid Recovered Fuel
SuDS	Sustainable Drainage Systems
SUE	State Unitary Enterprise
SUMP	Sustainable Urban Mobility Plan
TAR	Technical Assessment Report
TJS	Somoni
TOR	Terms of Reference
UN	United Nations
UNDP	United Nations Development Programme
UNDRR	United Nations Office for Disaster Risk Reduction
UNESCAP	United Nations Economic and Social Commission for Asia and the Pacific
UNFCCC	United Nations Framework Convention on Climate Change
WB	World Bank
WDI	World Bank's World Development Indicators

Forewords

Foreword from the Mayor

In 2019, our city administration launched the process for developing a Green City Action Plan (GCAP) with the generous support of the European Bank for Reconstruction and Development (EBRD) through its Green Cities programme.

The result of the GCAP process is this final report that enables us to identify, prioritise, and address Dushanbe's most acute environmental challenges, including solid waste management, water and wastewater, urban transport, and building energy efficiency. Our GCAP proposes 27 actions that can help our city tackle these challenges while promoting climate change action, social inclusiveness, as well as smart city solutions.

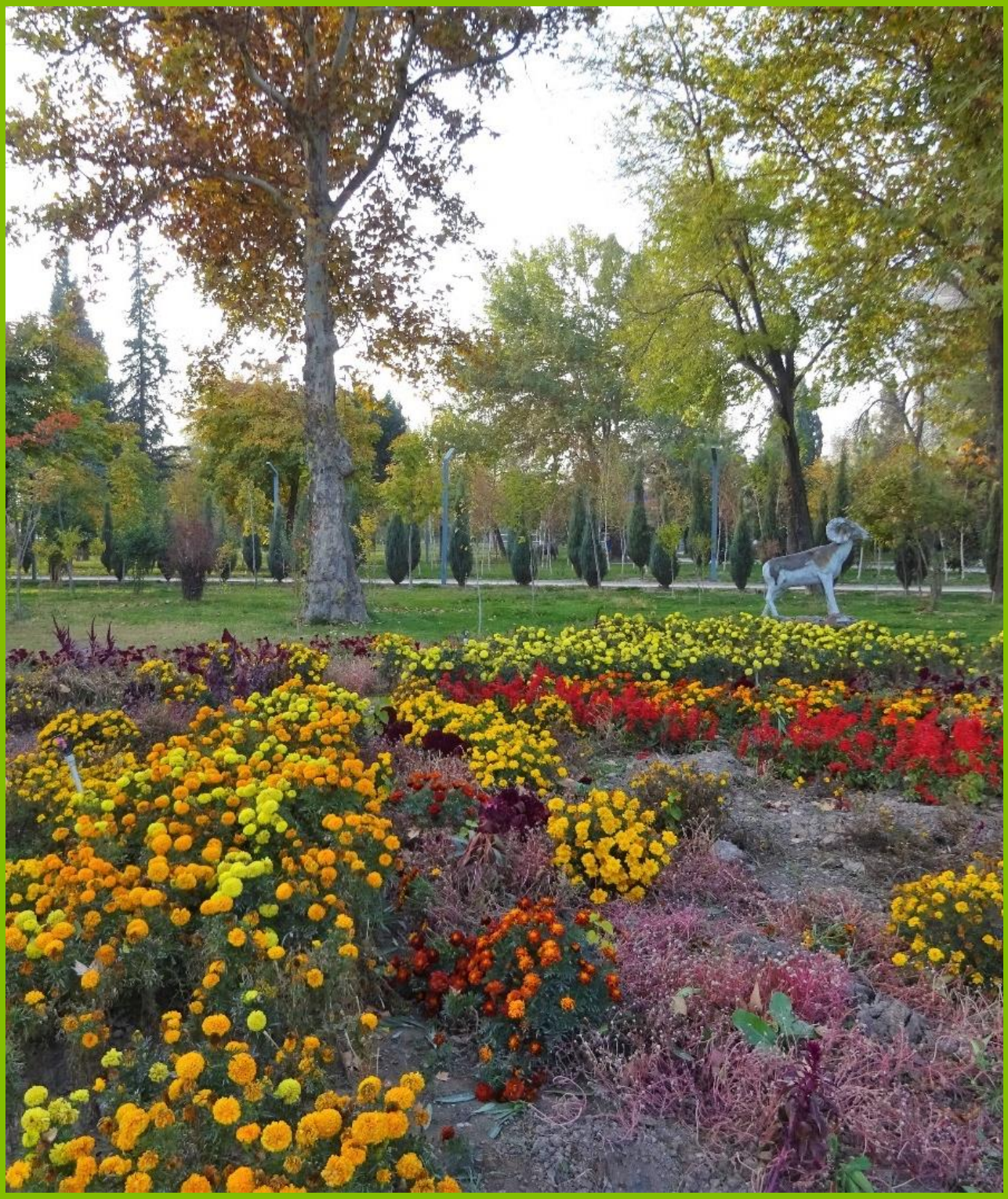
I am truly committed to driving forward the implementation of the GCAP vision for a clean, healthy, and safe Dushanbe. I believe that the actions proposed in this GCAP will accelerate Dushanbe on its journey to being an exemplary green, sustainable, and resilient city and help improve the lives of all residents whilst safeguarding the environment and biodiversity.

This GCAP builds on the guiding strategies of our central government and our city administration, including Tajikistan's National Development Strategy to 2030 and Dushanbe's Socio-Economic Development Programme to 2025. The holistic view taken in the GCAP facilitates green city action across the relevant sectors. This can support the different central and local departments, agencies, and state unitary enterprises to work together with the private sector and civil society to design and implement ambitious yet feasible infrastructure investments and institutional improvements.

I hope our GCAP will serve as an example for other cities in Tajikistan and across Central Asia, as there has never been a better time to address and respond to the critical issues that our cities are facing. At the same time, there are many green city opportunities in investing in low-carbon and resilient infrastructure, creating green jobs, protecting our environment, and advancing the wellbeing of our people.

For their enthusiasm, effort, and dedication to help develop this action plan, I would like to thank: my staff from Dushanbe City Administration and the State Unitary Enterprise "Smart City Dushanbe"; all involved stakeholders from government, private sector, and civil society; Ms. Rika Ishii, Head of EBRD Tajikistan office; Ms. Mariné Baghdasaryan, EBRD Operation Lead for the Dushanbe GCAP (London); all the EBRD Green Cities team and Sector Specialists; and the consulting team led by AECOM.

Rustam Emomali
Mayor of Dushanbe



Executive Summary

Executive Summary

Cities are dynamic and vital parts of society – they are the **main engines of social, economic and technological development**. According to the UN, around half of the world's population now lives in urban areas. To provide their populations with the myriad of demanded services, cities need inputs of large quantities of resources. As such, cities are a source of **significant environmental impacts**. To address these challenges, the EBRD developed the **Green Cities programme**, with the aim of building a better and more sustainable future for cities and their residents.

The **City of Dushanbe** joined the Green Cities programme in 2019 by committing to develop a Green City Action Plan (GCAP) as part of EBRD's loan to modernize and rehabilitate the city's district heating system. The GCAP is the most recent effort of the City of Dushanbe to tackle its environmental, social, and economic challenges and **realising its low-carbon and climate-resilient development potential**. The GCAP aligns with **key objectives of the national and city-level policies** such as the Tajikistan National Development Strategy 2015-2030 and the Dushanbe City Socio-Economic Development Program to 2025.

The GCAP pursues a **comprehensive assessment** of Dushanbe with a focus on seven urban sectors: **energy, water and wastewater, transport, buildings, industries, solid waste, as well as land use and biodiversity**. The GCAP intends to be a **dynamic document** – a step-by-step guide to city officials, government staff, and urban practitioners to tackle the city's priority environmental challenges (PECs, Table 1.1) and implement targeted green investments into both 'hard' (i.e., infrastructure) and 'soft' (i.e., policy, systems, capacities) solutions.

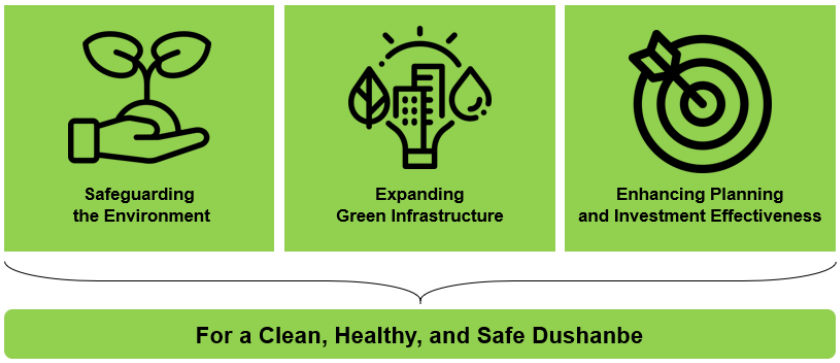
Based on the technical assessment, significant stakeholder engagement, and in alignment with key national and city-level strategies and plans, Dushanbe's **Green City Vision is to become a clean, healthy, and safe city**, where the environment is protected, the infrastructure system is expanded and climate-proofed, and planning and investment decision-making are made in a more targeted way (Figure 1.1).

Table 1.1. Dushanbe's Priority Environmental Challenges (PECs)

Energy	• Increasing energy demand from heating and cooling needs • Increasing emissions and pollution from cement plants, boiler houses, and small workshops
Water	• Lack of continuous supply and coverage of the water network • High rates of non-revenue water and unsustainable water consumption • Low quality and limited number of wastewater treatment plants
Transport	• Emissions from growing and ageing vehicle fleet • Limited incentives for clean transport and non-motorised mobility
Buildings	• Poor quality building stock of old Soviet-style housing • Lack of building-level data • Limited and poorly maintained community facilities
Industries	• Limited policies and practices around greening industry and promoting sustainable production • Air, water, and soil polluting industries within urban boundaries
Solid Waste	• Official landfill site does not meet international standards • Outdated or hazardous solid waste disposal and management practices
Land Use and Biodiversity	• Unauthorised quarries

Source: AECOM. 2021. GCAP Dushanbe: PECs Development Process. London.

Figure 1.1. Dushanbe's Green City Vision



Source: AECOM. 2021. GCAP Dushanbe: Vision and Objectives. London.

Based on the green city vision, **strategic objectives** for the pressure sectors have been formulated, which guided the identification of relevant actions (Table 1.2). From a longlist of more than 100 ideas, **27 actions** were prioritised and developed for implementation over the next 5 years (Table 1.3). There are **17 investment actions** and **10 policy actions**, with nearly all of them including some or directly targeting the **cross-cutting themes** of climate action, smart maturity, gender and social inclusion.

It is estimated that EUR 16.71 million (TSJ 223.75 million) are required for **development and advisory support** for Dushanbe's GCAP actions. **Capital expenditures** are estimated at EUR 255.27 million (TSJ 3.42 billion) and **operational expenditures** over the first 5 years are estimated at EUR 19.56 million (TSJ 261.91 million).

Based on the financial situation (e.g. debt sustainability) and capital market maturity in Tajikistan, a conservative approach was taken in arriving at an **achievable resource envelope**. This is exemplified by **DCA's estimated annual investment costs** of only EUR 3.82 million (TJS 51.19 million) over the 5-year period, which is **well within its resource capacity**, with an existing annual capital expenditure budget of EUR 49 million (TSJ 656.11 million) reported for 2021, alongside a consistent increase in revenue generation (EUR 239 million (TSJ 3.2 billion) planned for 2021) – especially through its own-source revenues, which can **enable additional borrowing** from international development partners, which is estimated at an annual EUR 27.26 million across all actions.

Although based on only limited local data and assumptions informed by international good practice, the **carbon emissions reductions for the GCAP actions are estimated to be 139,732 tCO2e per annum** – making a direct contribution to Tajikistan's Nationally Determined Contributions (NDCs). Additionally, several of the proposed actions contribute to **indirect positive effects** and/or have the **potential for significant upscaling** beyond initial pilot activities, which allows for further carbon emission reductions, particularly in the medium-to-long term beyond the timeframe of this GCAP.

In addition to those environmental benefits, it is estimated that several of the GCAP actions have the potential for **job creation**, with an estimated 885 new jobs being created through the construction, operation and maintenance works, as well as green economy services linked to several of the GCAP actions.

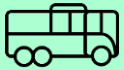
This GCAP report closes with guidance on the plan's **implementation structure**, spearheaded by the city's senior leadership, managed by the state-unitary enterprise 'Dushanbe Smart City' with a Green City Coordinator, and supported by a GCAP Coordination Board and Green Champions in different departments. Deploying a succinct **Progress Monitoring Plan and Impact Monitoring Plan** helps in tracking the implementation and effects of GCAP actions based on the **committed involvement of a variety of stakeholders** from the public sector, private sector, and civil society.

Table 1.2. Dushanbe's Green City Strategic Objectives

Sector	Strategic Objectives
Energy 	• Support the transition towards a resilient energy system that enables reliable electricity and heating services and access to resource-efficient technologies with reduced environmental impacts.
Water 	• Expand and upgrade the water supply and wastewater systems to all users for stable and resource-efficient 24-hour services supported by an operationally viable tariff regime.
Transport 	• Improve transport planning and investment to support an integrated and safe transport system that enables better connectivity, improved access to a variety of motorised and non-motorised transport modes, as well as reduced carbon emissions and air pollution.
Buildings 	• Optimise community-oriented upgrading in aging apartment blocks for universally accessible and affordable housing alongside increased awareness and incentives for green-building investments.
Industries 	• Collaborate with private sector and civil society in a green economy transition based on improved policy frameworks, investment support, enhanced data collection and monitoring of industrial emissions, and effective regulatory enforcement.
Solid Waste 	• Enable strategic solid waste management through waste recycling, appropriate treatment and disposal, and application of standards that safeguard communities and the environment from air, water, and land pollution.
Land Use and Biodiversity 	• Improve the conservation, enhancement, and efficient use of land resources to reduce greenhouse gas emissions and strengthen resilience to climate change and disaster risks alongside stronger development control and enhanced stakeholder engagement.

Source: AECOM. 2021. GCAP Dushanbe: Vision and Objectives. London.

Table 1.3. GCAP Dushanbe Actions Summary Matrix

Sector	Action ID	Action Title	Action Type (ENG)	GCAP Action Classification	Cross-Cutting Themes / Co-Benefits			Estimated Costs (Euro)			Estimated Carbon Emissions Reduction (Annual tCO2e)	Estimated Jobs Created
					Climate Action	Gender and Social Inclusion	Smart Maturity	CapEx	OpEx over 5 Years	Development / Advisory		
Energy 	1	Modernise and expand energy-efficient city-wide street lighting	Investment ('Hard')	Capital Investment	Directly targeted	Some elements	Directly targeted	2,422,500	800,000	100,000	80	5
	2	Carry out study on cleaner fuel options for combined heat and power plants	Policy ('Soft')	Investment-related feasibility study	Directly targeted	Some elements	N/A	N/A	N/A	75,000	N/A	N/A
	3	Phase out coal in more than 20 coal-fired boiler houses	Investment ('Hard')	Capital Investment	Directly targeted	Directly targeted	Directly targeted	25,000,000	1,250,000	800,000	N/A	N/A
	4	Modernise, climate-prove, and expand district heating network and infrastructure	Investment ('Hard')	Capital Investment	Directly targeted	Directly targeted	Directly targeted	9,346,000	1,409,000	N/A	39,000	20
Water 	5	Rehabilitate and extend drinking water supply network in key areas of the city	Investment ('Hard')	Capital Investment	Some elements	Some elements	Some elements	47,100,000	950,000	N/A	900	110
	6	Rehabilitate and extend sewerage network and upgrade wastewater treatment	Investment ('Hard')	Capital Investment	Some elements	Some elements	N/A	17,300,000	350,000	N/A	N/A	105
	7	Devise an institutional and capacity development programme for more sustainable water supply and wastewater services	Policy ('Soft')	Awareness, demonstration, training, and capacity building	Some elements	Some elements	Some elements	N/A	N/A	5,900,000	N/A	N/A
	8	Invest in green-grey infrastructure in flood risk zones	Investment ('Hard')	Capital Investment	Directly targeted	Directly targeted	N/A	12,500,000	500,000	350,000	5,193	40
Transport 	9	Develop a Sustainable Urban Mobility Plan for Dushanbe	Policy ('Soft')	Strategies, plans, and programmes	Some elements	Some elements	Some elements	N/A	N/A	800,000	N/A	N/A
	10	Develop pilot transport projects focused on sustainable urban mobility	Investment ('Hard')	Capital Investment	Some elements	Some elements	Some elements	10,450,000	1,306,250	650,000	N/A	100
	11	Prepare a local sustainable mobility and e-mobility plan for the city centre	Policy ('Soft')	Strategies, plans, and programmes	Some elements	Some elements	Some elements	N/A	N/A	400,000	N/A	N/A
	12	Implement a fleet renewal and EV charging infrastructure programme for urban transport and e-mobility	Investment ('Hard')	Capital Investment	Directly targeted	Some elements	Some elements	20,800,000	1,975,000	750,000	4,521	50
Buildings 	13	Develop and adopt a comprehensive programme for increased energy-efficient affordable housing	Investment ('Hard')	Capital Investment	Directly targeted	Directly targeted	Directly targeted	4,000,000	600,000	650,000	44	75
	14	Carry out area-based infrastructure upgrading and energy-efficient retrofitting pilot programme for older multi-storey apartment block neighbourhoods	Investment ('Hard')	Capital Investment	Directly targeted	Directly targeted	Some elements	4,000,000	600,000	550,000	7	50
	15	Update permission process and provide incentives to scale up and strengthen compliance with energy-efficient (EE) building construction and retrofitting in accordance with local EE codes	Policy ('Soft')	Standards, guidelines, and regulations	Directly targeted	Some elements	Some elements	7,500,000	N/A	150,000	N/A	20
	16	Incentivise and invest in energy-efficient upgrading and retrofitting of public and private buildings	Investment ('Hard')	Capital Investment	Directly targeted	Some elements	Some elements	10,580,000	1,322,500	980,000	394	150

Sector	Action ID	Action Title	Action Type (ENG)	GCAP Action Classification	Cross-Cutting Themes / Co-Benefits			Estimated Costs (Euro)			Estimated Carbon Emissions Reduction (Annual tCO2e)	Estimated Jobs Created
					Climate Action	Gender and Social Inclusion	Smart Maturity	CapEx	OpEx over 5 Years	Development / Advisory		
Industries	17	Devise strategy and set up fund and innovation platform to increase green-oriented entrepreneurship and industrial development	Investment ('Hard')	Other Investment	Some elements	Some elements	Directly targeted	3,000,000	150,000	250,000	N/A	30
	18	Develop green procurement processes for improved environmental performance in public and private sector	Policy ('Soft')	Standards, guidelines, and regulations	Directly targeted	Some elements	Some elements	N/A	N/A	250,000	N/A	N/A
	19	Improve separation of sensitive land uses from significant polluting users	Policy ('Soft')	Strategies, plans, and programmes	Some elements	Directly targeted	Some elements	N/A	N/A	250,000	N/A	N/A
Solid Waste	20	Develop and implement a system for diverting waste from landfill including sorting, recycling and recovery	Policy ('Soft')	Investment-related feasibility study	Directly targeted	Some elements	Some elements	27,250,000	4,125,000	1,500,000	60,100	20
	21	Launch construction and demolition waste recycling and reuse across the city	Investment ('Hard')	Capital Investment	Directly targeted	N/A	Directly targeted	5,000,000	750,000	450,000	25,600	30
	22	Construct new sanitary landfill site and close and remediate existing landfill site	Investment ('Hard')	Capital Investment	Directly targeted	Some elements	Some elements	42,750,000	2,125,000	750,000	N/A	50
Land Use and Biodiversity	23	Devise municipal staff capacity development programme on sustainable urban development	Policy ('Soft')	Awareness, demonstration, training, and capacity building	Some elements	Some elements	Some elements	N/A	N/A	250,000	N/A	N/A
	24	Devise community green space conservation and biodiversity upgrading programme for targeted local area investments utilising nature-based solutions	Investment ('Hard')	Capital Investment	Directly targeted	Some elements	Some elements	1,500,000	250,000	250,000	3,893	10
	25	Strengthen development control and land management towards ecologically-rich and climate-resilient neighbourhood-scale planning	Policy ('Soft')	Strategies, plans, and programmes	Some elements	Some elements	Some elements	50,000	500,000	150,000	N/A	N/A
	26	Improve environmental practices through systematic environmental data collection, monitoring, and online platform	Investment ('Hard')	Capital Investment	Some elements	Some elements	Directly targeted	225,000	30,000	200,000	N/A	3
Smart City	27	Develop a citywide digital twin for Dushanbe	Investment ('Hard')	Capital Investment	Some elements	Some elements	Directly targeted	4,500,000	562,500	250,000	N/A	17
							Sub-Totals	**255,273,500**	**19,555,250**	**16,705,000**	**139,732**	**885**

Source: AECOM, Urbanlogic, ARPA. 2022. GCAP Actions Development. London.

Main Report

1. Introduction

1.1. Purpose of the Green City Action Plan

Cities are dynamic and vital parts of society – they are the **main engines of social, economic and technological development**. According to the UN, around half of the world's population now lives in urban areas, and by 2030 this is likely to exceed 60 per cent of the global population.

To provide their populations with the myriad of demanded services, cities need inputs of large quantities of resources. As such, cities are a source **of significant environmental impacts**. For example, research indicates that cities already account for up to 70 per cent of energy use and 80 per cent of greenhouse gas emissions, figures which are set to rise over time. Furthermore, major environmental concerns for cities range from the quality of air and traffic congestion to pressure on limited green space, land and water resources. Urban activities and how they are organised deeply affect the environment, and the overall quality of life of urban populations.

To address these challenges, the EBRD developed the **Green Cities programme**, with the aim of building a better and more sustainable future for cities and their residents. The programme does this by identifying and prioritising environmental challenges, which are then connected with sustainable infrastructure investments and policy measures.

The **City of Dushanbe** joined the Green Cities programme in 2019 to advance green investments guided by the development of a Green City Action Plan (GCAP). The GCAP is the most recent effort of the City of Dushanbe to tackle its environmental, social, and economic challenges, while realising its low-carbon and climate-resilient development potential.

The GCAP aligns with **key objectives of the national and city-level policies** such as the Tajikistan National Development Strategy 2015-2030 and the Dushanbe City Socio-Economic Development Program to 2025. The key elements shared by these policies include a focus on: (i) improvement of living standards, and (ii) sustainable economic development.

The GCAP pursues a **comprehensive assessment** of the environmental and urban development challenges of a city with a focus on seven urban sectors: land use, transport, water and wastewater, waste management, energy, buildings and industry. This assessment is carried out in a systematic way with consideration also given to the cross-cutting elements of climate action, gender and social inclusion, as well as smart (digital) maturity.

The GCAP intends to be a **dynamic document** – a step-by-step guide to city officials, government staff, and urban practitioners to tackle environmental challenges and develop targeted sustainable, green investments into both 'hard' (i.e., infrastructure) and 'soft' (i.e., policy, systems, capacities) solutions.

Dushanbe's GCAP will **enable the city** to fulfil its vision of transforming Dushanbe into a clean, healthy, and safe city where citizens and businesses are offered ample economic opportunities, access to services and infrastructure is improved, and participation and representation in urban planning and decision-making is equal and transparent.

1.2. Process and Structure of the Green City Action Plan

In the development of this GCAP, Dushanbe City Administration (DCA) together with EBRD and the Consultant Team applied a systematic methodology that is based on the **Pressure-State-Response (PSR) assessment framework**.[1] The PSR framework identifies human activities that exert pressures on the urban environment in the transport, energy, building, industry, water, solid waste, and land-use and change its state in terms of environmental performance. It also identifies how society responds to these changes through general environmental, economic, social and sectoral policies, investments, and through changes in behaviour, thus affecting the pressures caused by human activities. The PSR framework therefore builds causal linkages between the environmental performance of a green city; the key associated economic activities of different social groups; and investment, services, and policy instruments to respond to these challenges.

The GCAP methodology has provided guidance to DCA through the following **key steps**:

- Establish a **green city baseline** including the policy, legislative, environmental, economic and social contexts that underpins the GCAP (*as set out in the External Framework Report, the Indicators Database and the Technical Assessment Report provided as*

[1] EBRD. 2020. GCAP Methodology. London.

appendices in Volume 2 of this report) – summarised in ***Chapter 2***;

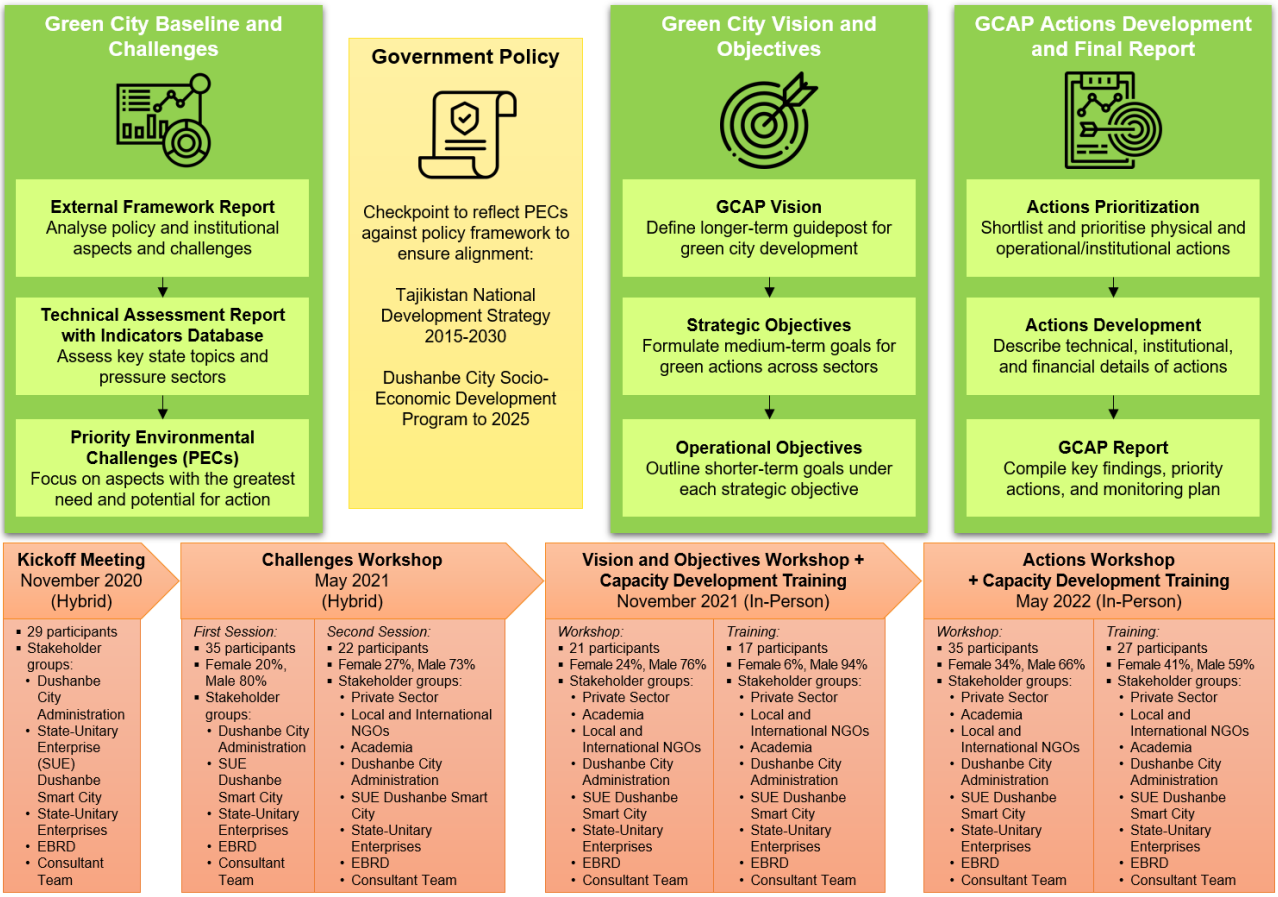
- Identify the city's **priority environmental challenges (PECs)** and set out the city's long-term **vision**, as well as the medium-term **strategic objectives** that guide its green city actions – presented in ***Chapter 3***;
- Identify, prioritise, and develop **actions** that the city can take forward to improve its environmental sustainability alongside economic and social development objectives (*with details on the calculation assumptions for estimating the carbon emission reductions provided as an appendix in Volume 2 of this report)* – described in detail in ***Chapter 4***; and
- Devise an effective **implementation approach** for the GCAP, supported through an efficient **monitoring system** (*with the progress and impact monitoring plan excel tool provided as an appendix in Volume 2 of this report*) – presented in ***Chapter 5***.

The development process of the GCAP Dushanbe is presented in Figure 1.1. As shown, this document compiles the results of several of the steps of the GCAP methodology, for which **detailed background reports** have been shared with relevant stakeholders.

The development of the GCAP Dushanbe involved **several stakeholder activities** through meetings with focal points and experts, virtual and in-person workshops, site visits, online consultations, surveys, and technical reviews between November 2020 and May 2022 (see Figure 1.2 for a collage of photos from those activities). Key stakeholder engagement workshops included participants from a variety of sectors, including city government, state-unitary enterprises, private sector local and international NGOs, and academia.

The development of the GCAP Dushanbe had **some limitations**, especially related to data collection and quality, digital literacy, as well as the challenges imposed by the COVID-19 pandemic. However, the team of local and international experts, the city officials, and a wide range of stakeholders involved in the development of the GCAP succeeded in keeping an adaptive spirit and adjust the GCAP approach to ensure that a thorough development process was followed, while taking the needed precautions to keep all parties involved safe and healthy. Online tools as well as social-media coverage of project developments were used in order to ensure that citizens had access to information and could contribute to the process.

Figure 1.1. GCAP Dushanbe Development and Stakeholder Engagement Process



Source: AECOM, ARPA, EBRD, DCA, DSC. 2020, 2021, 2022.

Figure 1.2. Impressions from the GCAP Dushanbe Stakeholder Engagement Process

Source: AECOM, ARPA, EBRD, DCA, DSC. 2020, 2021, 2022.

2. Dushanbe City Baseline

This chapter of the GCAP provides a quick overview of Dushanbe's profile, reflects relevant institutional and policy aspects, municipal finances, as well as key findings on the city's state topics and pressure sectors.

2.1. City Profile

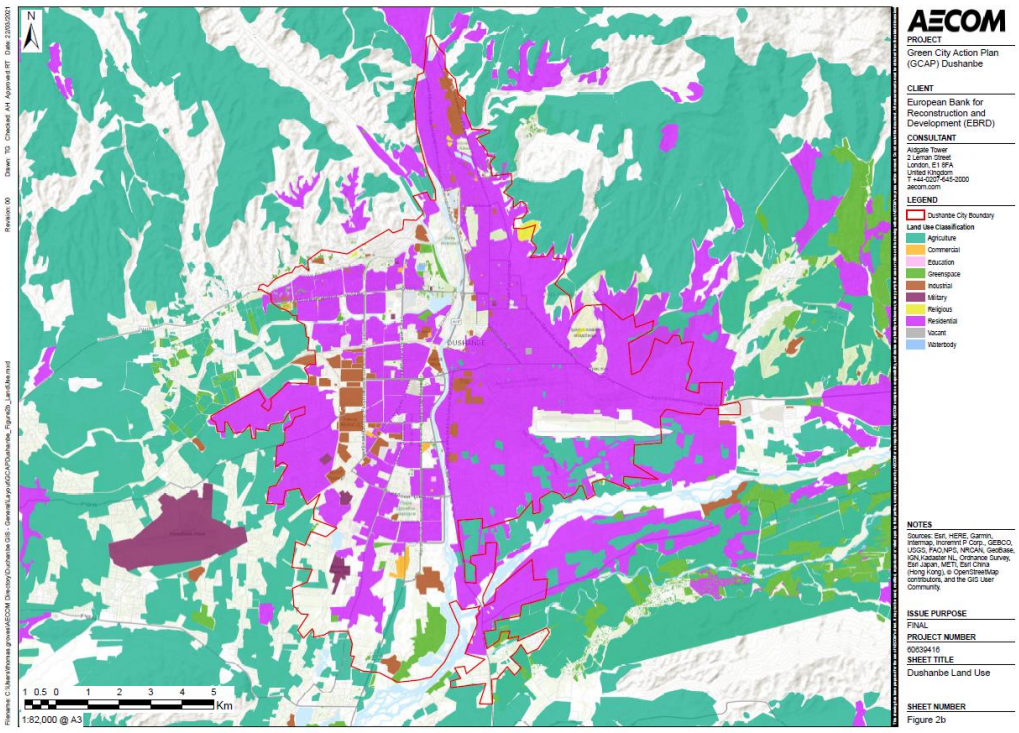
Geographic-Environmental Context

Dushanbe is located in the **centre of the Gissar Valley**, between the Gissar Ridge with an altitude of between 750-950 metres above sea level. The valley is bounded from the north by the Gissar Ridge and from the south by northern spurs of the Bobotag, Aktau, Rangon and Karatau mountains, which are between 1,400 and 1,700 metres above sea level. The rivers Varzob, Dushanbe, Kofarnikhon, and Luchob flow through the city. As of 2017, the territory of the city was nearly 12,900 ha, with urban land uses illustrated in Figure 2.1.[2]

Geologically, Dushanbe City sits on an area dominated by **soft and mostly unconsolidated sediments**. This makes slopes susceptible to landslides, and alluvial sediments (pebbles, sands and sandy loam) – which have formed in the river floodplains – vulnerable to a wide range of adverse human-made impacts. Soils in Dushanbe are characterized by low organic matter content and fine texture.

Dushanbe has extensive **natural vegetation cover**, throughout most of the urban districts, both the traditional apartment areas and the areas made up mainly of individual housing units. This is supplemented by formal parkland, such as Rudaki Park. **Rising urban population numbers and densities**, coupled with the process of urbanization, have resulted in significant losses in the urban ecology and biodiversity in Dushanbe. This has been further aggravated by energy supply constraints, which have led to illegal logging practices in some areas of the city and its urban fringe to supplement winter fuel deficiencies.

Figure 2.1. Dushanbe City Land Use Map (Open Street Map Generated)



Source: GCAP Dushanbe: External Framework Report. AECOM. 2021.

[2] Government of the Republic of Tajikistan. 2018. Dushanbe City Socio-Economic Development Program: 2025. Decree No 78. Dushanbe.

Socio-Demographic Context

The **population** of Dushanbe as of 1 January 2020 is estimated at 863,400.[3] Historically, population growth has been steady, at around 2% per annum.[4] The population density is 8,634 people/km², which is high in comparison to most other cities across Central Asia, but comparable (slightly higher) than other capital cities in the region, such as Tashkent (Uzbekistan) and Bishkek (Kyrgyz Republic). **Nearly 1 out of 10 people in Tajikistan live in Dushanbe**.[5]

According to preliminary estimates for November 2020, **labour force numbers** for Dushanbe counted 214,818 people in the working age, of which 209,811 (97.7%) were economically active, while 5,007 were officially unemployed.[6] Some 170,435 (79.3%) of the economically active were registered with various enterprises. The average monthly nominal wage paid to employees in November 2020 amounted to TSJ 2,228.52 (EUR 165.39), which is 7.6% more than in November 2019. Forecast figures suggest some 66% of the population will be economically active by **2025**, of which **more than 60% will be under 30 years of age**.[7] A notable feature of the labour force has been the underutilisation in the 15-29 age group, and although this situation has improved, the numbers of unemployed/under-employed remain significant.

The results of the Household Budget Survey for 2019 – comparing total monthly per capita consumption with the poverty line – showed that the extreme poverty rate[8] at the national level was at 10.7%, and the overall poverty rate was 26.3%. Although still high, the situation in Dushanbe is somewhat better: In 2019, the **extreme poverty rate stood at 9.4%, and the overall poverty rate stood at 18%**. DCA aims to eradicate poverty completely by 2026, in line with national policy. Beyond this, there are larger numbers of **low-income families** struggling to find access to the private housing market and some other urban services.

Gender and patriarchal stereotypes are prominent in the public consciousness and in the decision-making process. Key issues include unequal access of women and men to material (including land and finance) and non-material resources (including education and healthcare). These difficulties are constraining factors for the development of women. Progress is held back by a number of factors, including traditional male prejudice and extended family structures, where gender roles are clearly defined and female family members take on subordinate roles. Gender inequalities are still prevalent in **education**, particularly in higher education, where girls make up only 29% of total students (versus 45-48% in primary/secondary schools).

Government has recognized the importance of addressing **gender parity** as a priority for education reform projects, with some initial progress achieved.[9] **Family poverty** and traditional family structures are the most cited reasons why girls leave school. National programs and strategies encourage girls to complete their education, supported by scholarships for higher education. By 2020, the number of female civil servants in local government had significantly increased and amounts to 30.2%, of which some 26% are in leadership positions. There are 41 men (58.6%) and 29 women (41.4%) among the Deputies of the Assembly of the People's Deputies in Dushanbe.[10]

In terms of **domestic violence**, estimates at national level suggest a range of between one-third to one-half of women regularly experience physical, psychological, or sexual violence. In recent years, out of 2,571 people who filed complaints with state bodies, 2,475 (96.3%) were women. Research shows that over the past two years, 620 women have applied to the authorized state agency on violence.[11]

Where possible the GCAP actions that have been developed have sought to target cross-cutting themes such as gender and inclusion. During the implementation of the GCAP actions, the unequal power structures in Tajikistan should always be considered and where possible decisions with regards to GCAP actions that seek to reduce these inequalities should be taken.

[3] Женщины и мужчины Республики Таджикистан [Women and Men of the Republic of Tajikistan] (PDF) (in Tajik and Russian). Dushanbe: Agency on Statistics Under the President of the Republic of Tajikistan. 2020. p. 63.
[4] Government of the Republic of Tajikistan. 2020. Statistical Yearbook of the Republic of Tajikistan, 2020 prepared by the Agency on Statistics under the President of the Republic of Tajikistan. Dushanbe.
[5] Ibid.
[6] Government of the Republic of Tajikistan. 2020. Monthly Statistical Data of the Agency on Statistics under the President of the Republic of Tajikistan, December 2020. Dushanbe.
[7] Government of the Republic of Tajikistan. 2020. Statistical Yearbook of the Republic of Tajikistan, 2020 prepared by the Agency on Statistics under the President of the Republic of Tajikistan. Dushanbe.
[8] The Extreme Poverty Line is the food poverty line as it reflects a "minimum food basket" of 2,250 calories per person per day. The General Poverty Line is the "minimum food basket" plus and an additional non-food allowance.
[9] Dushanbe City Administration. 2020. Report/Presentation on the Progress of the "National Strategy of Activisation of Role of Women in the Republic of Tajikistan for 2011-2020". Dushanbe.
[10] Data obtained by Consultant Team from DCA Department of Women and Family Affairs in May 2021.
[11] Dushanbe City Administration. 2020. Report/Presentation on the Progress of the "National Strategy of Activisation of Role of Women in the Republic of Tajikistan for 2011-2020". Dushanbe.

Economic Context

Economic planning and development are set in the context of national policy, which was successful in achieving GDP growth at an average 7% from 2010 to 2017.[12] In parallel, there was a significant increase in per-capita income from EUR 136 (TSJ 1821) in 2000 to nearly EUR 671 (TSJ 8985) in 2017, as well as a noticeable poverty reduction from 80% to approximately 29.5%.

The volume of **industrial production in Dushanbe** for 2016 amounted to TSJ 1,461.8 million (EUR 108 million) compared with TSJ 1,421.6 million (EUR 105 million) in 2000 and TSJ 755.6 million (EUR 56 million) in 2010.[13] In 2020, this amounted to approximately 28% of the national productivity. In spite of these recent growth numbers, the city's industrial output is still below the 1991 figure at 82% by comparison. The industry sector was estimated to account for only 22% of GDP, including the extractive industries and mining. Some 70% of total industrial production is distributed among governmental and state-owned enterprises (SOEs).

There were approximately 480 **industrial operations** in Dushanbe in 2016. Light industry was the main type of industrial operation, using local materials, including raw cotton and silk. The largest individual industrial enterprises are the fat/oil and dairy plants, canneries, wine/vodka makers and breweries. Products for export manufactured in Dushanbe are cotton yarn, finished cotton fabrics, hosiery, cable products, fittings, and agricultural products. Foreign trade turnover in 2020 increased by 3.5% compared to 2019.[14] There are 328 **construction companies in Dushanbe** with more than 6,000 workers. There is a noticeable development of the construction sector in response to emerging requirements of the population, relevant organisations and institutions.

On the **demand side**, Tajikistan's growth in demand can be attributed to increased spending by domestic end users. This increase has allowed tertiary industries to contribute to the growth of the Tajik economy by nearly 43% over the period 2000–2017. **Investment growth and improvement of investment climate** are identified as strategic objectives for economic modernisation of Dushanbe City in parallel with improvements of the supporting legislative framework through the "Consultative Council on Entrepreneurship Development and Improvement of Investment Climate".[15]

The share of **investments in Dushanbe** out of the total volume of country's investments (EUR 6.1 billion (TSJ 81.7 billion))) is significant at a share of 74%. In 2016, the foreign investment inflow to Dushanbe was EUR 266 million (TSJ 3562 million) including EUR 215.2 million (TSJ 2882 million) of loans attracted by enterprises and organisations and EUR 50.9 million (TSJ 682 million) as direct investment. For the city's economic development, EUR 340 million (TSJ 4.6 billion) was allocated for 20 public investment projects. At present, 7 other public investment projects are being implemented at the amount of EUR 434 million (TSJ 5.8 billion).[16]

2.2. Institutional and Policy Framework

Government

The governance framework for DCA is set within the context of the Constitution of the Republic of Tajikistan and the associated constitutional laws and regulations, which cover the order of election, powers and activities of public authorities. The legislation establishes the general structure of state, national and local government bodies of the government, especially through the Constitution of the Republic of Tajikistan (November 1994) and the Constitutional Law "On Local Government Bodies" (May 2004). As such, DCA is the overall body who are responsible for the GCAP implementation.

Representative bodies of state power are formed through direct elections among the population of the corresponding administrative-territorial units (e.g., regions and cities/districts). Local executive government bodies and chairperson are appointed by the President and approved by local representative government bodies. Local government bodies, within their own authority, ensure the implementation of the constitution, laws, joint resolutions of the Parliament, acts of the President and the Government of Tajikistan.

The **general structure of the national and local government** includes several interconnected levels, forming a continuum from national policy down to local community organised activities. There are four main levels of governance relevant to Dushanbe.

- Level 1: State/Public Authorities (National Level)
- Level 2: Local Government Authorities (Dushanbe City)
- Level 3: Local Government Authorities (Dushanbe Districts)
- Level 4: Public Amateur Performance (Community Action Groups)
- Level 5: Self-Governing Bodies (Settlements and Villages) – *not relevant to Dushanbe City*

[12] World Bank. 2019. Nurturing Tajikistan's Growth Potential: Country Economic Memorandum 2019. https://www.worldbank.org/en/country/tajikistan/publication/cem-2019
[13] World Bank. 2019. Nurturing Tajikistan's Growth Potential: Country Economic Memorandum 2019. https://www.worldbank.org/en/country/tajikistan/publication/cem-2019
[14] Government of the Republic of Tajikistan. 2018. Dushanbe City Socio-Economic Development Program: 2025. Decree No 78. Dushanbe.
[15] Ibid.
[16] Ibid.

State Unitary Enterprises and Joint Stock Companies

To ensure the provision of essential public services, DCA has the right to establish and involve state owned and private sector organisations in their planning, financing, provision, as well as operation and maintenance. The creation of **state unitary enterprises (SUEs)**[17] is carried out within the framework of the Law "On State Enterprises", which determines the procedure for government agencies to create and operate SUEs. The direct procedure for the selection and attraction of companies by government/local authorities is carried out on a competitive basis in the manner prescribed by the Law "On Public-Private Partnerships" (amended 28 December 2012). There are **approximately 50 SUEs in Dushanbe**, covering a wide range of activities, including public utilities, transport, parks/gardens, social/community facilities, health, trade, hotels/accommodation, theatre/entertainment, media, and construction.

In addition to SUEs, the procedure for the selection and attraction of **joint stock companies**, or individual entrepreneurs, by government/local authorities is carried out on a competitive basis in the manner prescribed by the Law "On Licensing of Certain Types of Activities". In this context, private companies can act as service providers. Typically, private companies in the field of public service provision have included: power generation/supply, district energy/heating, and certain aspects of telecommunications.

Strategies and Development Planning

As reflected in the External Framework Report and the Technical Assessment Report that informed the development of the GCAP Dushanbe, there are several **key laws and regulations** that influence spatial, environmental, and infrastructural elements of planning and development at the city level in Tajikistan, for instance the Law on “Local Government Bodies” (2004), which regulates the structure and relationship between state (national) and local government entities, and the Law on “Status of the Capital” (2018), which provides specifications and administrative procedures governing Dushanbe in its function as the country’s capital / seat of government.

It is a fundamental consideration that the GCAP will provide the best context for application of the **city’s adopted development strategies and investment priorities** and contribute to the longer-term sustainability and prosperity of Dushanbe. As part of this, DCA’s short- to medium-term investment programme commitments and related investments by other international funding agencies will be a critical consideration in the next stages of the GCAP development.

At the **national level**, the policy context includes key strategies and action plans: (i) the National Development Strategy (2016-2030); (ii) the National Environmental Programme (2009-2019); (iii) the Tajikistan Environmental Performance Reviews; (v) the Tajikistan Climate Facts and Policy; (vi) the Transport Sector Master Plan; (vii) the Water Sector Reforms Strategy Plan; (viii) the Energy Efficiency Master Plan; (ix) Waste Management in Tajikistan (x) UNFCCC Nationally Determined Contribution (NDC) of the Republic of Tajikistan.

At the **local level**, the most significant documents directly relevant to GCAP preparation and implementation are: (i) Dushanbe City Socio-Economic Development Programme to 2025; (ii) the Housing and Communal Services Reform; (iii) the Master (General) Plan; (iv) the Landscape (General) Plan; and (v) Dushanbe Development Strategy to 2050.

Environmental and Spatial Policy

Tajikistan has a relatively well-developed framework of primary laws for **environmental protection** and related issues, but this is less true for secondary legislation (i.e., legislation created by ministers (or other regulatory bodies) under powers given to them by an Act of Parliament (primary legislation). They usually create legally enforceable regulations and the procedures for implementing them). Environment-related norms are set out in several general laws and laws applicable to specific environmental issues, procedures or types of natural resources.

Regarding **climate change**, the key national policy document, which addresses climate change adaptation and mitigation, is the National Climate Change Action Plan (2003). Implementation is as a primary responsibility for the National Agency for Hydrometeorology of Republic of Tajikistan (“Hydromet”). Other relevant policy plans include: (i) National Climate Change and Health Strategy; (ii) the National Adaptation Strategy; and (iii) National Strategies and Programmes on Glaciers, Energy Efficiency, Hydropower, Disaster Risk Reduction and Forests. Relevant legislation includes: (i) the Law on Energy Saving and Energy Efficiency; and (ii) the Law on the Use of Renewable Energy Sources.

The spatial pattern of land development is set out in the **Master (General) Plan for Dushanbe**, which confirms broad land use intention for the existing urban areas and proposed locations for new urban development, matching

[17] State Owned Enterprises in Tajikistan appear in two forms: as Joint-Stock Companies (JSCs) and State Unitary Enterprises (SUEs). According to the World Bank (Country Economic Memorandum[17] “Nurturing Tajikistan’s Growth Potential”, World Bank (May 2019), the JSCs comprise of formal boards of directors, and some JSCs report to the Ministry of Finance SOE’s Monitoring Department. SUEs can be national, regional, or municipal. At the national level, a SUE may run under the oversight of a line ministry or other government body, however it is not comprised of a formal board of directors, and legal possession belongs to the State Committee on Investments and State Property Management of the RoT.

the need for urban growth and urban resettlement. Making this key planning document easily available to the public could help households and businesses take better-informed decisions on where to move and invest in.

Legislative/Regulatory Support

The **range of legislation, regulations, and policy documentation** in Dushanbe is comprehensive, such that extensive new legislation/regulations may not be a priority issue. However, the legislative and regulatory context may in part lack the **operational and enforcement capacity** necessary to secure their implementation. It is understood that on-the-ground controls and enforcement in the environment, land management, and land use sectors are relevant in this regard.

Much of the legislative context, including environmental management and protection, was developed based on the laws and regulations adopted in the Soviet period. The Government of the Republic of Tajikistan has tended to gradually adjust and supplement earlier legislation as changing conditions have demanded. However, as the legislation often reflects approaches to environmental management from previous regimes and contexts, **integrated strategy and project planning** in keeping with current environment and climate change needs are apparently not regulated at all or regulated inappropriately

2.3. Municipal Finance

Financial management/budgeting relevant to Dushanbe is organised in a two-tier system with (i) the first tier consisting of the 'republican budget' for national government tasks and 'state special-purpose funds', such as the social insurance and pensions fund; and (ii) the second tier consisting of local budgets. Several government expenditure areas are funded from both the republican and local budgets, including support for energy, transport, roads, education, and culture.

In terms of **local budget formation**, the Local Executive Authorities of State Power (i.e., local authorities) are responsible for preparing and executing their local budgets. The Local Representative Bodies of State Power (i.e., local council / 'Majlis of People's Deputies') approve local budgets through legal and regulatory acts on an annual basis. The local budget formation is guided by requirements stipulated by national budget and tax legislation of the current fiscal year and the Ministry of Finance's Methodological Guidelines on "Forecasting of State Revenue Receipts".

This process in the case of Dushanbe City is the responsibility of two different organisational entities – one under DCA and one under the national government – namely, the **Department of Economy, Finance, and Forecasting of the Dushanbe City Chairman's Office** (DEFF, local) and the **Main Department of Finance of Dushanbe under the Ministry of Finance of the Republic of Tajikistan** (MDF, national). MDF takes a key role in the budget preparation process, while DEFF takes a key role in the budget execution process.

The **local revenue budget** is categorised into tax revenues of local budgets (e.g., local taxes, revenues from regulated national taxes, and certain state duties), non-tax revenues (e.g., property rents and national government transfers), as well as in-payments from regulated national fees and other payments. The proportion and distribution of taxes from the republican budget to local budgets is only fixed by the annual 'State Budget Law of the Republic of Tajikistan' for the following fiscal year. Therefore, these allocations can change from year to year. In addition to those allocations, the annual State Budget Law also grants periodic tax exemptions which again leads to fluctuating revenue levels from particular taxes in certain sectors of the economy.

At the national level, a **multi-year policy planning system** is in place, with three components: (i) long-term National Development Strategy (10-15 years); (ii) medium-term Development Plan (up to 5 years); and (iii) Socio-Economic Development Plans (approved on an annual basis). This system is loosely interlinked with the **budgeting process**, although the spending (expenditures) in the annual and 3-year budget plans/projections can often not clearly be linked to a certain achievement of specific economic or social policy targets indicated in the national policy planning documents.

Given the relative high indebtedness of the government, **public-private partnerships (PPPs)** offer an alternative approach to project financing and for operation and maintenance regimes. Given capacity constraints, PPP projects still highly benefit from active involvement of international development partners. Transparency and public oversight are critical for effective PPP projects and need to be further improved in Tajikistan. There is potential for broader **privatisation** of currently government-owned services and businesses that are more typically provided by the private sector. PPPs can function as an intermediary delivery mode between the current SOE model and full privatisation and their increasing number since the 2000s are a positive sign in that direction.

For further information on local revenues and expenditures in comparison to the investments required for the proposed GCAP actions, see Chapter 4.1.

2.4. Findings from State Topics

This section summarises the findings from the State Topics presented in the GCAP Dushanbe Technical Assessment Report. The section presents, first, the summarised findings from an analysis of the performance against measures of environmental quality for air, water, and land (Table 2.1). After this, this section illustrates the climate change context of Dushanbe including climate risk alongside the state of climate change mitigation and adaptation.

Status of Air, Water, and Land Resources in Dushanbe

Data collection for the analysis of air, water, and land resources presented several challenges. Data pertaining to **air quality** in Dushanbe was of a good quality, with information received from the Committee for Environmental Protection (CEP). However, there is only one monitoring station in Dushanbe hence the monitoring of air quality is very limited. The data availability in Dushanbe regarding **water resources** was mixed. Data pertaining some indicators was available from different agencies (i.e., CEP and the State Unitary Enterprise Dushanbevodokanal (DVK)). However, The Agency of Statistics suspended the collection of statistical reporting data on water in 2010 hence other data on water quality is not available since then. Information relating to **land resources** was particularly challenging with no information available regarding soil quality and potential pollutants. Furthermore, most available information on biological diversity, ecosystems, and forests is outdated, and information that was shared was typically anecdotal with limited official documented confirmation.

Table 2.1. Summarised Findings from State Topics

Air 	• Significant air pollution comes from both anthropogenic sources such as **vehicles and industrial facilities** (e.g., cement factories), as well as from **natural climate events** such as dust storms. • **Elevated concentrations of PM_{10}** (with $PM_{2.5}$ less elevated) potentially suggests that airborne ground material (leading to hazy and polluted conditions) may cause air pollution in Dushanbe rather than combustion emissions. This is typically the case where the natural environment is predominantly arid, or the monitoring station is located close to dust-generating activity, such as a minerals industry or construction site. • Elevated concentrations of SO_2, compared to low NO_X concentrations, suggest that this is due to the **burning of high sulphur content fuel-oil or coal** for heating rather than road traffic emissions.
Water 	• Currently the quality of **drinking water is unknown** due to lack of sampling. The Agency of Statistics suspended the collection of statistical reporting data on water in 2010.[18] • There is a **high concentration of ammonium in the two main rivers of Dushanbe**. Identifying and addressing the causes of this is required to improve environmental conditions of Dushanbe's waterways. • Water consumption in Dushanbe is currently not sustainable, as evidenced by the **water exploitation index**. This is a critical issue, especially as the population of Dushanbe continues to grow.[19]
Land 	• Due to the **lack of data on core land quality indicators** in Dushanbe, it is difficult to identify key challenges pertaining to land quality. Soil samples should be taken routinely, or at least annually, to identify any issues with the land quality such as exceeding safe levels of metal concentrations in soil. • With an increasing population, the demand for housing and green spaces within urban limits are **increasing the pressures on land**. A concerted effort to continue improving the provision of green space within Dushanbe could lead to multiple benefits such as increasing biodiversity, reducing the urban heat island effect, and improving the health and wellbeing of the population. • Geo-spatial data indicates **high levels of erosion** in the north and south of the city, which may suggest the land is prone to degradation and instability, which could possibly be an issue for assets in those areas, particularly considering that Dushanbe can be categorised as an area of **high seismicity**. Special attention needs to be given to areas in the south of the city since several active fault lines can be found close to this part of the city.

Source: AECOM. 2021. GCAP Dushanbe: Technical Assessment Report. London.

[18] UNECE. 2017. Tajikistan – Third Environmental Performance Reviews. Available from: https://unece.org/fileadmin/DAM/env/epr/epr_studies/ECE.CEP.180.Eng.pdf
[19] https://www.macrotrends.net/cities/22615/dushanbe/population [Online Resource]

Climate Action Context

Carbon emissions declined in Tajikistan in the early 1990s as a result of the split of the Soviet Union and the related economic downturn, with emissions remaining level until 2013, after which the emissions in Tajikistan have been increasing both in absolute terms (kilotons of CO_2) and in relative terms (metric tons per capita). Addressing this rise and reducing carbon emissions in the country will require a wide range of policy initiatives, national programmes, and investments. Emissions must level off for Tajikistan to achieve an **unconditional target** that would cap emissions at **60-70%** of 1990 GHG emissions – this translates to keeping emissions to 21.32-24.87 $MtCO_2eq$ in 2030. Its **conditional target** (i.e., subject to significant international funding and technology transfer) puts an emission cap at **50-60%** of 1990 GHG emissions, representing a limit of 17.76-21.32 $MtCO_2eq$ in 2030.[20]

Central Asian countries such as Tajikistan are prone to **high levels of climate and disaster risk** due to their topography and the exposure of populations and economies to multiple hazards. The region experiences hazards ranging from geophysical hazards such as earthquakes, landslides, debris flows, and avalanches to hydrometeorological hazards such as flooding, mudslides, droughts, and extreme temperatures, which have been known to cause severe economic and human losses.[21] For instance, according to the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP), the current Average Annual Loses (AAL) for all types of hazards in Tajikistan represents 8.4% of the GDP and the estimated adaptation costs for the country are 1.8% of the GDP.[22]

Hazard mapping has not been comprehensively conducted in the country since the Soviet period. Therefore, hazard assessments rely on largely outdated maps. The Notre Dame Global Adaptation Initiative ranks Tajikistan as the **most vulnerable country to natural hazards in Central Asia** (111th out of 180 counties worldwide): Relative to other countries, its current vulnerabilities are manageable but improvements in readiness will help it to better adapt to future challenges.[23] Whilst the country faces a number of hazards, Dushanbe is specifically vulnerable to earthquakes, flooding, drought, heatwaves and urban heat island, landslides and avalanches, and soil erosion.

The **key national policy document** for climate change, which addresses climate change adaptation and mitigation, is the National Climate Change Action Plan (NCCAP) (2003). Implementation is as a primary responsibility of the State Agency for Hydrometeorology, which is at the national level. The Committee for Environmental Protection is responsible for policy development and implementation relating to disaster emergencies and remediation. In addition, within Dushanbe, DCA has authority to act (as granted by the law "On the Status of the Capital of the RoT") with relevance to 'Ensuring public order and fire safety, as well as organizing measures to eliminate the consequences of natural disasters, emergencies and assistance to affected persons.' Additionally, the Government of Tajikistan developed 'The national strategy of adaptation to climate change of the Republic of Tajikistan for the period till 2030' in 2019 with relevance to Dushanbe.

There have been a range of activities focusing on **climate and disaster resilience** – typically targeted at national-level capacities or other regions within Tajikistan. Exemplary projects include the Aga Khan Development Network's community-based disaster risk reduction work[24]; the EU-funded project "Strengthening disaster resilience and accelerating implementation of Sendai Framework for Disaster Risk Reduction in Central Asia"[25], implemented by the UNDRR[26] and the UNDP-implemented disaster and climate resilience activities.[27] Policy plans include: (i) National Climate Change and Health Strategy; (ii) the National Adaptation Strategy, and (iii) National Strategies and Programs on Glaciers, Energy Efficiency, Hydropower, Disaster Risk Reduction and Forests. Relevant legislation includes: (i) the Law on Energy Saving and Energy Efficiency; and (ii) the Law on the Use of Renewable Energy Sources. Additionally, Tajikistan is participating in the international Pilot Programme for Climate Resilience (PPCR). The main efforts of the PPCR in Tajikistan are focused on the hydraulic power industry, development of other renewable sources of energy, agriculture and forestry, adequate response to and risk reduction against natural disasters, provision of hydrometeorological services, as well as measures to raise public awareness.[28]

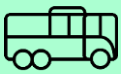
[20] UNFCCC. 2021. The Updated Nationally Determined Contribution (NDC) of the Republic of Tajikistan. https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Tajikistan%20First/NDC_TAJIKISTAN_ENG.pdf
[21] DCA. 2016. Dushanbe Declaration on Disaster Risk Reduction for Resilience Building. Available from: https://www.preventionweb.net/files/49561_dushanbedeclarationeng.pdf.
[22] UNESCAP. 2022. Risk and Resilience Portal: Tajikistan. Available from: https://rrp.unescap.org/country-profile/TJK
[23] Notre Dame Global Adaptation Initiative. 2021. ND-Gain Country Index. Available from: https://gain.nd.edu/our-work/country-index/.
[24] Aga Khan Development Network. 2020. Tajikistan. https://www.akdn.org/where-we-work/central-asia/tajikistan
[25] OECD. 2021. GREEN Action Task Force: Greening the Economy in Eastern Europe, Caucasus and Central Asia. Website. http://www.oecd.org/countries/tajikistan/eap-tf.htm
[26] UN. 2020. Central Asia Countries Strengthen Coordination in Disaster Risk Reduction. Press Release: 11 December. https://tajikistan.un.org/en/105321-central-asia-countries-strengthen-coordination-disaster-risk-reduction
[27] UNDP. 2020. Country Profile: Tajikistan. https://www.tj.undp.org/content/tajikistan/en/home/
[28] IIED. 2020. Good Climate Finance Guide. Case Study 8: Participatory and Devolved Resilience Investment Planning in Tajikistan. P. 30-31. London.

2.5. Findings from Pressure Sectors

This section summarises the findings of the key challenges in Pressure Sectors presented in the GCAP Dushanbe Technical Assessment Report. This section is divided into 7 sub-sections – organised along the 7 pressure sectors of the GCAP Pressure-State-Response (PSR) Framework. Each sub-section presents the key environmental challenges and implications for the GCAP for each sector.

Sector	Key environmental challenges and implications for the GCAP
Energy 	• **Lack of incentives for local renewable energy (including heat) generation**: Although entailing some advantages, the low cost of electricity and the monopoly control over electricity generation and supply prevent the establishment of a competitive market in renewables. As a result, DCA needs to decide if it wants to actively invest or incentivise private investments in other forms of renewable energy generation. This is particularly relevant to heating. Dushanbe's climate provides opportunity to harness solar thermal systems and ground-source heat pumps that could connect to the existing and expanding district heating network. Moreover, decentralised, neighbourhood-level district heating systems enhance overall resilience to climate and other disaster events. • **Lack of stress-testing and redundancy in energy systems**: Dushanbe's use of hydropower enables for a high proportion of renewable energy supply; however, it presents a risk to the electricity network as it is dependent on water levels. Additionally, there is no data available on the business continuity processes in place for the electricity and heating networks and how future climate scenarios are accounted for in planning. The City of Dushanbe's Department of Energy and Industry could create a standardised approach to stress-testing and future-proofing the systems alongside the actions presented in this GCAP. • **Coal-fired combined heat and power (CHP) plants**: While CHPs themselves are highly efficient, one of Dushanbe's CHPs runs on highly carbon intensive coal. CHPs can, however, have multiple inputs. • **Increasing energy demand from heating and cooling needs:** Growing urban population, combined with increased incomes and warmer temperatures resulting from climate change, will likely drive air-conditioning uptake.

Sector	Key environmental challenges and implications for the GCAP
Water 	• **Contamination of water supplies**: Insufficient capacity, coverage and overaged infrastructure has led to regular contamination of drinking water supplies and river water with consequences for public and environmental health. • **Lack of whole water cycle management**: With present and future climate challenges, Dushanbe needs to focus on more sustainable water management, recycling greywater (and wastewater) through seasons of low precipitation, while capturing precipitation through wet seasons. • **High levels of non-revenue water**: Leaks and unauthorised consumers have led to huge water losses and uncertainty of water supply. • **Lack of gender-sensitive approach to water management**: There is a need to incorporate a gender sensitive approach to water management (including sanitation) to capture the needs of women and marginalised groups who are most affected by water shortages and contaminated water (e.g., in Dushanbe's urban fringes).

Sector	Key environmental challenges and implications for the GCAP
Transport 	• **Emissions from the growing and ageing vehicle fleet:** The demand for private passenger vehicles is increasing in Dushanbe, risking resulting in increased pollution, higher levels of congestion, and longer travel times. Relevant authorities may seek to exert additional control over the emissions of vehicles and quality checks for conformity with environmental standards and regulations. There is an opportunity to move towards electrification of vehicles in Dushanbe. • **Lack of non-motorised transport infrastructure:** Dushanbe has limited quality infrastructure for cycling and walking. Poor safety conditions and road design focusing on motorised transport contribute to the negative environment for walking and cycling. To improve the appeal of cycling for commuting purposes, there is a need for better recognition in the value of non-motorised transport as viable modes in a full transport hierarchy. • **Deteriorating public transport and limited options:** The poor reliability of public transport increases the preference of residents towards private vehicles. All bus systems are operated by 4 SUEs. Therefore, DCA in coordination with the SUEs may seek to update the investment programme for public transport ensuring that sufficient human and financial resources are allocated to the programme on time. DCA may seek to implement measures to reverse the public/private transport share and optimise investment in clean, accessible, and affordable public transport modes. DCA could explore new collaboration models such as performance-based contracting as well as establishing prioritised lanes which are currently missing. • **Limited incentives for electric/hybrid vehicles:** Insufficient policy and financial incentives for electric and hybrid cars is limiting their adoption. Some additional fiscal incentives could include increased excise tax for older cars or reduced excise tax on hybrid or electric cars. • **Need for more integrated land use/transport planning:** Integrated traffic and transport planning for Dushanbe is a key issue in developing and ensuring affordable “green” solutions to steadily worsening environmental conditions in Dushanbe.

Sector	Key environmental challenges and implications for the GCAP
Buildings 	• **Poor quality building stock for old Soviet-style buildings**: While new builds in Dushanbe are more energy efficient, there remains a significant historical building stock of Soviet-style walk ups that provide inadequate thermal comfort and poor energy efficiency. • **Insufficient incentives for green buildings**: The Law on Energy Saving and Energy Efficiency does not provide enough detail nor incentives to adequately promote meaningful change in energy efficiency of existing and new builds. This also relates to missing details on building-level energy or heat generation where possible (e.g., solar water heaters) or capturing waste heat from building appliances. Combined with the low cost of energy, building owners and occupants have little incentive to save energy or invest in measures to improve energy efficiency in buildings. • **Lack of building-level data**: Dushanbe lacks building-level data and monitoring. This is in part due to a lack of metering to understand building energy and water consumption habits. • **Incomplete coverage of sewage connections**: Not all buildings in Dushanbe have continuous connections to the sewage network; and some remain disconnected.

Sector	Key environmental challenges and implications for the GCAP
Industries 	• **Lack of data on industry, contaminated sites, monitoring/evaluation that is publicly available**: The lack of industry-specific data is a challenge to building an evidence-based improvement strategy. • **Necessity for further policies and practices around greening industry and promoting sustainable production:** At present, there was no evidence of any sustainability or green policies to align industry practices with nationally determined contributions nor international best practice. • **Air, water, and soil polluting industries within urban boundaries**: Although not extensive, there are polluting industries located within Dushanbe (cement plants, boiler houses, small workshops). There is much potential to support these industries in understanding the most useful investments for their businesses, shifting to cleaner technologies, and improving operation and maintenance approaches for the safe and environmentally better management of facilities. • **Sub-optimal use of by-products of industrial processes:** There was no evidence of reuse or redirection of industrial by-products for other purposes (e.g., sludge for heat generation or implementation of circular principles). Better linking industry to other sectors such as energy and solid waste could be a focus area. • **Slow uptake of smart technologies to improve industrial efficiency**: There was no evidence of the integration of smart technologies within the industrial sector to improve manufacturing operations or optimise distribution. Implementing “smart factory” technologies could facilitate other goals, such as improved circularity within industry and waste processes.

Sector	Key environmental challenges and implications for the GCAP
Solid Waste 	• **Insufficient data management and monitoring:** The absence of up-to-date data and figures for solid waste management hinders Dushanbe’s ability to improve performance or understand the main challenges in need of addressing in the solid waste sector. • **Rudimentary landfill:** Currently the city is not meeting the level equivalent to the EU standard, the existing landfill requires reconstruction of operations and processes for separating and disposing of waste, modernisation of equipment and controls, and regulations for environmental protection. • **Non-existent household or commercial separation of waste:** There are no facilities for households or industry to separate waste and for waste to be processed, managed, and recycled. The GCAP should seek to initiate household and commercial waste separation processes to build awareness and initiate recycling processes to help reducing environment and health impacts. • **Inadequate hazardous waste disposal processes:** Hazardous waste processes do not meet the level equivalent to the EU standards for disposal and cause an immediate threat to human and environmental health without intervention. • **Industrial waste infrastructure**: Infrastructure, collection, and processing of industrial waste is insufficient for the city with 60% of industrial waste transported in vehicles with 12 m^3 capacity. • **Lack of circular waste processes:** There are no circular waste processes for utilising municipal solid waste (MSW), wastewater sludge or industry waste. There are opportunities to establish refuse derived fuel (RDF) and solid recovered fuel (SRF) processes to produce energy and wastewater sludge processing including anaerobic digestion for soil improver, co-composting or co-incineration etc.

Sector	Key environmental challenges and implications for the GCAP
Land Use and Biodiversity 	• **Rapid population growth and urbanisation:** increases the pressures on land for housing (specifically high-rise multi-family housing) and the demand for urban services. DCA should steer its spatial growth management with a focus on primary growth corridors in terms of land conversion, transport infrastructure, and basic urban services network expansion and provision. • **Planning processes**: DCA can contribute to environmental protection by limiting development in Dushanbe's natural and agricultural areas to preserve the environment and its biodiversity. Similarly, consideration for the environmental impact of increasing built-up area should be taken. Natural hazards should be taken into account as the need for increased urban density and high-rise buildings can increase the risk to buildings from seismicity. • **Housing affordability**: Decent housing remains unaffordable for the average household.[29] This in turn leads to pressure for the illegal use of land in the urban fringe and flood plain areas leading to a series of critical environmental impacts. • **Climate-smart greening:** Dushanbe's built environment drives increasing temperature patterns through impervious surfaces and the urban heat island effect, which will be amplified by continued climate induced warming in the future. This warming will likely affect the quality of urban life. • **Competing land use priorities:** Green space is competing with other land use types, such as residential and commercial construction and transport infrastructure. These priorities need not be mutually exclusive, and the integration of green space standards into urban development and regeneration projects needs to be understood as a possibility. Efforts to increase green space could have positive impacts on other state indicators, such as air and water. One key option to be considered by Dushanbe is the inclusion of green space in any future planning, and the protection of natural habitats.

[29] AECOM. 2021. GCAP Dushanbe: External Framework Report. London.

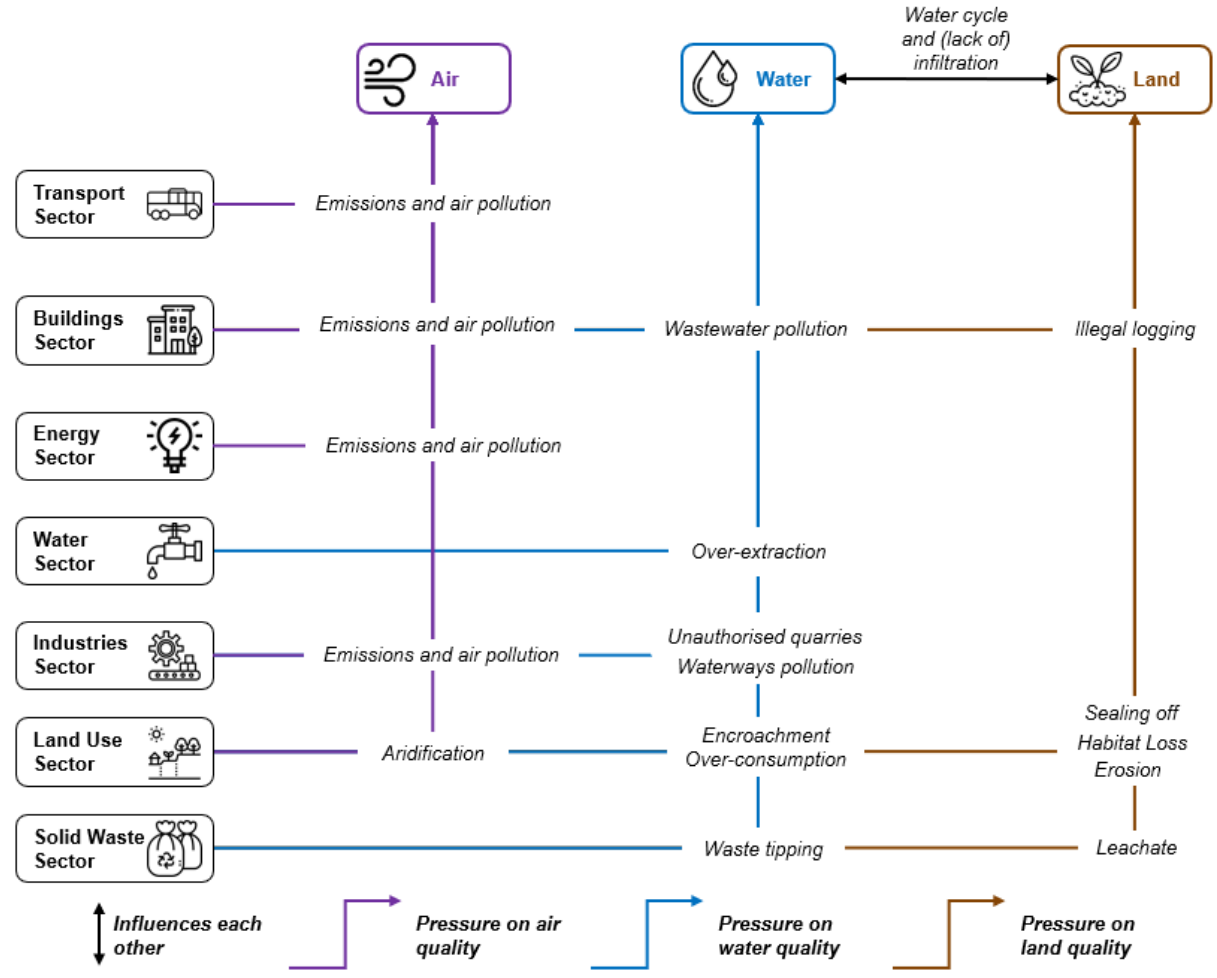
3. Priority Environmental Challenges, Green City Vision and Strategic Objectives

In order to move from the baseline assessments presented in Chapter 2 towards developing physical ('hard') and operational/institutional ('soft') actions for this GCAP Report, it is essential to define **Priority Environmental Challenges (PECs)**, an overarching longer-term **Green City Vision** and medium-term **Strategic Objectives**. They represent the next step in the design of a sustainable and actionable plan incorporating a series of existing strategies and targeted investments, which will ensure a holistic approach to green city planning, emphasising environmental sustainability whilst also bringing real improvements to the living and working conditions of the Dushanbe population.

3.1. Priority Environmental Challenges

The GCAP development process builds on the initial External Framework Report (EFR) (analysing policy and institutional aspects and challenges) and the Technical Assessment Report (TAR) with Indicators Database (providing a technical analysis of key state topics and pressure sectors).[30] As part of this process, the interlinkages between state topics and pressure sectors were analysed and summarised in a problem tree (**Error! Reference source not found.**).

Figure 3.1. Problem Tree for Sectors' Pressure Exerted on the Environment (State Topics) in Dushanbe



Source: AECOM. 2021. GCAP Dushanbe: PECs Development Process. London.

[30] EBRD. 2020. Green City Action Plan Methodology. London.

Extrapolating key conclusions from this, the GCAP process uses **Priority Environmental Challenges (PECs)** that help to focus on the analysis and planning towards greener city development on those areas and aspects in each sector where the government, stakeholders, and involved experts see both the greatest need and the biggest potential for action.

Based on the **first stakeholder engagement in May** 2021, findings of the EFR and complemented by the data obtained through the development of the TAR, **a comprehensive list of 46 environmental challenges** across the Land Use and Biodiversity, Water Supply and Distribution, Wastewater and Stormwater Management, Transport, Energy, Buildings, Industries, and Solid Waste sectors was developed.

This list of environmental challenges was presented to **DCA's Expert Group** during the **second stakeholder engagement** held in-person in Dushanbe in November 2021. The members of the Expert Group were tasked with ranking the environmental challenges identified for each sector based on their areas of expertise.

This helped to **shortlist and finalise the environmental challenges to the key PECs**. The process allowed the development of PECs in alignment with **national and city level policy priorities**.

The PECs that have been developed and shortlisted for the GCAP are detailed in Table 3.1. The PECs informed the further GCAP development, in particular by **linking up identified priority challenges with relevant 'hard' and 'soft' actions** that can help address related needs while also realising Dushanbe's long-term Green City Vision and Strategic Objectives, which are presented in the next section.

Table 3.1. Dushanbe Priority Environmental Challenges (PECs)

Energy	• Increasing energy demand from heating and cooling needs • Increasing emissions and pollution from cement plants, boiler houses, and small workshops
Water	• Lack of continuous supply and coverage of the water network • High rates of non-revenue water and unsustainable water consumption • Low quality and limited number of wastewater treatment plants
Transport	• Emissions from growing and ageing vehicle fleet • Limited incentives for clean transport and non-motorised mobility
Buildings	• Poor quality building stock of old Soviet-style housing • Lack of building-level data • Limited and poorly maintained community facilities
Industries	• Limited policies and practices around greening industry and promoting sustainable production • Air, water, and soil polluting industries within urban boundaries
Solid Waste	• Official landfill site does not meet international standards • Outdated or hazardous solid waste disposal and management practices
Land Use and Biodiversity	• Unauthorised quarries

Source: AECOM. 2021. GCAP Dushanbe: PECs Development Process. London.

3.2. Green City Vision and Strategic Objectives

The **Vision and Strategic Objectives** have been developed both from the Technical Assessment Report, the External Framework Report, national and city-level policy documents, an Online Survey, and more nuanced findings from Stakeholder Engagement Activities, covering the interests of DCA, state-owned enterprises (SOEs), private sector, and selected academic institutions and non-government organisations (NGOs).

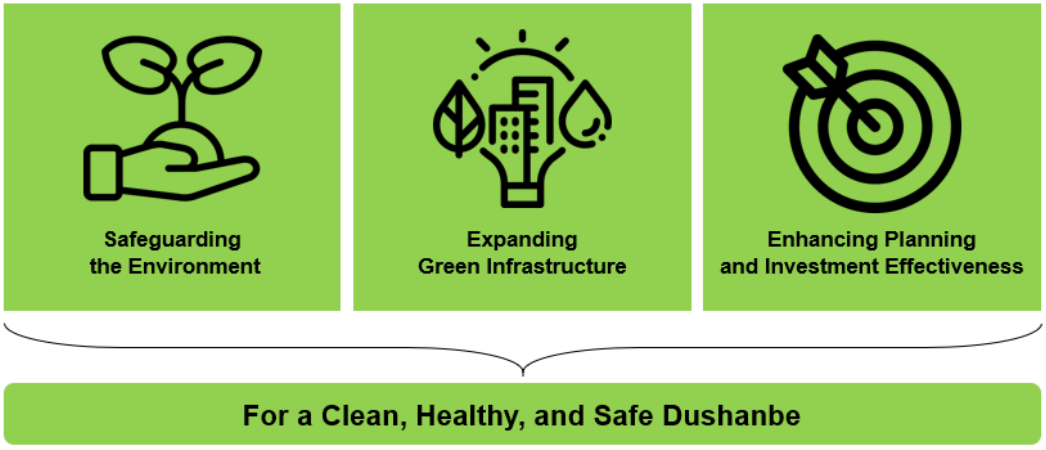
The key elements of the **national and city level visions and sub-goals** that align with the findings in the GCAP's assessment reports set a backdrop to the GCAP Vision and Strategic Objectives. These include a focus on (i) improvement of living standards, and (ii) sustainable economic development. At a more granular level, these visions contain strategic objectives that influence the multiple sectors of green city development and include energy security and efficiency, environmental and ecological improvements, improved transport systems, better access to housing, and stronger urban planning and construction activities. Additionally, with regard to human development, reduction in social inequality, access to decent employment and social and cultural services, and promotion of a child-friendly city are considered.

Another element of deriving a green city vision for Dushanbe was a Russian-language **Online Survey** that the Consultant Team conducted with support of DCA and DSC between August 5th and November 15th, 2021. The online survey functioned as a digital tool (given COVID-19 circumstances) to engage citizens from Dushanbe to share their viewpoints and 43 responses were received, with half of the participants from civil society and one quarter from the private sector.

Vision

Based on the above-described inputs into the process **Dushanbe's green city vision** was developed (Figure 3.2).

Figure 3.2. Dushanbe's Green City Vision



Source: AECOM. 2021. GCAP Dushanbe: Vision and Objectives. London.

Strategic Objectives

Under the umbrella of Dushanbe's green city vision, **strategic objectives** have been formulated that reflect inputs received from stakeholder engagement activities and the online survey, interlinked with Dushanbe's PECs (**Error! Reference source not found.**).

The strategic objectives function as **sector-specific medium-term goals** for green city development, which guided the identification of relevant actions during the green city actions development phase of the GCAP process.

In addition to those strategic objectives, **several cross-cutting enablers** have been recognised as critical to the implementation success of Dushanbe's green city ambitions, namely:

(i) Strengthened municipal mandates;

(ii) Legislative/regulatory support and enforcement;

(iii) Effective land and development management;

(iv) Enhanced technical capacities and systems;

(v) Open governance;

(vi) Increased social equity and inclusion; and

(vii) Expanded participation opportunities for private sector.

Table 3.2. Dushanbe's Green City Strategic Objectives

Sector	Strategic Objectives
Energy	Support the transition towards a resilient energy system that enables reliable electricity and heating services and access to resource-efficient technologies with reduced environmental impacts.
Water	Expand and upgrade the water supply and wastewater systems to all users for stable and resource-efficient 24-hour services supported by an operationally viable tariff regime.
Transport	Improve transport planning and investment to support an integrated and safe transport system that enables better connectivity, improved access to a variety of motorised and non-motorised transport modes, as well as reduced carbon emissions and air pollution.
Buildings	Optimise community-oriented upgrading in aging apartment blocks for universally accessible and affordable housing alongside increased awareness and incentives for green-building investments.
Industries	Collaborate with private sector and civil society in a green economy transition based on improved policy frameworks, investment support, enhanced data collection and monitoring of industrial emissions, and effective regulatory enforcement.
Solid Waste	Enable strategic solid waste management through waste recycling, appropriate treatment and disposal, and application of standards that safeguard communities and the environment from air, water, and land pollution.
Land Use and Biodiversity	Improve the conservation, enhancement, and efficient use of land resources to reduce greenhouse gas emissions and strengthen resilience to climate change and disaster risks alongside stronger development control and enhanced stakeholder engagement.

Source: AECOM. 2021. GCAP Dushanbe: Vision and Objectives. London.

4. Green City Actions

Chapter 4 forms the core part of this document as it presents detailed information on the 27 shortlisted priority actions of Dushanbe's GCAP. The first section provides a summary of those actions, followed by action sheets organised into the sectors that have structured the GCAP development throughout the process.

4.1. Summary of Green City Actions

Actions Development Process

The key steps carried out to identify and finalise the selection of GCAP actions were as follows:

1. Scope actions from **existing city strategy documents and plans** (October to November 2021);
2. Identify **additional actions** based on technical findings of the GCAP development process (November to December 2021);
3. Engage relevant stakeholders on **longlisted actions** through focus group discussions to derive a shortlist (January to February 2022);
4. Carry out a **multi-criteria analysis** of the shortlisted actions to arrive at prioritised GCAP actions – looking at key economic, social, environmental, and feasibility criteria and aiming to achieve a balanced set of actions that include a range of **both 'hard' and 'soft' interventions** (February to March 2022);
5. Develop the prioritised actions through the use of a **streamlined template**, including estimates on costs, financing instruments and sources, potential carbon emissions reductions, other physical savings, job creation, as well as impacts on state and pressure indicators (March to April 2022);
6. Conduct **several rounds of technical reviews** to finalise the prioritised actions (April to June 2022);
7. Obtain **final endorsement** of the prioritised GCAP actions from DCA's Expert Group and city stakeholders during workshops (May to June 2022).

Out of more than 100 longlisted actions, 26 priority actions across the 7 pressure sectors were identified and developed. Additionally, 1 priority action on smart city development was incorporated into the final list in reflection of the importance of increased smart maturity in city operations and the role that the state-owned enterprise Dushanbe Smart City (DSC) will continue to play in the implementation of the GCAP. The prioritised actions are proposed for the **GCAP implementation timeframe of 5 years** (2022 to 2027) and provide opportunities for **cross-sectoral synergies** as many of them highlight where positive co-benefits can be achieved beyond individual intervention areas and sectors. The **final list of 27 GCAP actions** is presented in Table 4.1.

Notwithstanding the available information and stakeholder inputs that informed the development of the action details, many actions require **further preparation and analysis** through feasibility studies to scope out and confirm technical requirements and solutions tailored to a more detailed scale. As such, the action template used in this GCAP report can guide future updates and additions to the individual actions.

Actions Overview and Cross-Cutting Themes/Co-Benefits

The prioritised 27 actions are evenly distributed across the key sectors that influence low-carbon and climate-resilient development in Dushanbe. There are **17 investment actions** and **10 policy actions**, with nearly all of them including some or directly targeting the cross-cutting GCAP themes/co-benefits relating to climate action, gender and social inclusion, as well as smart maturity.

In terms of **climate action**, the sectors of energy, buildings, and solid waste are of critical importance to Dushanbe's low-carbon development. Additionally, climate action as a cross-cutting theme can be found in resilience-focused actions of the water, industries, and land use sectors.

Gender and social inclusiveness have been considered across all actions, and most potential has been found in those actions that target improved livability for vulnerable households (e.g. in the energy, transport, and buildings sector) or that enable broader community participation and participatory planning and implementation processes (e.g. in the buildings and land use sector).

Besides the stand-alone smart city action #27, **smart maturity** was also considered as a cross-cutting theme in several sectors, including technology solutions in energy, water, transport, and buildings, where it can support improved management of operations and a more efficient use of resources.

Estimates of Investment Needs and Finance Sources

Each action sheet in the ensuing sections provides guidance on **estimated costs** and possible **financing instruments and sources**. In terms of costs, it is estimated that approximately EUR 16.71 million (TSJ 223.75 million) are required for **development and advisory support** in preparation of Dushanbe's GCAP actions. **Capital expenditures** for the actions are estimated at EUR 255.27 million (TSJ 3.42 billion) (an average EUR 51.05 million per annum (TSJ 683.63 million per annum)). **Operational expenditures** over the first 5 years are estimated at EUR 19.56 million (TSJ 261.91 million).

Combining estimated capital expenditures and development and advisory costs, the **total investment needs** for the 27 GCAP actions are estimated to be shouldered about 10% directly by the national and local government, about 6% by the private sector (including SOEs), and about 84% by international development partners (with more than half of this support through (concessional) loans). This comparatively large share of international development finance is based on the financial situation and capital market maturity in Tajikistan, recognising the challenges that Dushanbe and the country overall have experienced in recent years with regard to **debt sustainability**. More advanced financing modalities – for instance through green bonds – are currently unlikely at the city level, as the financial management system does not yet meet international standards.

Therefore, a conservative approach was taken in identifying, scoping, and detailing the GCAP actions towards an **achievable resource envelope**. This is exemplified by **DCA's estimated annual investment costs** of only EUR 3.82 million (TJS 51.19 million) over the 5-year period, which is well within its resource capacity, with an existing annual capital expenditure budget of EUR 49 million (TSJ 656.11 million) reported for 2021, alongside a consistent increase in revenue generation (EUR 239 million (TSJ 3.2 billion) planned for 2021) – especially through its own-source revenues. This should facilitate the ability to shoulder additional borrowing from international development partners, which is estimated at an annual EUR 27.26 million across all actions.[31]

In addition, the **central government** can play a supporting role particularly for those actions that are dependent or influenced by policymaking and incentive-setting at the national level, as well as for providing sovereign guarantees for international development loans that flow through to the city. Building on their existing position in the Tajik economy, **state-owned enterprises (SOEs)** will also be key actors in the financing and implementation of GCAP actions, especially in relation to utility infrastructure.

Estimates of Emission Reductions

Although based on only limited local data and assumptions informed by international good practice, the **carbon emissions reductions** for the GCAP actions are estimated to be 139,732 tCO2e per annum over the immediate 5-year timeframe of this GCAP.

Accordingly, it is worth underscoring that several actions further contribute to indirect positive effects that could allow for additional carbon emission reductions, particularly in the medium-to-long term beyond the timeframe of this GCAP. This is particularly pertinent to actions that propose a piloting activity over the first few years, to be followed by scaled-up investments based on tested and proven solutions, e.g. in the energy and buildings sectors.

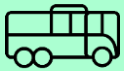
Among the 27 actions, the district heating action 4, the green infrastructure-linked actions 8 and 24, the electric vehicle action 12, and the solid waste and construction waste actions 20 and 21 have the **largest estimated carbon emissions reduction** over the GCAP's initial 5-year timeframe.

Estimates of Job Creation

In addition to the environmental benefits, it is estimated that several of the GCAP actions have the potential for **job creation**, with an estimated 885 new jobs being created through the construction, operation and maintenance works, as well as green economy services linked to several of the GCAP actions. It is particularly the community-focused (neighbourhood-based) actions in the buildings and land use sectors, as well as the actions in the industries sector that have potential to particularly increase job opportunities for women, e.g. in green-oriented entrepreneurship.

[31] Financial statistics provided by DCA to the Consultant Team in May 2021.

Table 4.1. GCAP Dushanbe Actions Summary Matrix

Sector	Action ID	Action Title	Action Type (ENG)	GCAP Action Classification	Cross-Cutting Themes / Co-Benefits			Estimated Costs (Euro)			Estimated Carbon Emissions Reduction (Annual tCO2e)	Estimated Jobs Created
					Climate Action	Gender and Social Inclusion	Smart Maturity	CapEx	OpEx over 5 Years	Development / Advisory		
Energy 	1	Modernise and expand energy-efficient city-wide street lighting	Investment ('Hard')	Capital Investment	Directly targeted	Some elements	Directly targeted	2,422,500	800,000	100,000	80	5
	2	Carry out study on cleaner fuel options for combined heat and power plants	Policy ('Soft')	Investment-related feasibility study	Directly targeted	Some elements	N/A	N/A	N/A	75,000	N/A	N/A
	3	Phase out coal in more than 20 coal-fired boiler houses	Investment ('Hard')	Capital Investment	Directly targeted	Directly targeted	Directly targeted	25,000,000	1,250,000	800,000	N/A	N/A
	4	Modernise, climate-prove, and expand district heating network and infrastructure	Investment ('Hard')	Capital Investment	Directly targeted	Directly targeted	Directly targeted	9,346,000	1,409,000	N/A	39,000	20
Water 	5	Rehabilitate and extend drinking water supply network in key areas of the city	Investment ('Hard')	Capital Investment	Some elements	Some elements	Some elements	47,100,000	950,000	N/A	900	110
	6	Rehabilitate and extend sewerage network and upgrade wastewater treatment	Investment ('Hard')	Capital Investment	Some elements	Some elements	N/A	17,300,000	350,000	N/A	N/A	105
	7	Devise an institutional and capacity development programme for more sustainable water supply and wastewater services	Policy ('Soft')	Awareness, demonstration, training, and capacity building	Some elements	Some elements	Some elements	N/A	N/A	5,900,000	N/A	N/A
	8	Invest in green-grey infrastructure in flood risk zones	Investment ('Hard')	Capital Investment	Directly targeted	Directly targeted	N/A	12,500,000	500,000	350,000	5,193	40
Transport 	9	Develop a Sustainable Urban Mobility Plan for Dushanbe	Policy ('Soft')	Strategies, plans, and programmes	Some elements	Some elements	Some elements	N/A	N/A	800,000	N/A	N/A
	10	Develop pilot transport projects focused on sustainable urban mobility	Investment ('Hard')	Capital Investment	Some elements	Some elements	Some elements	10,450,000	1,306,250	650,000	N/A	100
	11	Prepare a local sustainable mobility and e-mobility plan for the city centre	Policy ('Soft')	Strategies, plans, and programmes	Some elements	Some elements	Some elements	N/A	N/A	400,000	N/A	N/A
	12	Implement a fleet renewal and EV charging infrastructure programme for urban transport and e-mobility	Investment ('Hard')	Capital Investment	Directly targeted	Some elements	Some elements	20,800,000	1,975,000	750,000	4,521	50
Buildings 	13	Develop and adopt a comprehensive programme for increased energy-efficient affordable housing	Investment ('Hard')	Capital Investment	Directly targeted	Directly targeted	Directly targeted	4,000,000	600,000	650,000	44	75
	14	Carry out area-based infrastructure upgrading and energy-efficient retrofitting pilot programme for older multi-storey apartment block neighbourhoods	Investment ('Hard')	Capital Investment	Directly targeted	Directly targeted	Some elements	4,000,000	600,000	550,000	7	50
	15	Update permission process and provide incentives to scale up and strengthen compliance with energy-efficient (EE) building construction and retrofitting in accordance with local EE codes	Policy ('Soft')	Standards, guidelines, and regulations	Directly targeted	Some elements	Some elements	7,500,000	N/A	150,000	N/A	20
	16	Incentivise and invest in energy-efficient upgrading and retrofitting of public and private buildings	Investment ('Hard')	Capital Investment	Directly targeted	Some elements	Some elements	10,580,000	1,322,500	980,000	394	150

Sector	Action ID	Action Title	Action Type (ENG)	GCAP Action Classification	Cross-Cutting Themes / Co-Benefits			Estimated Costs (Euro)			Estimated Carbon Emissions Reduction (Annual tCO2e)	Estimated Jobs Created
					Climate Action	Gender and Social Inclusion	Smart Maturity	CapEx	OpEx over 5 Years	Development / Advisory		
Industries 	17	Devise strategy and set up fund and innovation platform to increase green-oriented entrepreneurship and industrial development	Investment ('Hard')	Other Investment	Some elements	Some elements	Directly targeted	3,000,000	150,000	250,000	N/A	30
	18	Develop green procurement processes for improved environmental performance in public and private sector	Policy ('Soft')	Standards, guidelines, and regulations	Directly targeted	Some elements	Some elements	N/A	N/A	250,000	N/A	N/A
	19	Improve separation of sensitive land uses from significant polluting users	Policy ('Soft')	Strategies, plans, and programmes	Some elements	Directly targeted	Some elements	N/A	N/A	250,000	N/A	N/A
Solid Waste 	20	Develop and implement a system for diverting waste from landfill including sorting, recycling and recovery	Policy ('Soft')	Investment-related feasibility study	Directly targeted	Some elements	Some elements	27,250,000	4,125,000	1,500,000	60,100	20
	21	Launch construction and demolition waste recycling and reuse across the city	Investment ('Hard')	Capital Investment	Directly targeted	N/A	Directly targeted	5,000,000	750,000	450,000	25,600	30
	22	Construct new sanitary landfill site and close and remediate existing landfill site	Investment ('Hard')	Capital Investment	Directly targeted	Some elements	Some elements	42,750,000	2,125,000	750,000	N/A	50
Land Use and Biodiversity 	23	Devise municipal staff capacity development programme on sustainable urban development	Policy ('Soft')	Awareness, demonstration, training, and capacity building	Some elements	Some elements	Some elements	N/A	N/A	250,000	N/A	N/A
	24	Devise community green space conservation and biodiversity upgrading programme for targeted local area investments utilising nature-based solutions	Investment ('Hard')	Capital Investment	Directly targeted	Some elements	Some elements	1,500,000	250,000	250,000	3,893	10
	25	Strengthen development control and land management towards ecologically-rich and climate-resilient neighbourhood-scale planning	Policy ('Soft')	Strategies, plans, and programmes	Some elements	Some elements	Some elements	50,000	500,000	150,000	N/A	N/A
	26	Improve environmental practices through systematic environmental data collection, monitoring, and online platform	Investment ('Hard')	Capital Investment	Some elements	Some elements	Directly targeted	225,000	30,000	200,000	N/A	3
Smart City 	27	Develop a citywide digital twin for Dushanbe	Investment ('Hard')	Capital Investment	Some elements	Some elements	Directly targeted	4,500,000	562,500	250,000	N/A	17
							Sub-Totals	**255,273,500**	**19,555,250**	**16,705,000**	**139,732**	**885**

Source: AECOM, Urbanlogic, ARPA. 2022. GCAP Actions Development. London.

4.2. GCAP Energy Actions

Four actions have been shortlisted and prioritised in the energy sector. They focus on the potential around energy efficiency, production performance, network expansion, and cleaner energy sources. They are estimated to have a 14% share in the overall capital expenditure budget of the GCAP, while contributing potentially to 28% of the estimated overall carbon emissions reductions.

1 Modernise and expand energy-efficient city-wide street lighting

Sector	☒ Energy		
Action Type	☒ Investment ('Hard')		
GCAP Action Classification	☒ Capital Investment		
Priority Environmental Challenges Addressed	• Need to improve efficiency and reliability in heating and electricity.		
Strategic Objective Supported	Support the transition towards a resilient energy system that enables reliable electricity and heating services and access to resource-efficient technologies with reduced environmental impacts.		
Linkage to Existing Policies/Plans	• Tajikistan National Development Strategy 2015-2030 • Dushanbe Socio-Economic Development Programme until 2025 • The Law on Energy Saving and Energy Efficiency • The Law on the Use of Renewable Energy Sources		
Description	The city will substitute 2,377 old, inefficient lamps with LED lamps and introduce additional features including smart control and monitoring systems and retrofitting of selected lamp posts to integrate EV charging points. LED lamps will have longer lifespans reducing future maintenance costs and the risk and disposal costs associated with harmful waste streams from the disposal of low-pressure sodium lamps and mercury halide lamps. LED lamps will improve visibility and safety for street users compared with existing systems and will be designed to reduce light pollution. The system will also be designed to enable dimming of lamps late at night for further energy saving. There is an opportunity to also incorporate other smart uses, e.g. in relation to air quality monitoring (Land Use Sector Action 26). In addition, streetlamps that integrate sockets for EV charging will save costs on establishing separate charging points and connecting them to the power grid. Following this initial phase of old lamp replacements, further phases of replacements are likely required and should be combined with other neighbourhood or street-specific investments, e.g. around road construction, apartment block renovations, or new site developments. In terms of implementation mode, DCA may consider a public-private partnership (PPP) where the streetlights upgrading can be combined with EV charging infrastructure if electricity provision and revenue flows from such investment can be clarified.		
Rationale and Linkage to Other GCAP Actions / Existing Projects/Work	Street lighting in Dushanbe consumes more than 35,000 kWh of electricity per day, with many municipal street lighting systems relying on inefficient lamps, resulting in high energy consumption and increased rate of GHG emissions. This action will contribute to emissions reduction and increased energy efficiency through more efficient public lighting systems. It will also reduce maintenance cycles and operational costs, and contribute to reduced resource use and waste production. This action is linked to / complements Buildings Sector Actions 14, 15, 16, Land Use Sector Action 26, and Smart City Action 27.		
Cross-Cutting Themes / Co-benefits	**Climate Action**	**Gender and Social Inclusion**	**Smart Maturity**
	☒ Directly targeted ☐ Some elements *Reason*:	☐ Directly targeted ☒ Some elements *Reason*:	☒ Directly targeted ☐ Some elements *Reason*:

<table>
<tr><td></td><td>The action will directly contribute to reduction in electricity consumption and CO_2 emissions.</td><td>The action will improve the safety for women and children, pedestrians and cyclists in the city.</td><td>The action represents a direct smart maturity intervention by automating control over lighting systems and increasing energy efficiency.</td></tr>
<tr><td>Status of Preparation</td><td colspan="3">☒ Concept note / pre-feasibility study
☒ Under implementation to be scaled up/expanded</td></tr>
<tr><td>Implementation Process and Timeline</td><td colspan="3">
<table>
<tr><th>Step</th><th>Duration</th><th>Task Owner / Support Required</th></tr>
<tr><td>Establish the project team and focal point within Dushanbe City Administration (DCA) and SUE “Dushanbe for City Lighting”</td><td>3-4 months</td><td rowspan="8">SUE “Dushanbe for City Lighting” supported by the city’s Department of Energy and Industry</td></tr>
<tr><td>Develop outline business case</td><td>4-6 months</td></tr>
<tr><td>Identify the locations with the highest impact and engage local residents</td><td>6 months</td></tr>
<tr><td>Establish clear goals and performance metrics</td><td>3 months</td></tr>
<tr><td>Engagement with wider stakeholders such as Ministry of Energy and Water Resources</td><td>1 month</td></tr>
<tr><td>Tendering process for private contractor</td><td>3 months</td></tr>
<tr><td>Implementation</td><td>12 months</td></tr>
<tr><td>Monitoring and evaluation</td><td>6 months</td></tr>
</table>
</td></tr>
<tr><td>Next Steps</td><td colspan="3">Establish the project team within Dushanbe City Administration (DCA) and SUE “Dushanbe for City Lighting” and finalise technical assessment.</td></tr>
<tr><td>Action Owner(s)</td><td colspan="3">SUE “Dushanbe for City Lighting” supported by the city’s Department of Energy and Industry</td></tr>
<tr><td>Stakeholders</td><td colspan="3">
<table>
<tr><th>Stakeholder Group</th><th>Engagement (Inform, Consult, Involve, Collaborate, Empower)</th></tr>
<tr><td>SUE “Dushanbe for City Lighting”</td><td>Empower</td></tr>
<tr><td>Dushanbe City Administration - Department of Energy and Industry</td><td>Collaborate</td></tr>
<tr><td>Ministry of Energy and Water Resources</td><td>Involve</td></tr>
<tr><td>International Financial Institutions and/or bilateral donors</td><td>Collaborate</td></tr>
<tr><td>Manufacturers and vendors of equipment</td><td>Involve</td></tr>
<tr><td>Residents of streets in selected locations</td><td>Consult</td></tr>
</table>
</td></tr>
<tr><td>Indicative Project Costs</td><td colspan="3">
<table>
<tr><th>CapEx [€]</th><th>OpEx over 5 years [€]</th><th>Development / Advisory Costs [€]</th></tr>
<tr><td>Assumed that two-thirds will be upgraded (1,600) [est. €300 unit cost] and one-third will need full replacement (777) [est. €2,500 unit cost]:
2,422,500
The cost of retrofitting streetlamps to integrate EV charging points should be added based on the number of lamps.
The cost of adding other smart features to the streetlights has not been included in this initial cost envelop. Possible related data centre functionalities and costs are reflected under Smart City Action 27.</td><td>800,000</td><td>100,000</td></tr>
</table>
</td></tr>
<tr><td>Potential Financing Instruments and Sources</td><td colspan="3">
<table>
<tr><th>Instrument</th><th>Source</th><th>Amount € / Share %</th></tr>
<tr><td>Grant</td><td>International development partner (e.g., international development bank or bilateral donor) or national government</td><td>50,000 (Advisory Costs) / 50%</td></tr>
</table>
</td></tr>
</table>

	Own-Source	City Government	50,000 (Advisory Costs) / 50% 422,500 (CapEx) / 17%
	Concessional loan	International development bank	2,000,000 (CapEx) / 83%

Revenue Opportunities	☒ No	☐ Yes →	Action as currently designed provides opportunity for cost savings but no direct revenue streams. Action could be upgraded by adding e.g. electric vehicle charging infrastructure to newly installed street lamps, which could allow for revenue opportunities, e.g. by using an Energy Service Company (ESCO) implementation mechanism whereby the ESCO assesses, implements, and finances the LED street lighting measures combined with electric vehicle charging infrastructure, with expected energy cost savings and the charges for use of the charging infrastructure providing the return on investment to the company.

Impact Measures (Quantitative and Qualitative)	State Indicators	• Annual CO2 emissions per capita • Annual CO2 emissions per unit of GDP • Concentration of mercury, cadmium, and zinc in soil
	Pressure Indicators	N/A
	Estimated Carbon Emissions Reduction	• 80 Annual tCO2e; based on replacing high-pressure sodium and mercury lamps with LED lamps and 50% operation (dark hours) over the course of a year
	Physical Annual Savings	• See above pressure indicators – savings are expected with regard to reduced energy use and longer lifespan of newly installed LED lamps.
	Climate Resilience Benefits	• N/A
	Reductions in Operating Expenditures	• Longer lifespan of newly installed LED lamps allows for reduced maintenance costs. Smart management systems enables reduced use time and thus reduced electricity costs. Integrating EV charging points to street lamps will eliminate the need for separate charging points and their maintenance, that would be more costly.
	Other Indicators / Social and Economic Benefits	• Improves safety and security • Contributes to social equity as it allows vulnerable people to use pedestrian and bicycling infrastructure longer and more safely. • Given the scale of the rollout of LED lighting, an estimate 5 new jobs (primarily focused on the installation activities) may be created through this action

Potential Project Risks	**Area**	**Risks**
	Social	• Perception of “Lower Quality light” among local population and residents of lit streets.
	Environmental	• Risk from inappropriate disposal of existing light sources if not effectively regulated or managed.
	Economic	• There may be challenges associated with finding and accessing adequate financing and partners as current design does not provide direct revenue stream. • While expanding EV charging infrastructure is needed to stimulate greater uptake of electric vehicles, the higher upfront cost of purchasing vehicles may still prove to be a barrier, resulting in limited usage of new streetlights with EV sockets.
	Other	• Existing procurement regulations may act as a barrier as they require procurement of lowest up-front cost products which do not take into account life-cycle costs.

2 Carry out study on cleaner fuel options to support combined heat and power plants

Sector	☒ Energy		
Action Type	☒ Policy ('Soft')		
GCAP Action Classification	☒ Investment-related feasibility study		
Priority Environmental Challenges Addressed	• Increasing energy demand from heating and cooling needs • Increasing emissions and pollution from cement plants, boiler houses, and small workshops		
Strategic Objective Supported	• Support the transition towards a resilient energy system that enables reliable electricity and heating services and access to resource-efficient technologies with reduced environmental impacts.		
Linkage to Existing Policies/Plans	• Law on Energy (2000) and recent amendments • Law on Renewable Energy Sources (2010) • Law on Energy Saving and Energy Efficiency (2013) • Tajikistan National Development Strategy 2015-2030 • Dushanbe City Socio-Economic Development Program to 2025		
Description	Dushanbe has two combined heat and power (CHP) plants – CHP1 (designed to run on gas, dual-fired by gas and mazut) and CHP2 (operational from 2016 and designed to be fired by highly carbon intensive coal with limited retrofitting options, with a 50-year lifespan). The lack of commercially viable domestic reserves of natural gas and interrupted supply from Uzbekistan, combined with substantial indigenous coal reserves in close proximity to Dushanbe, has led to an overwhelming reliance on coal to close the gap between energy demand and supply, especially in the winter. There is untapped potential for greater diversification to cleaner and more sustainable energy generation modes in Dushanbe. A technical study will explore the potential for long-term energy solutions that would reduce the reliance on coal-fired CHP and diversify energy sources in Dushanbe (e.g., PV, biomass, surplus heat, centralised solar thermal, and heat pumps). The study could also consider any further potential for hydropower generation. The study will have two phases: an initial phase will seek to estimate the technically feasible renewable energy generation capacity from each source of energy and the seasonal variation in this capacity. It will aim to determine the cost for heat or power generated from each source and how it could be integrated within Dushanbe's existing power generation and district heating infrastructure. It would also seek to compile existing information on any exploitable national gas reserves. The analysis would also reflect on the impact of different climate and disaster hazards on the different energy sources. The second phase of the study will explore the potential delivery options, commercial supply arrangements and delivery timescales for those technologies considered viable. This would include techno-economic modelling of preferred options to develop and confirm if there is a viable outline business case.		
Rationale and Linkage to Other GCAP Actions / Existing Projects/Work	A technical study will explore the possibility of integrating renewable energy sources to diversify Dushanbe's energy supply, with the objective of reducing the reliance on, and gradually phasing out the use of coal in Dushanbe's combined heat-power system. This action is linked to Energy Sector Actions 3 and 4, and Buildings Sector Action 16.		
Cross-Cutting Themes / Co-benefits	**Climate Action**	**Gender and Social Inclusion**	**Smart Maturity**
	☒ Directly targeted ☐ Some relevant elements *Reason*: Shift to cleaner fuel options would directly contribute to reduction of GHG emissions and pollutants.	☐ Directly targeted ☒ Some relevant elements *Reason*: The action will increase energy security for end-users across different segments of society and is expected to also have health benefits.	☐ Directly targeted ☐ Some relevant elements *Reason*: N/A
Status of Preparation	☒ Concept note / pre-feasibility study		

<table>
<tr><td>Implementation Process and Timeline</td><td>
<table>
<tr><th>Step</th><th>Duration</th><th>Task Owner / Support Required</th></tr>
<tr><td>Develop study scope, issue Request for Quotation and submission of proposals by interested parties</td><td>3 months</td><td>City of Dushanbe’s Department of Energy and Industry and JSC “Dushanbe CHPP”</td></tr>
<tr><td>Review of proposal and issue of contract (incl. contract negotiation)</td><td>3 months</td><td>City of Dushanbe’s Department of Energy and Industry and JSC “Dushanbe CHPP”</td></tr>
<tr><td>Phase 1 draft of the study circulated for comments</td><td>3 months</td><td rowspan="4">City of Dushanbe’s Department of Energy and Industry and JSC “Dushanbe CHPP”
Private Sector Contractor</td></tr>
<tr><td>Updated draft and recommendations for shortlisted options</td><td>1 month</td></tr>
<tr><td>Phase 2 short-listed option development including technical, commercial, and legal aspects</td><td>6 months</td></tr>
<tr><td>Final study</td><td>3 months</td></tr>
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<tr><td>Next Steps</td><td>Determine the full scope of the study, including energy sources to be considered, identify financing source, potential study partners and issue a Request for Quotation (RfQ).</td></tr>
<tr><td>Action Owner(s)</td><td>City of Dushanbe’s Department of Energy and Industry and JSC “Dushanbe CHPP”</td></tr>
<tr><td>Stakeholders</td><td>
<table>
<tr><th>Stakeholder Group</th><th>Engagement (Inform, Consult, Involve, Collaborate, Empower)</th></tr>
<tr><td>Ministry of Energy and Water Resources</td><td>Consult</td></tr>
<tr><td>City of Dushanbe’s Department of Energy and Industry</td><td>Empower</td></tr>
<tr><td>JSC “Dushanbe CHPP”</td><td>Collaborate</td></tr>
<tr><td>OJSC Dushanbe Heating Networks</td><td>Involve</td></tr>
<tr><td>Energy consumers and end-users</td><td>Inform</td></tr>
<tr><td>Private Sector Contractor</td><td>Involve</td></tr>
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</td></tr>
<tr><td>Indicative Project Costs</td><td>
<table>
<tr><th>CapEx [€]</th><th>OpEx over 5 years [€]</th><th>Development / Advisory Costs [€]</th></tr>
<tr><td>N/A</td><td>N/A</td><td>75,000</td></tr>
</table>
</td></tr>
<tr><td>Potential Financing Instruments and Sources</td><td>
<table>
<tr><th>Instrument</th><th>Source</th><th>Amount € / Share %</th></tr>
<tr><td>Grant or Own-Source</td><td>International development partner or city government</td><td>75,000 (Advisory Costs) / 100%</td></tr>
</table>
</td></tr>
<tr><td>Revenue Opportunities</td><td>☒ No ☐ Yes →</td></tr>
<tr><td>Impact Measures (state and pressure indicators)</td><td>
<table>
<tr><td>State Indicators</td><td>• Average annual concentration of PM2.5
• Average annual concentration of PM10
• Average daily concentration of SO2
• Annual CO2 equivalent emissions per capita
• Annual CO2 emissions per unit of GDP</td></tr>
<tr><td>Pressure Indicators</td><td>• Heating and cooling consumption in residential and non-residential buildings from fossil fuels
• Share of population with access to heating and cooling
• Share of population with authorized access to electricity
• Annual number of electrical interruptions per year per customer
• Proportion of total energy derived from renewable energy sources as a share of total city energy consumption</td></tr>
<tr><td>Estimated Carbon Emissions Reduction</td><td>• As this is a study-related action, no direct carbon emissions reductions are expected from this action</td></tr>
<tr><td>Physical Annual Savings</td><td>• Only indirectly if study findings lead to use of cleaner fuel options. Also see pressure indicators above.</td></tr>
<tr><td>Climate Resilience Benefits</td><td>• Indirectly the study findings can inform actions to further strengthen the resilience of energy supply in Dushanbe.</td></tr>
</table>
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	Reductions in Operating Expenditures	• Depending on the chosen sources and costs, the study may lead to investments that result in reduced energy supply/production costs.
	Other Indicators / Social and Economic Benefits	• No new job creation is expected through this action.
Potential Project Risks	**Area**	**Risks**
	Social	• Findings of the study – opposition to coal phase out based on local employment concerns.
	Environmental	• Findings of the study – perception of visual or environmental impacts from technologies such as biomass crop monocultures, energy from waste or hydropower.
	Economic	• Findings of the study – potential to find that some renewable solutions may not be available on the desired scale or financially viable.
	Other	• Findings of the study – potential to find that retrofitting or phasing out coal from the existing CHP2 may not be technically feasible.

3 Phase out coal in more than 20 coal-fired boiler houses

Sector	☒ Energy	
Action Type	☒ Investment ('Hard')	
GCAP Action Classification	☒ Capital Investment	☒ Monitoring, data collection, analysis, and studies
Priority Environmental Challenges Addressed	• Increasing energy demand from heating and cooling needs • Increasing emissions and pollution from cement plants, boiler houses, and small workshops	
Strategic Objective Supported	Support the transition towards a resilient energy system that enables reliable electricity and heating services and access to resource-efficient technologies with reduced environmental impacts.	
Linkage to Existing Policies/Plans	• Law on Energy (2000) and recent amendments • Law on Renewable Energy Sources (2010) • Law on Energy Saving and Energy Efficiency" (2013) • Tajikistan National Development Strategy 2015-2030 • Dushanbe City Socio-Economic Development Program to 2025	
Description	Dushanbe has more than 20 operational small boiler houses which supply public buildings, including hospitals, kindergartens, and schools, and are predominantly based on coal. With most boilers originally designed to be gas-fired but later converted to coal due to unavailability and high price of natural gas, the efficiency of these boilers decreased substantially, leaving many public buildings severely underheated. This has also contributed to high rates of emissions and local air-pollution due to non-existent or poorly maintained flue gas cleaning systems. In the short and medium term, the city will reduce emissions and pollution from 20 coal-fired boiler houses by: 1. **Demand reduction** – exploring interventions that will reduce demand. These include insulation performance, air tightness, controls of the buildings etc. 2. **Distribution performance** – review performance of internal energy distribution systems and assess interventions that will improve performance and minimise unwanted loss and inefficiency. Interventions include pipework insulation, system cleanliness/water quality, pumps and controls. 3. **New Generation Performance** – explore viable alternative heating solutions, as a replacement (in whole or in part) of the existing coal-based systems. Options may include local gas boilers, photovoltaic (PV) or other solar, thermal or heat pumps. May also include connection to district energy system (see Energy Sector Action 4). 4. Initially existing data on current system design, age and condition would be supplemented as required by condition surveys to determine appropriate interventions for each site. Local energy monitoring will be undertaken to enable detailed understanding of energy demand. Data to be used to support creation of dynamic simulation model and digital assessment of intervention performance. Metering should be installed as part of the proposed works to form part of an Energy Management System (EMS). Following this, the city will consider incentives for low-carbon options to gradually phase out coal from small boiler houses through a mix of different viable solutions (e.g., air and ground source heat pumps).	
Rationale and Linkage to Other GCAP Actions / Existing Projects/Work	Efficiently-run small boiler houses coupled with energy efficiency measures will contribute to improved reliability and efficiency of heating supply in Dushanbe, while incentives for low-carbon options will support gradual reduction of reliance on coal. This action is related to Energy Sector Actions 2 and 4, and Buildings Sector Actions 14 and 16.	
Cross-Cutting Themes / Co-benefits	**Climate Action**	**Gender and Social Inclusion** / **Smart Maturity**
	☒ Directly targeted ☐ Some relevant elements *Reason*:	☒ Directly targeted ☐ Some relevant elements *Reason*: / ☒ Directly targeted ☐ Some relevant elements *Reason*:

<table>
<tr><td></td><td>The action will directly contribute to GHG emissions reduction in Dushanbe and potentially increase network resilience.</td><td>The action will increase energy security and air quality for users of targeted public buildings, including people with health issues, elderly and children.</td><td>The action will introduce innovative heat metering equipment to reduce energy losses.</td></tr>
<tr><td>Status of Preparation</td><td colspan="3">☒ Project idea</td></tr>
<tr><td>Implementation Process and Timeline</td><td colspan="3"><table>
<tr><th>Step</th><th>Duration</th><th>Task Owner / Support Required</th></tr>
<tr><td>Determine and agree scope via feasibility study, identify 20 target assets</td><td>3 months</td><td rowspan="5">Dushanbe City Authority, Department of Energy and Industry and Dushanbe Teploset JSC</td></tr>
<tr><td>Implement temporary metering, undertake surveys and create digital models (if required)</td><td>9 months</td></tr>
<tr><td>Complete reports with data and digital models</td><td>4 months</td></tr>
<tr><td>Develop, scope out and agree on interventions to be implemented</td><td>3 months</td></tr>
<tr><td>Implementation of agreed measures</td><td>16 months</td></tr>
</table></td></tr>
<tr><td>Next Steps</td><td colspan="3">Conduct a feasibility study to determine whether coal-fired boilers require rehabilitation or complete replacement, identify target public buildings using multi-criteria analysis and undertake cost assessment and comparison of different upgrading options.</td></tr>
<tr><td>Action Owner(s)</td><td colspan="3">Dushanbe City Authority, Department of Energy and Industry and Dushanbe Teploset JSC</td></tr>
<tr><td>Stakeholders</td><td colspan="3"><table>
<tr><th>Stakeholder Group</th><th>Engagement (Inform, Consult, Involve, Collaborate, Empower)</th></tr>
<tr><td>City of Dushanbe’s Department of Energy and Industry</td><td>Empower</td></tr>
<tr><td>Dushanbe Teploset JSC</td><td>Empower</td></tr>
<tr><td>JSC “Dushanbe CHPP”</td><td>Involve</td></tr>
<tr><td>Ministry of Energy and Water Resources of the Republic of Tajikistan</td><td>Involve</td></tr>
<tr><td>Antimonopoly Committee under the Government of the Republic of Tajikistan</td><td>Involve</td></tr>
<tr><td>Public buildings residents and inhabitants directly affected by the project</td><td>Consult</td></tr>
</table></td></tr>
<tr><td>Indicative Project Costs</td><td>CapEx [€]</td><td>OpEx over 5 years [€]</td><td>Development / Advisory Costs [€]</td></tr>
<tr><td></td><td>As the actual measures are undefined at the moment, no reliable definite cost estimate can be provided. The following resource envelope is indicated to provide initial guidance:
Phase 1: 20 boiler houses, each with an investment of 500,000: 10,000,000
Phase 2: coal phase-out: 15,000,000[32]
Total: 25,000,000</td><td>Estimated at 2-3% of investment costs for Phase 1: 1,250,000</td><td>800,000</td></tr>
<tr><td>Potential Financing Instruments and Sources</td><td colspan="3"><table>
<tr><th>Instrument</th><th>Source</th><th>Amount € / Share %</th></tr>
</table></td></tr>
</table>

[32] Based on some existing studies, actual investment costs to address coal phase-out and greening and resilience-strengthening of Dushanbe’s energy system could potentially be significant higher / prohibitively high.
World Bank. 2015. Keeping Warm: Urban Heating Options in Tajikistan. Summary Report. Washington, D.C.
World Bank. 2013. Tajikistan’s Winter Energy Crisis: Electricity Supply and Demand Alternatives. Washington, D.C.

	Grant	International development partner (e.g., international development bank or bilateral donor)	800,000 (Advisory Costs) / 100%
	Equity	State unitary enterprises	2,500,000 (CapEx) / 10%
	Concessional loan	International finance institution, with national government guarantee	20,000,000 (CapEx) / 80%
	Grant	International finance institution	2,500,000 (CapEx) / 10%

Revenue Opportunities	☐ No	☒ Yes →	Energy production and supply allows for revenue opportunities; however, current energy tariffs in Dushanbe do not enable the commercially sustainable operation of related services, correspondingly inhibiting much needed infrastructure investments into assets and network. If tariffs were to be increased, subsidies or other grant-like support instruments would be required to support low-income energy users.

Impact Measures (state and pressure indicators)	State Indicators	• Average annual concentration of PM2.5 • Average daily concentration of SO2 • Average daily concentration of NOx • Annual CO2 equivalent emissions per capita • Annual CO2 emissions per unit of GDP
	Pressure Indicators	• Heating and cooling consumption in non-residential buildings from fossil fuels • Share of population with access to heating and cooling • Proportion of total energy derived from RES as a share of total city energy consumption • Buildings covered by district heating systems
	Estimated Carbon Emissions Reduction	• While the absolute carbon emissions from existing boiler houses are not known, it is clear that a replacement of coal with gas would allow carbon reductions of about 50%, while the use of renewable energy sources would allow significant reductions close to 100%.
	Physical Annual Savings	• Improvements to distribution and generation performance, as well as reductions in demand would all allow for reduced resource inputs
	Climate Resilience Benefits	• The diversification of the energy sources may allow for increased resilience of the overall network against climate shocks (e.g., storms) and stresses (e.g., summer heat)
	Reductions in Operating Expenditures	• N/A
	Other Indicators / Social and Economic Benefits	• No direct job creation is expected from this action.

Potential Project Risks	**Area**	**Risks**
	Social	• Continued use of coal will have ongoing air-quality implications with social health impacts through asthma and other respiratory illnesses. • Shift to other energy sources with the aim to increase tariffs to commercially sustainable levels may result in low-income users not being able to afford regular energy supply.
	Environmental	• Even if made more efficient and with modern flue gas cleaning system, coal-fired boiler houses will continue to produce GHG emissions and contributing to local air-pollution in the city.
	Economic	• Accessing external assistance and finance for upgrading boilers that run on coal might prove to be a challenge. • Scale of investments needed to phase out coal and green and resilience-proof energy system could be prohibitively high and not feasible without grant support from international climate finance.
	Other	• N/A

4 Modernise, climate-proof, and expand district heating network and infrastructure

Sector	☒ Energy	
Action Type	☒ Investment ('Hard')	
GCAP Action Classification	☒ Capital Investment	☒ Strategies, plans, and programmes ☒ Investment-related feasibility study
Priority Environmental Challenges Addressed	• Increasing energy demand from heating and cooling needs	
Strategic Objective Supported	Support the transition towards a resilient energy system that enables reliable electricity and heating services and access to resource-efficient technologies with reduced environmental impacts.	
Linkage to Existing Policies/Plans	• Law on Energy (2000) and recent amendments • Law on Renewable Energy Sources (2010) • Law on Energy Saving and Energy Efficiency" (2013) • Tajikistan National Development Strategy 2015-2030 • Dushanbe City Socio-Economic Development Program to 2025	
Description	The district heating system in Dushanbe is in poor condition due to lack of investment and insufficient maintenance and operates significantly below its design capacity. Estimates suggest that heat losses within distribution and transmission network range between 20% to 30% as a consequence of leakages and poor insulation layer, and that around 90% of the transmission and distribution network needs replacement or repair.[33] Many residents have dismantled building-internal heating infrastructure (radiators and pipes) and rely on individual heating systems (electric heaters and solid fuel fired stoves) which drives up energy consumption, pollution and carbon emissions. At present, only 1,073 houses/multistore buildings, 104 schools and hospitals and 137 enterprises and organisations are connected to the network. Through this action Dushanbe will modernise and expand its district heating supply network, substations and related infrastructure (building-level metering, to be expanded to individual apartment-level smart metering in the medium-term) to scale up service provision, reduce reliance on individual heating systems and improve supply reliability. It shall also enable the reduction of the network's operating temperature to enable it to more easily integrate lower temperature waste heat and renewable sources. Dushanbe's climate also provides opportunity to harness solar thermal systems and ground-source heat pumps that could be connected to the existing and expanding district heating network, particularly for larger site re-/development projects. This action has already commenced in 2020, with EBRD's feasibility study for district heating in Dushanbe to lay the foundation for a project to rehabilitate and expand the district heating network, rehabilitate pumping stations, introduce metering at pumping stations, and improve overall capacity and management of the district heating systems. The corresponding investment loan has been signed in 2021. The work would also be informed by the outcome of Energy Sector Action 2 which proposes assessing feasible alternatives to coal for heating and power generation.	
Rationale and Linkage to Other GCAP Actions / Existing Projects/Work	Rehabilitating and modernising the district heating system in Dushanbe will reduce inefficiencies and leakages. Expanding the network towards greater service provision will reduce energy consumption, carbon emissions and pollution. This action is related to Energy Sector Actions 2 and 3, as well as Buildings Sector Actions 14 and 16 (e.g. with regard to the use of household-level smart heating/cooling systems and metering for more efficient resource use and improved consumption charging/incentives).	
Cross-Cutting Themes / Co-benefits	**Climate Action**	**Gender and Social Inclusion** / **Smart Maturity**
	☒ Directly targeted ☐ Some relevant elements *Reason*:	☒ Directly targeted ☐ Some relevant elements *Reason*: / ☒ Directly targeted ☐ Some relevant elements *Reason*:

[33] World Bank. 2015. Keeping Warm: Urban Heating Options in Dushanbe. Washington DC.

<table>
<tr><td></td><td>The action will directly contribute to the reduction of GHG emissions by reducing energy intensity and inefficiencies in the heating system.</td><td>The action will increase energy security for a range of users, including elderly and children.</td><td>The action will introduce smart instruments, including SCADA systems for pumping stations, modern hydraulic simulation software, etc.</td></tr>
<tr><td>Status of Preparation</td><td colspan="3">☒ Full project proposal including feasibility study</td></tr>
<tr><td>Implementation Process and Timeline</td><td colspan="3"><table>
<tr><th>Step</th><th>Duration</th><th>Task Owner / Support Required</th></tr>
<tr><td>Energy mapping and feasibility study</td><td>18 months</td><td rowspan="2">City of Dushanbe’s Department of Energy and Industry and JSC “Dushanbe CHPP” supported by EBRD</td></tr>
<tr><td>Procurement</td><td>6 months</td></tr>
<tr><td>Implementation</td><td>2-4 years</td><td>City of Dushanbe’s Department of Energy and Industry and JSC “Dushanbe CHPP” supported by EBRD
Private Sector Contractor/Consultants</td></tr>
</table></td></tr>
<tr><td>Next Steps</td><td colspan="3">Feasibility study concluded in late 2021, next steps outlined in the study.</td></tr>
<tr><td>Action Owner(s)</td><td colspan="3">City of Dushanbe’s Department of Energy and Industry and JSC “Dushanbe CHPP”</td></tr>
<tr><td>Stakeholders</td><td colspan="3"><table>
<tr><th>Stakeholder Group</th><th>Engagement (Inform, Consult, Involve, Collaborate, Empower)</th></tr>
<tr><td>JSC “Dushanbe CHPP”</td><td>Empower</td></tr>
<tr><td>City of Dushanbe’s Department of Energy and Industry</td><td>Collaborate</td></tr>
<tr><td>Local Agency of Housing and Communal Services</td><td>Involve</td></tr>
<tr><td>EBRD</td><td>Collaborate</td></tr>
<tr><td>OSHC “Barki Tojik”</td><td>Involve</td></tr>
<tr><td>Ministry of Energy and Water Resources of Tajikistan</td><td>Involve</td></tr>
<tr><td>Local residents affected by works</td><td>Consult</td></tr>
<tr><td>Contractors and suppliers</td><td>Collaborate</td></tr>
</table></td></tr>
<tr><td>Indicative Project Costs</td><td colspan="3"><table>
<tr><th>CapEx [€]</th><th>OpEx over 5 years [€]</th><th>Development / Advisory Costs [€]</th></tr>
<tr><td>9,346,000 (incl. technical assistance costs)</td><td>Est. at 3% of CapEx: 1,401,900</td><td>Included in CapEx</td></tr>
</table></td></tr>
<tr><td>Potential Financing Instruments and Sources</td><td colspan="3"><table>
<tr><th>Instrument</th><th>Source</th><th>Amount € / Share %</th></tr>
<tr><td>Sovereign-guaranteed loan</td><td>EBRD</td><td>4,673,000 (CapEx) / 50%</td></tr>
<tr><td>Grant</td><td>EBRD</td><td>4,673,000 (CapEx) / 50%</td></tr>
</table></td></tr>
<tr><td>Revenue Opportunities</td><td colspan="3">☐ No ☒ Yes → The expansion of the system and increased performance (reduced losses) would allow expansion of paying customer base providing for increased revenues to the state-owned entity.</td></tr>
<tr><td>Impact Measures (state and pressure indicators)</td><td colspan="3"><table>
<tr><td>State Indicators</td><td>• Average annual concentration of PM2.5
• Average daily concentration of SO2
• Average daily concentration of NOx
• Annual CO2 equivalent emissions per capita
• Annual CO2 emissions per unit of GDP</td></tr>
<tr><td>Pressure Indicators</td><td>• Heating and cooling consumption in residential buildings from fossil fuels
• Heating and cooling consumption in non-residential buildings from fossil fuels
• Share of population with access to heating and cooling
• Proportion of total energy derived from renewable energy sources as a share of total city energy consumption
• Buildings covered by district heating systems</td></tr>
<tr><td>Estimated Carbon Emissions Reduction</td><td>• 39,000 Annual tCO2e as per EBRD study</td></tr>
<tr><td>Physical Annual Savings</td><td>• 100,000 cubic metres of water savings annually</td></tr>
</table></td></tr>
</table>

		• Also see pressure indicators above – main focus is on reduced transmission and distribution losses and lower GHG emissions.
	Climate Resilience Benefits	• Upgrading and rehabilitating district heating system in Dushanbe, including transmission and distribution networks, will improve the system's ability to cope with increasing demand, heat stress, and extreme weather hazards.
	Reductions in Operating Expenditures	• More efficient management of the system will reduce operation and maintenance costs.
	Other Indicators / Social and Economic Benefits	• Given the scale of the investment, it can be estimated that 50 jobs may be created through the construction activities, while 20 new jobs may be created in combination with the operation and maintenance needs of the increased network.
Potential Project Risks	**Area**	**Risks**
	Social	• District energy system may be seen as unreliable and expensive and property owners and residents may be reluctant to rehabilitate dismantled systems in the building.
	Environmental	• District energy system may still be using carbon-intensive solid fuels (i.e., coal).
	Economic	• Cost of heat may prove too high for consumers. • On the other hand, existing low tariffs may negatively affect commercial sustainability of plant / system operators.
	Other	• N/A

4.3. GCAP Water Actions

Within the water sector, 4 priority actions for water supply, wastewater, and stormwater management have been developed – promoting both rehabilitation and network expansion, with an important role assigned to institutional and capacity strengthening. Given the scale and need of investments in the sector in Dushanbe, it is not surprising that the 4 actions account for around 30% of the overall GCAP capital expenditure budget. Although their estimated contribution to carbon emissions reduction is limited, they play a significant role in terms of job creation potential with a 29% share in the estimated new jobs from all GCAP actions.

5 Rehabilitate and extend drinking water supply network in key areas of the city

Sector	☒ Water
Action Type	☒ Investment ('Hard')
GCAP Action Classification	☒ Capital Investment
Priority Environmental Challenges Addressed	• Lack of continuous supply and coverage of the water network
Strategic Objective Supported	Expand and upgrade the water supply and wastewater systems to all users for stable and resource-efficient 24-hour services supported by an operationally viable tariff regime.
Linkage to Existing Policies/Plans	• 20-Year Roadmap for Water Supply and Sanitation in Dushanbe – Developed by CDIA during preparation of ADB's Dushanbe Urban Water Supply and Sanitation Project (DUWSSP) • National Development Strategy • Dushanbe City Socio-economic Development Programme (to 2025) • Dushanbe Development Strategy (to 2050)
Description	Coverage of water supply in Dushanbe is 83% but several areas of the city receive water only on an intermittent basis, due to pressure issues, ageing infrastructure causing high physical losses, and insufficient treatment capacity. There is a need for large-scale rehabilitation and expansion of water supply infrastructure. In 2018 the Cities Development Initiative for Asia (CDIA) have prepared a 20-year road map (total investment requirement of $340 million) to upgrade the Dushanbe's water supply system with a long-term objective to deliver 24-hour, high-quality water supply to all residents. The approach to implementing this city-wide programme will commence with rehabilitating water supply infrastructure in two priority areas of the city, including upgrading and protection of wellfields and intakes. This will be replicated in the remaining areas of the city with the support of international donors. It is thus recognised that future investment needs beyond the GCAP implementation timeframe of 5 years will be extensive and likely above €100 million over 10 to 15 years. As part of this, investments will be required to increase network capacity in inner-city areas that have seen densification from mid-level buildings to high-rise buildings, which have increased the demand on water quantity and pressure beyond the original system's target performance. This action focuses on implementation of water supply rehabilitation works in the Shomansur District in Eastern Dushanbe (with ADB support) and the Sino District in Western Dushanbe (with WB support) as the first phase in upgrading the city's water supply system. Action components include: • Rehabilitation of two existing well fields and associated pumping, treatment, storage and installation of a SCADA system. As well as implementation of source water mabnagement plans and river-bank stablisation works to protect the well field. • Replacement and reinforcement of transmission lines and water mains. • Rehabilitation of pumping stations and construction / rehabilitation of reservoirs.

<table>
<tr><td></td><td>

- Rehabilitation of distribution network including metered house connections and installation of bulk meters to enable a district metered area (DMA) approach.

</td></tr>
<tr><td>Rationale and Linkage to Other GCAP Actions / Existing Projects/Work</td><td>The project will significantly reduce water losses and therefore contribute to delivering efficient and reliable water supply in one area of the city, for scaling up to other areas across Dushanbe over the next 20 years. By reducing physical losses, the total water demand of the city will be reduced, delivering a more climate-resilient water supply system. By reducing water losses, this action links closely, and will be implemented in partnership with Water Sector Action 7, as well as Water Sector Action 6 under ADB's Dushanbe Urban Water Supply and Sanitation Project and World Bank's Dushanbe Water Supply and Wastewater Project.</td></tr>
<tr><td>Cross-Cutting Themes / Co-benefits</td><td>
<table>
<tr><th>Climate Action</th><th>Gender and Social Inclusion</th><th>Smart Maturity</th></tr>
<tr><td>☐ Directly targeted
☒ Some elements
Reason:
By reducing physical losses, water abstraction can be reduced.
Climate change mitigation is achieved through energy savings resulting from efficiency in water treatment and supply.
Adapting surface and groundwater sources to climate change by protection from bank erosion and reducing elevated turbidity through catchment management.</td><td>☐ Directly targeted
☒ Some elements
Reason:
The project will develop a Gender and Social Inclusion Action Plan to ensure inclusive delivery of water supply services.</td><td>☐ Directly targeted
☒ Some elements
Reason:
SCADA systems and district metered areas will be included in project design to enable smart management of water supply systems, more efficient water use, and reduced physical losses.</td></tr>
</table>
</td></tr>
<tr><td>Status of Preparation</td><td>☒ Under implementation to be scaled up/expanded</td></tr>
<tr><td>Implementation Process and Timeline</td><td>
<table>
<tr><th>Step</th><th>Duration</th><th>Task Owner / Support Required</th></tr>
<tr><td>Finalise project scope, undertake technical due diligence</td><td>Completed</td><td rowspan="4">State Unitary Enterprise Dushanbevodokanal / ADB / WB</td></tr>
<tr><td>Establish Project Implementation Group</td><td>Completed</td></tr>
<tr><td>Procurement of detailed design, tender support and construction supervision services</td><td>Completed</td></tr>
<tr><td>Procurement of contractor for the 2 water supply works packages</td><td>Completed</td></tr>
<tr><td>Project implementation</td><td>5 years</td><td rowspan="2">State Unitary Enterprise Dushanbevodokanal / ADB / WB / Consultants</td></tr>
<tr><td>Project monitoring and reporting</td><td>Continuous (in parallel with implementation)</td></tr>
</table>
</td></tr>
<tr><td>Next Steps</td><td>Continue construction works in accordance with environmental and social management plans and initiate monitoring reporting.</td></tr>
<tr><td>Action Owner(s)</td><td>State Unitary Enterprise Dushanbevodokanal (SUE DVK)</td></tr>
<tr><td>Stakeholders</td><td>
<table>
<tr><th>Stakeholder Group</th><th>Engagement (Inform, Consult, Involve, Collaborate, Empower)</th></tr>
<tr><td>State Unitary Enterprise Dushanbevodokanal (SUE DVK)</td><td>Empower</td></tr>
<tr><td>Ministry of Energy and Water Resources</td><td>Inform</td></tr>
<tr><td>Executive Body of Dushanbe City</td><td>Collaborate</td></tr>
<tr><td>Design and Construction supervision consultant</td><td>Collaborate</td></tr>
<tr><td>Selected Contractor for Works Package (water supply)</td><td>Collaborate</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><td></td><td colspan="3"><table>
<tr><td>Recipient communities</td><td>Consult</td></tr>
<tr><td>ADB</td><td>Collaborate</td></tr>
</table></td></tr>
<tr><td rowspan="2">Indicative Project Costs</td><td>CapEx [€]</td><td>OpEx over 5 years [€]</td><td>Development / Advisory Costs [€]</td></tr>
<tr><td>47,100,000 (includes design and supervision)
Note: Future investment needs beyond the GCAP timeframe have not been included here (see above description)</td><td>950,000 (O&M is the responsibility of SUE DVK and will be covered through tariff collections which will be enhanced by efficiency improvements and non-revenue water reduction)</td><td>Completed / N/A</td></tr>
<tr><td>Potential Financing Instruments and Sources</td><td colspan="3"><table>
<tr><th>Instrument</th><th>Source</th><th>Amount € / Share %</th></tr>
<tr><td>Grant [34]</td><td>Asian Development Bank</td><td>25,300,000 / 54%</td></tr>
<tr><td>Grant</td><td>World Bank</td><td>17,100,000 / 36%</td></tr>
<tr><td>Own-Source</td><td>Government of Tajikistan</td><td>4,700,000 / 10%</td></tr>
</table></td></tr>
<tr><td>Revenue Opportunities</td><td colspan="3">☐ No ☒ Yes → Expansion of the water supply system will expand the customer base and deliver additional revenue to SUE DVK. (The project will also reduce costs per unit of water, improving financial position without generating additional revenue per se.)</td></tr>
<tr><td rowspan="8">Impact Measures (Quantitative and Qualitative)</td><td>State Indicators</td><td colspan="2">• Percentage of water samples in a year which comply with national potable water standards - %
• Water exploitation index - %</td></tr>
<tr><td>Pressure Indicators</td><td colspan="2">• Water consumption per capita - l/p/d
• Non-revenue water - %
• Average hours of water supply per household - h/day
• Percentage of water treated to applicable national standards - %</td></tr>
<tr><td>Estimated Carbon Emissions Reduction</td><td colspan="2">• 900 annual tCO2e; based water supply emissions factor applied to estimated annual water savings</td></tr>
<tr><td>Physical Annual Savings</td><td colspan="2">• Estimated at 6Mm3/yr reduction in physical water losses over next 5 years (20-year target is reduction from currenlty 64% to 30%)</td></tr>
<tr><td>Climate Resilience Benefits</td><td colspan="2">• Upgrading water sources (and implementing local adaptation through river bank protection) will deliver a more resilient water supply system to the city which is facing climate change exacerbated water security threats.</td></tr>
<tr><td>Reductions in Operating Expenditures</td><td colspan="2">• New pumps, new pipes, and better pressure management will reduce physical losses and bring down operational cost per unit of water delivered to customers.</td></tr>
<tr><td>Other Indicators / Social and Economic Benefits</td><td colspan="2">• Given the labour intensity of the construction work, an estimated 100 jobs could be created; with an additional 10 jobs for the later operation and maintenance of the expanded network.
• Improved reliability and quality of water supply benefits households, including vulnerable residents, contributing to their health and wellbeing.
• Improved water supply also benefits businesses' operational sustainability.</td></tr>
<tr><td>Potential Project Risks</td><td>Area</td><td colspan="2">Risks</td></tr>
<tr><td>Social</td><td colspan="2">• Refurbishing pipelines and other water supply infrastructure may have temporary impacts on communities, land access, and commercial operations, if unforseen, these issues can resulting in project delays.</td></tr>
</table>

[34] Grant financed due to the current financial position of SUE DVK, the efficiency improvements in this action and tariff review in Action 7 will help to improve the financial position of SUE DVK in the short term in preparation for future loan financing in the sector.

	Environmental	• Expansion of groundwater sources could deplete groundwater, impacting water security. • Gravel excavation in the riverbed can impact the surface water intakes impacting water security
	Economic	• Potential for cost over-run. • Scaling up of project across other areas of the city may be inhibited by the high investment costs and potential lack of financing from international sources, especially if reduced or no grant financing is provided.
	Other	• N/A

6 Rehabilitate and extend sewerage network and upgrade wastewater treatment

Sector	☒ Water
Action Type	☒ Investment ('Hard')
GCAP Action Classification	☒ Capital Investment
Priority Environmental Challenges Addressed	• Low quality and limited number of wastewater treatment plants
Strategic Objective Supported	Expand and upgrade the water supply and wastewater systems to all users for stable and resource-efficient 24-hour services supported by an operationally viable tariff regime.
Linkage to Existing Policies/Plans	• 20-Year Roadmap for Water Supply and Sanitation in Dushanbe – Developed by CDIA during preparation of ADB's Dushanbe Urban Water Supply and Sanitation Project (DUWSSP). • National Development Strategy • Dushanbe City Socio-economic Development Programme (to 2025) • Dushanbe Development Strategy (to 2050)
Description	The sewerage network covers only about 60% of Dushanbe. The collector system has insufficient capacity and/or is non-functional. And wastewater treatment is ineffective due to the critical condition of infrastructure and a high dilution of wastewater. There is a need for large-scale rehabilitation and expansion of sanitation infrastructure in the city. The Cities Development Initiative for Asia (CDIA) has prepared a 20-year road map (total investment requirement of $285 million) to upgrade Dushanbe's sanitation system with a long-term objective to deliver high-quality and reliable wastewater collection and treatment for environmental protection. The approach to implementing this city-wide program includes identifying priority areas for the rehabilitation of wastewater infrastructure in Dushanbe to be replicated in the remaining areas with the support of international donors, including ADB and World Bank, who are both active in the water and sanitation sector in Dushanbe. City stakeholders have proposed to consider a wastewater and stormwater masterplan to guide the strategic expansion of the system across the city. This action focuses on the implementation of the expansion and rehabilitation of wastewater collection infrastructure in the Shomansur District (with ADB support) in Eastern Dushanbe and the Sino District in Western Dushanbe (with World Bank support) as the first phase in upgrading the city's sanitation system. A feasibility study on wastewater treatment will also be conducted. The feasibility study will focus on the most cost-effective approach to rehabilitating the existing wastewater treatment plant in the short term, and step-wise development of a new plant outside of the city which may take up to 15 years to plan, design and develop. This will then be developed into a feasible project with development partners. The new wastewater treatment plant would make use of state-of-the-art technology (not lagoons), including treatment of sludge and energy recovery with an ambition to achieve minimal energy intensity per m3 of wastewater treated. This would enable the existing wastewater treatment plant site in the city to be remediated and redeveloped. In addition to the already identified interventions and investment components, additional smart technology solutions could be considered as the capacity of the involved entities is improving. Besides smart metering, the investments could support the installation of network sensors at key stations and points (e.g. for leakages or breakages), flow meters, an improved data management system (e.g. with a supervisory control and data acquisition SCADA system).
Rationale and Linkage to Other GCAP Actions / Existing Projects/Work	The project will expand and rehabilitate wastewater collection infrastructure in one area of the city, for scaling up over the next 20 years (including wastewater treatment) to deliver improvements in water quality and biodiversity (potential) of receiving water bodies. This action links closely and will be implemented in partnership with Water Sector Actions 5 and 7 under ADB's Dushanbe Urban Water Supply and Sanitation Project and World Bank's Dushanbe Water Supply and Wastewater Project. This action is linked to Land Use Action 26 where water quality monitoring should be undertaken at strategic locations, downstream of effluent outfalls and CSOs to monitor performance and improvement.

<table>
<tr><td rowspan="2">Cross-Cutting Themes / Co-benefits</td><td>Climate Action</td><td>Gender and Social Inclusion</td><td>Smart Maturity</td></tr>
<tr><td>☐ Directly targeted
☒ Some elements
Reason:
By reducing water quality impacts on the water environment, this water is available for exploitation.</td><td>☐ Directly targeted
☒ Some elements
Reason:
The project will develop a Gender and Social Inclusion Action Plan to ensure inclusive delivery of water supply services.</td><td>☐ Directly targeted
☒ Some elements
Reason:
The project in the medium to long term should consider incorporation of smart technologies adjusted to available capacities.</td></tr>
<tr><td>Status of Preparation</td><td colspan="3">☒Under implementation to be scaled up/expanded</td></tr>
<tr><td>Implementation Process and Timeline</td><td colspan="3"><table>
<tr><th>Step</th><th>Duration</th><th>Task Owner / Support Required</th></tr>
<tr><td>Finalise project scope, undertake technical due diligence</td><td>Completed</td><td rowspan="4">State Unitary Enterprise Dushanbevodokanal / ADB / WB</td></tr>
<tr><td>Establish Project Implementation Group</td><td>Completed</td></tr>
<tr><td>Procurement of detailed design, tender support and construction supervision services</td><td>Completed</td></tr>
<tr><td>Procurement of contractor for the wastewater works package</td><td>Completed</td></tr>
<tr><td>Project implementation</td><td>5 years</td><td rowspan="2">State Unitary Enterprise Dushanbevodokanal / ADB / WB / Consultants</td></tr>
<tr><td>Project monitoring and report</td><td>5 years Continuous (in parallel with implementation)</td></tr>
</table></td></tr>
<tr><td>Next Steps</td><td colspan="3">Commence construction works in accordance with environmental and social management plans and initiate monitoring reporting.</td></tr>
<tr><td>Action Owner(s)</td><td colspan="3">State Unitary Enterprise Dushanbevodokanal (SUE DVK)</td></tr>
<tr><td>Stakeholders</td><td colspan="3"><table>
<tr><th>Stakeholder Group</th><th>Engagement (Inform, Consult, Involve, Collaborate, Empower)</th></tr>
<tr><td>State Unitary Enterprise Dushanbevodokanal (SUE DVK)</td><td>Empower</td></tr>
<tr><td>Ministry of Energy and Water Resources</td><td>Inform</td></tr>
<tr><td>Executive Body of Dushanbe City</td><td>Collaborate</td></tr>
<tr><td>Design and Construction supervision consultant</td><td>Collaborate</td></tr>
<tr><td>Selected Contractor for Works Package 3</td><td>Collaborate</td></tr>
<tr><td>Recipient communities</td><td>Consult</td></tr>
<tr><td>Committee for Environmental Protection</td><td>Collaborate</td></tr>
<tr><td>ADB</td><td>Collaborate</td></tr>
</table></td></tr>
<tr><td>Indicative Project Costs</td><td colspan="3"><table>
<tr><th>CapEx [€]</th><th>OpEx over 5 years [€]</th><th>Development / Advisory Costs [€]</th></tr>
<tr><td>17,300,000 (includes design and supervision)</td><td>350,000</td><td>Completed / N/A</td></tr>
</table></td></tr>
<tr><td>Potential Financing Instruments and Sources</td><td colspan="3"><table>
<tr><th>Instrument</th><th>Source</th><th>Amount € / Share %</th></tr>
<tr><td>Grant[35]</td><td>Asian Development Bank</td><td>8,600,000 / 51%</td></tr>
<tr><td>Grant</td><td>World Bank</td><td>7,000,000 / 38%</td></tr>
<tr><td>Own-Source</td><td>Government of Tajikistan</td><td>1,700,000 / 10%</td></tr>
</table></td></tr>
<tr><td>Revenue Opportunities</td><td colspan="3">☐ No ☒ Yes → Wastewater collection and treatment is a revenue generating activity.</td></tr>
<tr><td></td><td>State Indicators</td><td colspan="2">• BOD in rivers and lakes – mg/l
• Ammonium NH4 concentration in rivers and lakes – mg/l</td></tr>
</table>

[35] Grant financed due to the current financial position of SUE DVK, the efficiency improvements in Action 5 and tariff review in Action 7 will help to improve the financial position of SUE DVK in the short term in preparation for future loan financing (for wastewater treatment)

Impact Measures (Quantitative and Qualitative)	Pressure Indicators	• Percentage of wastewater treated to applicable national standards - % • Percentage of population connected to sewer system - % • Annual number of stormwater / sewer overflows per 100km of network length – No.
	Estimated Carbon Emissions Reduction	• As the new wastewater treatment plant will only become operational beyond the GCAP's 5-year timeframe, there are no carbon emissions reductions expected in the short/medium term. • In the long-term, with the new wastewater treatment plant the possible carbon emissions reductions will depend on the energy intensity of the energy recovery on the site.
	Physical Annual Savings	• While the expansion of the system will likely result in increased absolute resource use (e.g. water and energy), the improvements to the network's performance (e.g. reduced leakage) would allow for a relative improvement to resource inputs (e.g. flushing water)
	Climate Resilience Benefits	• Upgrading wastewater collection systems will reduce sewer overflows annually, which are expected to increase as weather patterns change (i.e. more intense rainfall events). • Protecting water resources through better wastewater collection and treatment makes water resources more available during climate extremes (i.e. hotter summer).
	Reductions in Operating Expenditures	• Efficiency gains in the operation of the network should reduce relative operating costs.
	Other Indicators / Social and Economic Benefits	• Expanded wastewater services benefit residents, including lower-income households and vulnerable populations. • Given the labour intensity of the construction activities, this action may create 100 jobs; and an additional 5 jobs for the later operation and maintenance of the expanded network.
Potential Project Risks	**Area**	**Risks**
	Social	• Refurbishing wastewater collection infrastructure may have temporary impacts on communities, land access, and commercial operations, if unfoseen, these issues can resulting in project delays.
	Environmental	• Clean water infiltration reduces effectiveness of wastewater treatment
	Economic	• Cost over-run
	Other	• Insufficient policing of trade discharges and failure to instigate proactive assets renewals programme could risk that investment benefits are only short term (risk to be mitigated through Water Sector Action 7)

7 Devise an institutional and capacity development programme for more sustainable water supply and wastewater services

Sector	☒ Water
Action Type	☒ Policy ('Soft')
GCAP Action Classification	☒ Awareness, demonstration, training, and capacity building ☒ Organisational measure
Priority Environmental Challenges Addressed	• High rates of non-revenue water and unsustainable water consumption • Lack of continuous supply and coverage of the water network
Strategic Objective Supported	Expand and upgrade the water supply and wastewater systems to all users for stable and resource-efficient 24-hour services supported by an operationally viable tariff regime.
Linkage to Existing Policies/Plans	• 20-Year Roadmap for Water Supply and Sanitation in Dushanbe – Developed by CDIA during preparation of ADB's Dushanbe Urban Water Supply and Sanitation Project (DUWSSP). • Integrated Urban Development Project • National Development Strategy • Tajikistan Municipal Development Strategy • Dushanbe City Socio-economic Development Programme (to 2025) • Dushanbe Development Strategy (to 2050)
Description	Currently non-revenue water (NRW) is at 64% in Dushanbe. Of this, 29% is physical losses, the remaining 35% is in unauthorised consumption, unbilled consumption, inaccurate billing, and poor collections. Increasing costs due to inefficient infrastructure operations, high physical losses, inaccurate billing, poor collections, and the low cost of water, means that the water operator in Dushanbe State Unitary Enterprise Dushanbevodokanal (SUE DVK) currently operates at a loss. In parallel with investments planned under Water Sector Action 5 and Water Sector Action 6, there is a clear need for institutional capacity development to improve the financial position of SUE DVK and ensure the sustainability of investments. This action includes institutional capacity development in five workstreams to deliver the following outputs: • Operational improvements – purchase of leak detection equipment and development of leak detection plans, develop schedules for maintenance, up-to-date water balance calculations for management of district metered areas (DMAs) for leak identification. • Financial management – increasing the coverage of the customer database (>95% coverage), implement a new digital financial management system, integrate this with more accurate and frequent metering (through a smart metering pilot) to improve billing and collections. • Organisational and human resources – on-the-job training to improve business planning and reporting in both water supply and wastewater business units, development of clear job descriptions and development pathways, development of links with universities and technical colleges for recruiting qualified staff. • Customer relations – conduct an awareness raising program and customer satisfaction surveys to improve collections and acceptance of any increases in the 'cost' of water and wastewater services, and promote water conservation. • Tariff study – develop a long term financing strategy based on updated business plans and review/updated the existing tariff calculation method. The work will be led and supported by a consultants procured under ADB's Dushanbe Urban Water Supply and Sanitation Project and World Bank's Dushanbe Water Supply and Wastewater Project.
Rationale and Linkage to Other GCAP Actions / Existing Projects/Work	There is a need for large-scale rehabilitation of water supply and metering infrastructure in Dushanbe, which will be undertaken under Water Sector Action 5, including leakage reduction measures through replacing ageing pipes, establishment of district metered areas (DMAs), and SCADA systems for real-time management of pressure (and leakage) in the water supply system. In parallel with these investments, there is a requirement for institutional capacity to improve operations, financial management, organisational and human resources, customer relations, and review tariff setting to improve the commercial,

<table>
<tr><td></td><td colspan="3">technical, and financial sustainability of water sector services by the state unitary enterprise in Dushanbe.
By reducing physical losses, the total demand of the city will be reduced, also delivering a more climate-resilient water supply system. This Action will be implemented together with Water Sector Action 6, under ADB's Dushanbe Urban Water Supply and Sanitation Project and World Bank's Dushanbe Water Supply and Wastewater Project.</td></tr>
<tr><td>Cross-Cutting Themes / Co-benefits</td><td>Climate Action</td><td>Gender and Social Inclusion</td><td>Smart Maturity</td></tr>
<tr><td></td><td>☐ Directly targeted
☒ Some elements
Reason:
Climate change is producing more intense seasonal water shortages. Training in water loss reduction and management will reduce abstraction rates, reducing pressure on water resources.</td><td>☐ Directly targeted
☒ Some elements
Reason:
The project will develop a Gender and Social Inclusion Action Plan to ensure inclusive development of institutional capacity.</td><td>☐ Directly targeted
☒ Some elements
Reason:
Training in operation of SCADA systems and district metered areas will be included in project design to enable smart management of water supply systems, more efficient water use, and reduced physical losses. New smart metering and tariff collections systems will be implemented.</td></tr>
<tr><td>Status of Preparation</td><td colspan="3">☒ Under implementation to be scaled up/expanded</td></tr>
<tr><td>Implementation Process and Timeline</td><td colspan="3">
<table>
<tr><th>Step</th><th>Duration</th><th>Task Owner / Support Required</th></tr>
<tr><td>Finalise project scope, undertake due diligence</td><td>Completed</td><td rowspan="4">State Unitary Enterprise Dushanbevodokanal / ADB</td></tr>
<tr><td>Establish Project Implementation Group</td><td>Completed</td></tr>
<tr><td>Procurement of detailed design, tender support and construction supervision services</td><td>Completed</td></tr>
<tr><td>Procurement of consultant to deliver advisory services for institutional capacity development</td><td>6 months</td></tr>
<tr><td>Project implementation</td><td>5 years</td><td rowspan="2">State Unitary Enterprise Dushanbevodokanal / ADB / Consultants</td></tr>
<tr><td>Project monitoring and reporting</td><td>Continuous (in parallel)</td></tr>
</table>
</td></tr>
<tr><td>Next Steps</td><td colspan="3">Procure consultancy services for the proposed institutional capacity development programme.</td></tr>
<tr><td>Action Owner(s)</td><td colspan="3">State Unitary Enterprise Dushanbevodokanal (SUE DVK)</td></tr>
<tr><td>Stakeholders</td><td colspan="3">
<table>
<tr><th>Stakeholder Group</th><th>Engagement (Inform, Consult, Involve, Collaborate, Empower)</th></tr>
<tr><td>State Unitary Enterprise Dushanbevodokanal (SUE DVK)</td><td>Empower</td></tr>
<tr><td>Ministry of Energy and Water Resources</td><td>Inform</td></tr>
<tr><td>Executive Body of Dushanbe City</td><td>Collaborate</td></tr>
<tr><td>Design and Construction supervision consultant</td><td>Collaborate</td></tr>
<tr><td>Selected Contractor for Works Package (water supply)</td><td>Collaborate</td></tr>
<tr><td>Recipient communities</td><td>Consult</td></tr>
<tr><td>ADB</td><td>Collaborate</td></tr>
</table>
</td></tr>
<tr><td>Indicative Project Costs</td><td colspan="3">
<table>
<tr><th>CapEx [€]</th><th>OpEx over 5 years [€]</th><th>Development / Advisory Costs [€]</th></tr>
<tr><td>N/A</td><td>N/A</td><td>5,900,000</td></tr>
</table>
</td></tr>
<tr><td>Potential Financing Instruments and Sources</td><td colspan="3">
<table>
<tr><th>Instrument</th><th>Source</th><th>Amount € / Share %</th></tr>
<tr><td>Grant</td><td>Asian Development Bank</td><td>900,000 / 15%</td></tr>
<tr><td>Grant</td><td>World Bank</td><td>3,200,000 / 54%</td></tr>
<tr><td>Own-Source</td><td>Government of Tajikistan</td><td>1,800,000 / 31%</td></tr>
</table>
</td></tr>
</table>

Revenue Opportunities	☐ No	☒ Yes →	The project will improve collection rates and therefore increase the revenue generated per unit of water delivered. (The project will also reduce costs per unit of water, improving financial position without generating additional revenue per se.)

Impact Measures (Quantitative and Qualitative)	State Indicators	• Water exploitation index - %
	Pressure Indicators	• Water consumption per capita - l/p/d • Non-revenue water - %
	Estimated Carbon Emissions Reduction	• N/A (counted under Water Sector Action 5)
	Physical Annual Savings	• The estimated physical loss reduction is provided in Water Sector Action 5, which includes the investments in pipe rehabilitation, pressure management, and metering. To avoid double counting, the losses are accounted under Water Sector Action 5. This task will contribute to the water savings by implementing the institutional systems required to monitor and manage physical losses.
	Climate Resilience Benefits	• Improving efficiency and reduced losses in the water supply system will reduce the abstraction demand, putting less stress on water resources annually and retaining water resources buffering for climate extremes (i.e. heat stress and droughts).
	Reductions in Operating Expenditures	• Better management of physical losses and more efficient business processes will bring down operational cost per unit of water delivered to customers.
	Other Indicators / Social and Economic Benefits	• Improved water services may positively impact on payment performance of users. • Given the nature of the action, no direct job creation is expected.

Potential Project Risks	**Area**	**Risks**
	Social	• Public perception may be hampered by poor operational performance
	Environmental	• N/A
	Economic	• Decreasing financial sustainability of DVK in the face of increased operational costs
	Other	• Insufficient coordination between the ‘investment’ and ‘institutional’ measures of this project • District metered areas (DMAs) are established but not properly managed • Issues with customer database and other data hamper progress • Chosen IT system/technologies are not compatible between each other or with existing systems or limited digital literacy prevent uptake/effective use by staff

8 Invest in blue-green-grey infrastructure in flood risk zones

Sector	☒ Water
Action Type	☒ Investment ('Hard')
GCAP Action Classification	☒ Capital Investment
Priority Environmental Challenges Addressed	• Unauthorised quarries
Strategic Objective Supported	Improve the conservation, enhancement, and efficient use of land resources to reduce greenhouse gas emissions and strengthen resilience to climate change and disaster risks alongside stronger development control and enhanced stakeholder engagement.
Linkage to Existing Policies/Plans	• Dushanbe City Socio-Economic Development Program to 2025 (Strengthening of urban planning and construction activities and improve the environment and ecology) • Dushanbe Master Plan • District and Action Area Plans (where available) • Building and environmental regulations
Description	This action focuses on delivering blue-green-grey infrastructure solutions to increase flood resilience, enhance urban biodiversity, improve water quality, and promote groundwater recharge. The action will increase the amenity value of Dushanbe's rivers by providing safe access for residents and connecting the river systems with existing urban parks. The action will include preparation of a drainage and irrigation strategy for Dushanbe, which will inform the investment actions. The proposed investments will: • Restore a more natural river cross-section and bed profile with natural flow (depth, velocity) variability at dry flows for ecological enhancement; • Maintain, and where possible increase, conveyance capacity during high-flow events to increase flood resilience; • Make space for water by reconnecting the river with its floodplain, and linking these areas of green space to a new network of connected parks, where possible; • Use sustainable drainage systems (SuDS) features for managing local runoff and water quality and promoting groundwater recharge – which will support water security; • Stabilise riverbanks by planting appropriate tree species; and • Develop exclusion zones for quarrying of aggregates. Preliminary locations identified include: • The canalised sections of the Luchob River which flows into the Varzob River from the north west, adjacent to the new 'Youth Park'. • The Varsob River, through the centre of Dushanbe, downstream of the Gissar Canal offtake. • The floodplain areas at the confluence between the Varsob and Kofarnihon Rivers adjacent to the wastewater treatment plant, which are heavily quarried. Suitable locations for rehabilitation and restoration should be selected based on criteria which may include: local flood risk, existing condition of hydraulic structures and need for repair, bank stabilisation requirement, existing land use and land availability (avoiding relocation of residents where possible and safe to do so), proximity to green space for linkage to other urban parks, proximity to residential areas to deliver amenity value.
Rationale and Linkage to Other GCAP Actions / Existing Projects/Work	Climate change is likely to increase flood risk in the spring in Dushanbe, and is contributing to extreme summer heat, as well as water scarcity in the summer months. Through the city centre, the main rivers are constrained within concrete embankments and controlled by concrete hydraulic structures creating limited habitat or amenity value, especially as flows are low during much of the year. Residents use the dry riverbeds for recreation and the recent construction boom has led to illegal quarrying of aggregates from the river banks, exacerbating instability issues. Existing grey infrastructure in the rivers is highly deteriorated following years of insufficient maintenance, this poses a risk to residents who cross the waterbodies, use them for washing, or playing (e.g., children and youth). This action should be delivered in conjunction with Land Use and Biodiversity Sector Action 24, and in consideration of the Buildings Sector Action 14. Interlinkages with Water

<table>
<tr><td></td><td colspan="3">Action 6 should be explored in terms of the city's wastewater and stormwater system and their performance during extreme rain events.
It should be noted that the planned metro system (2 lines) is planned to potentially be routed alongside/on top of the eastern bank of Varsob River in a north-south direction.</td></tr>
<tr><td rowspan="2">Cross-Cutting Themes / Co-benefits</td><td>Climate Action</td><td>Gender and Social Inclusion</td><td>Smart Maturity</td></tr>
<tr><td>☒ Directly targeted
☐ Some elements
Reason:
The action will provide increased resilience to flooding and promote groundwater recharge. Green space helps to mitigate urban heating resulting from climate change.</td><td>☒ Directly targeted
☐ Some elements
Reason:
Improved access to green space and nature provide wellbeing benefits to residents of Dushanbe. Parks will provide safe, inclusive access to major water bodies of Dushanbe.</td><td>☐ Directly targeted
☐ Some elements
Reason:
N/A</td></tr>
<tr><td>Status of Preparation</td><td colspan="3">☒ Project idea</td></tr>
<tr><td>Implementation Process and Timeline</td><td colspan="3">
<table>
<tr><th>Step</th><th>Duration</th><th>Task Owner / Support Required</th></tr>
<tr><td>Prepare a Drainage and Irrigation strategy for Dushanbe</td><td>1 year</td><td>Dushanbe City Department for Irrigation and Drainage
Dushanbe City Land Management Committe</td></tr>
<tr><td>Prepare green space conservation and biodiversity upgrading strategy (under Land Use and Biodiversity Sector Action 24)</td><td>1 year</td><td>Dushanbe City Department for Landscape Improvement and Department of the Committee for Environmental Protection
Dushanbe City Land Management Committe</td></tr>
<tr><td>Prioritise suitable locations for rehabilitation and restoration based on selected criteria (see description)</td><td>1 month</td><td>Dushanbe City Departments of:
Architecture and Planning
Landscape Improvement
Irrigation and Drainage
Dushanbe City Land Management Committe</td></tr>
<tr><td>Commission detailed design, including hydraulic, geomorphological, ecology, and landscaping</td><td>6 months</td><td>Dushanbe City Departments of:
Architecture and Planning
Landscape Improvement
Irrigation and Drainage</td></tr>
<tr><td>Construction of designed restoration / green space pilot project</td><td>1 year</td><td>Dushanbe City Departments of:
Architecture and Planning
Landscape Improvement
Irrigation and Drainage
SUE for parks and gardens</td></tr>
<tr><td>Expansion of the project to 2 more locations</td><td>2 years</td><td>Dushanbe City Departments of:
Architecture and Planning
Landscape Improvement
Irrigation and Drainage
SUE for parks and gardens
Dushanbe City Land Management Committe</td></tr>
</table>
</td></tr>
<tr><td>Next Steps</td><td colspan="3">Establish high-level political support and develop a project concept note which outlines responsibilities and inputs required from different stakeholders, a timeframe, and planning level cost estimate for developing a funding proposal. Clarify plans for metro system and its potential overlap/impact on Varsob River / riverbanks.</td></tr>
<tr><td>Action Owner(s)</td><td colspan="3">Dushanbe City Department of Architecture and Planning and Dushanbe City Department for Irrigation and Drainage</td></tr>
<tr><td>Stakeholders</td><td colspan="3">
<table>
<tr><th>Stakeholder Group</th><th>Engagement (Inform, Consult, Involve, Collaborate, Empower)</th></tr>
</table>
</td></tr>
</table>

	Dushanbe City Department of Architecture and Planning	Empower
	Dushanbe City Department for Irrigation and Drainage	Empower
	Dushanbe City Land Management Committee	Collaborate
	Dushanbe City Committee for Environmental Protection	Involve
	SUE for park complexes and gardens	Involve
	Local Community Organisations	Consult
	NGO “Little Earth”	Consult
	NGO “YGPE” – Environmental Organization	Consult
	National Biodiversity and Biosafety Centre	Consult
	Universities and research institutes – e.g., departments for water engineering, environmental management, and planning	Involve

Indicative Project Costs	**CapEx [€]**	**OpEx over 5 years [€]**	**Development / Advisory Costs [€]**
	12,500,000	500,000	350,000

Potential Financing Instruments and Sources	**Instrument**	**Source**	**Amount € / Share %**
	Grant	International development partner (e.g., international development bank or bilateral donor)	350,000 (Advisory Costs) / 100%
	Grant	National government	2,500,000 (CapEx) / 20%
	Own-Source	City government	500,000 (CapEx) / 4%
	Grant	International development partner (e.g., international development bank or bilateral donor)	2,500,000 (CapEx) / 20%
	Concessional Loan	International development partner (e.g., international development bank or bilateral donor)	7,000,000 (CapEx) / 56%

Revenue Opportunities	☒ No	☐ Yes →

Impact Measures (Quantitative and Qualitative)		
	State Indicators	• Concentration of PM2.5, PM10, SO2, NOx in air • Open green space area ratio per 100 000 inhabitants • Inter-connectivity between existing/planned urban green spaces • Connectivity with peri-urban green spaces • Abundance of bird species / other species
	Pressure Indicators	• Population density on urban land • Percentage of urban development that occurs on existing urban land rather than on greenfield land
	Estimated Carbon Emissions Reduction	• 155,800 tCO2e over the lifetime of vegetation • 5,200 annual tCO2e; based on an average 30-year tree lifespan • Note: Trees will require several years to mature for full carbon sequestration effects to materialise
	Physical Annual Savings	• See above pressure indicators. • Intervention could support reduced clean-up and restoration costs and material needs along river banks and flood-exposed areas
	Climate Resilience Benefits	• Increase resilience to flooding by making space for water, stabilising banks, and incorporating sustainable urban drainage into design to promote groundwater recharge. • Green space helps to mitigate urban heating resulting from climate change.

	Reductions in Operating Expenditures	• Improved drainage and stormwater management may allow for reduced damages to stormwater infrastructure and other physical assets across the city, thus reducing repair costs following extreme weather events.
	Other Indicators / Social and Economic Benefits	• Given the labour intensity of the action, it is estimated that the implementation activities could create 30 new jobs, while the later operation may result in 10 additional jobs. • Increased access to greenspace and biodiversity can support widespread improvement in health, reduction of morbidity and mortality in urban residents. • Improvements to blue and green spaces in Dushanbe can increase the city's attractiveness to visitors/tourists, potentially leading to increased revenues.
Potential Project Risks	**Area**	**Risks**
	Social	• Displacement of informal settlements and low-income households living along the river or in floodplains
	Environmental	• Routing of metro lines alongside/on top of Eastern bank of Varsob River couldimpact the viability of connected green space in this location.
	Economic	• Limited resources to deliver green space upgrading and biodiversity pilots to sufficient quality
	Other	• Lack of political support to access finance for biodiversity and amenity upgrades – particularly where traditionally grey infrastructure solutions may be favoured over blue/green (or hybrid) approaches • Lack of enforcement to prevent illegal quarrying from the river preventing project reaching its full potential

4.4. GCAP Transport Actions

In the transport sector, 4 actions have been prioritised that aim to promote public transit and non-motorised transportation, as well as electric and smart mobility. The capital expenditures for those actions are estimated to account for 12% of the overall GCAP budget. Their possible contribution to the overall carbon emissions reductions is fairly limited in the GCAP's initial 5-year timeframe, but there is much potential for scaling up the transport actions to have a broader positive impact on reducing carbon emissions in the city. They may also contribute to 17% of the estimated job creation from the GCAP actions.

9 Develop a Sustainable Urban Mobility Plan for Dushanbe

Sector	☒ Transport
Action Type	☒ Policy ('Soft')
GCAP Action Classification	☒ Strategies, plans, and programmes
Priority Environmental Challenges Addressed	• Emissions from growing and ageing vehicle fleet • Limited incentives for clean transport and non-motorised mobility
Strategic Objective Supported	Improve transport planning and investment to support an integrated and safe transport system that enables better connectivity, improved access to a variety of motorised and non-motorised transport modes, as well as reduced carbon emissions and air pollution.
Linkage to Existing Policies/Plans	• Dushanbe Socio-Economic Development Program 2025 • Dushanbe Urban Master Plan • National Development Strategy (2016) • State Target Program for the Development of the Transport Complex of the Republic of Tajikistan until 2025 • Dushanbe Public Transport Program
Description	The action is to develop a Sustainable Urban Mobility Plan (SUMP) for the city, improving on the existing Dushanbe Master Plan and building on the Public Transport Development Strategy (PTDS). This will include the development of a four-step multi-modal traffic model of Dushanbe that can inform the SUMP. This new SUMP will enable sustainable development of transport infrastructure in Dushanbe, the expansion of an accessible and integrated public transport system, the promotion of active mobility modes (walking, cycling, etc.) and electric mobility and the construction of adequate infrastructure for these modes, as well as the formulation of effective parking and traffic management policies. The SUMP will consider the new metro (2 lines) planned for Dushanbe by the Ministry of Transport and the National Railway Company of the Republic of Korea. The SUMP is expected to be a comprehensive planning study for the city and its main outputs will be an actionable list of policy, institutional/managerial, and physical investment actions to promote sustainable urban mobility in Dushanbe. Pilot transport projects that are developed will be informed by the SUMP (Action 10).
Rationale and Linkage to Other GCAP Actions / Existing Projects/Work	Since the early 2000s, Dushanbe has experienced a rapid expansion in the use of private motor vehicles. Simultaneously, the public transport system has been deteriorating. This has negative consequences in the city in terms of people's mobility and wellbeing (i.e., air pollution). There is a need to rethink urban mobility in Dushanbe that can help promote more sustainable modes of transport. This action is related to the current work sponsored by the EBRD for the establishment of a Public Transport Development Strategy (PTDS) for Dushanbe.[36] This action is related to Energy Sector Action 1, Transport Sector Actions 10, 11, and 12, and Land Use and Biodiversity Sector Action 23.

[36] Dushanbe Public Transport. Project number – 39989. https://www.ebrd.com/work-with-us/projects/psd/dushanbe-public-transport.html

<table>
<tr><td>Cross-Cutting Themes / Co-benefits</td><td>Climate Action</td><td>Gender and Social Inclusion</td><td>Smart Maturity</td></tr>
<tr><td></td><td>☐ Directly targeted
☒ Some elements
Reason:
This action promotes the use of non-motorized transport avoiding emissions of GHGs related to travel inside Dushanbe.</td><td>☐ Directly targeted
☒ Some elements
Reason:
This action can promote the development of public and non-motorised transport in the city that better fulfils the needs of women and children, the elderly and disabled individuals.</td><td>☐ Directly targeted
☒ Some elements
Reason:
Smartness will play a crucial role in transport planning and management with the use of information and communication technologies (ICTs), such as real time information, Automated Fare Collection, Passenger information system, Automated Teller Machines. In the future, a City-wide Digital Twin (Action 27) may be used as a powerful tool for transport planning.</td></tr>
<tr><td>Status of Preparation</td><td colspan="3">☒ Project idea</td></tr>
<tr><td>Implementation Process and Timeline</td><td colspan="3">
<table>
<tr><th>Step</th><th>Duration</th><th>Task Owner / Support Required</th></tr>
<tr><td>Establish the project team and focal point within Dushanbe City Administration (DCA) and Transport-related State Unitary Enterprises (SUEs)</td><td>1 months</td><td rowspan="4">Transport Department (supported by Department of Architecture and Urban Planning, and Transport-related State Unitary Enterprises (SUEs))</td></tr>
<tr><td>Develop study scope, issue Request for Quotation and submission of proposals by interested parties</td><td>3 months</td></tr>
<tr><td>Review of proposal and issue of contract (incl. contract negotiation)</td><td>3 months</td></tr>
<tr><td>Develop SUMP alongside the four-step multi-modal traffic model and review of the spatial plan – including micro-mobility infrastructure, integration with public realm and public transport interchanges; car parking management plan.</td><td>15-18 months</td></tr>
<tr><td>Publication of the SUMP and capacity building of stakeholders for adoption of the plan</td><td>3 months</td><td>Transport Department (supported by Department of Architecture and Urban Planning; independent consultants; engagement with users)</td></tr>
</table>
</td></tr>
<tr><td>Next Steps</td><td colspan="3">DCA and Transport Department to identify focal points to develop the concept note/Terms of Reference for the SUMP for initial consultations within the relevant stakeholders to initiate process to apply for funding and procure technical experts for the study.</td></tr>
<tr><td>Action Owner(s)</td><td colspan="3">• Transport Department (Dushanbe City Administration)
• Transport-related State Unitary Enterprises (SUEs) (4 Units – "Bus-1", "Bus-2", "Bus-3" and "Trolleybus")
• Department of Architecture and Urban Planning
• SUE “Dushanbe hadamot nakliyotrason”</td></tr>
<tr><td>Stakeholders</td><td colspan="3">
<table>
<tr><th>Stakeholder Group</th><th>Engagement (Inform, Consult, Involve, Collaborate, Empower)</th></tr>
<tr><td>Ministry of Transport</td><td>Involve</td></tr>
<tr><td>Transport Department (Dushanbe City Administration)</td><td>Empower</td></tr>
<tr><td>Department of Architecture and Urban Planning</td><td>Empower</td></tr>
</table>
</td></tr>
</table>

	Dushanbe Districts / “Mahalla” Councils	Involve
	Transport-related State Communal Unitary Enterprises (SUEs) (4 Units)	Collaborate
	State Unitary Enterprise “Design Institute for Transport Infrastructure”	Collaborate
	SUE “Dushanbe hadamot nakliyotrason” of local executive bodies of state power of Dushanbe	Consult
	Traffic Police / Transport Inspection Agency	Consult
	SUE “Smart City”	Involve
	Vulnerable population representatives (e.g., NGOs, civil society groups)	Involve
	Universities and research institutes – e.g., departments of planning and transport engineering	Consult

Indicative Project Costs	**CapEx [€]**	**OpEx over 5 years [€]**	**Development / Advisory Costs [€]**
	N/A	N/A	800,000

Potential Financing Instruments and Sources	**Instrument**	**Source**	**Amount € / Share %**
	Grant	International Development Partner (e.g., bilateral donor)	800,000 (Advisory Costs) / 100%

Revenue Opportunities	☒ No	☐ Yes →

Impact Measures (Quantitative and Qualitative)		
	State Indicators	• Average annual concentration of PM2.5 • Average annual concentration of PM10 • Average daily concentration of SO2 • Average daily concentration of NOx • Percentage of public infrastructure at risk
	Pressure Indicators	• Share of total passenger car fleet run by electric, hybrid fuel cell, Liquefied Petroleum Gas (LPG) and Compressed Natural Gas (CNG) energy (total and by type) • Transport modal share in total trips (cars, motorcycles, taxi, bus, metro, tram, bicycle, pedestrian) • Kilometres of road dedicated exclusively to public transit per 100 000 population • Kilometres of bicycle path per 100000 population • Share of population having access to public transport within 15 min by foot • Average commuting distance / Average commuting time
	Estimated Carbon Emissions Reduction	• Given the nature of this action, no direct carbon emissions reductions are expected.
	Physical Annual Savings	• See above pressure indicators. The study will not result in any direct physical savings, but it can inform transport planning and investment decision-making for an improved use of resources and reduced carbon intensity of the transport sector in Dushanbe.
	Climate Resilience Benefits	• Findings from the study can inform proactive climate resilience planning in Dushanbe, including the consideration of using nature-based solutions for the management of hazards such as flooding or heat waves.
	Reductions in Operating Expenditures	• Following the study, improvements to current management approaches and targeted investments can support reduced operation and maintenance costs. A more integrated public transport system can also help reduce operating costs for all of the public transport companies in the city.

	Other Indicators / Social and Economic Benefits	• Increased access of vulnerable populations in Dushanbe to transport which has implications for their social, psychological, and economic well-being. • An improved transport system – particularly around non-motorised modes – can also be attractive to visitors/tourists coming to Dushanbe, with potentially increased revenues. • Given the nature of this action, no job creation is expected.
Potential Project Risks	**Area**	**Risks**
	Social	• The needs of vulnerable populations (women, children, the elderly, people with disabilities) are not effectively captured and attended.
	Environmental	• Additional space may be required to the detriment of other public areas such as green spaces. • The rapid construction of transport infrastructure in response to urbanisation may increase spatial fragmentation and may convert green space to grey infrastructure.
	Economic	• Tariff integration may be difficult to negotiate between operators. • Sustainable financing sources may not be identified hindering the complete implementation of the SUMP.
	Other	• Due to socio-economic aspirations from Dushanbe citizens, private car ownership and use might not see a reduction in spite of the increased public and non-motorised transport offer. • Complex planning governance at the city level may prevent the study to inform planning processes and decisions in other departments.

10 Develop pilot transport projects focused on sustainable urban mobility

Sector	☒ Transport	
Action Type	☒ Investment ('Hard')	
GCAP Action Classification	☒ Capital Investment	☒ Investment-related feasibility study ☒ Awareness, demonstration, training, and capacity building
Priority Environmental Challenges Addressed	• Emissions from growing and ageing vehicle fleet • Limited incentives for clean transport and non-motorised mobility	
Strategic Objective Supported	Improve transport planning and investment to support an integrated and safe transport system that enables better connectivity, improved access to a variety of motorised and non-motorised transport modes, as well as reduced carbon emissions and air pollution.	
Linkage to Existing Policies/Plans	• Dushanbe Socio-Economic Development Program 2025 • Dushanbe Urban Master Plan • National Development Strategy (2016) • Transport Sector Master Plan (National Plan)	
Description	Dushanbe City will develop pilot transport projects focusing on sustainable urban mobility. Pilot projects will be related to: (i) Promoting non-motorised transport (e.g., bicycles) and better walkability in the city, (ii) Improving accessibility to public transport by, for example, making bus stops and buses more accessible for people with disabilities and other vulnerable populations, and (iii) Developing sustainable urban transport infrastructure including road safety measures, resilience considerations, and improved flow and speed (e.g., exclusive lanes for public transport and addition of flyover options in currently congested dense junctions – learning from experiences with the separate trolley bus land along Ismoil Somoni Avenue). Road infrastructure and public space projects should seek to include relevant measures for public transport and active mobility modes, whilst relevant planning and network development will be further informed by the Sustainable Urban Mobility Plan (SUMP) – see Transport Sector Action 9. This action also provides a key opportunity to test out SMART technologies before full roll-out.	
Rationale and Linkage to Other GCAP Actions / Existing Projects/Work	Dushanbe has limited quality infrastructure for cycling and walking. Poor safety conditions and road design focusing on motorised transport contribute to the negative environment for walking and cycling and have deteriorated the air quality in the city. Currently, the EBRD are planning to scope out a road project in Dushanbe along the principles of a sustainable road, integrating active transport modes and traffic management. Additionally, public transport infrastructure in Dushanbe is not sufficiently accessible for people with disabilities and other vulnerable populations. This action is related to Energy Sector Action 1, Transport Sector Actions 9, 11, and 12, and Land Use and Biodiversity Sector Action 23.	
Cross-Cutting Themes / Co-benefits	**Climate Action**	**Gender and Social Inclusion**	**Smart Maturity**
	☐ Directly targeted ☒ Some elements *Reason*: This action promotes the use of non-motorised transport avoiding emissions of GHGs related to travel inside Dushanbe.	☐ Directly targeted ☒ Some elements *Reason*: This action can promote the development of public and non-motorised transport in the city that better fulfils the needs of women and children, the elderly and disabled individuals.	☐ Directly targeted ☒ Some elements *Reason*: This action provides an opportunity to test smart technologies before full roll out. These may include 'smart' elements such as apps showing the best routes for people with disabilities, digital technologies showing real-time traffic information, or information and communication technologies (ICTs) for improved traffic management.
Status of Preparation	☒ Project idea		
Implementation Process and Timeline	**Step**	**Duration**	**Task Owner / Support Required**

	Prioritise longlist of potential pilot transport projects to deliver sustainable urban mobility identified in the Sustainable Urban Mobility Plan (SUMP)	3 months	Transport Department (supported by Department of Architecture and Urban Planning, independent consultants, incl. engagement with users)
	Develop preliminary designs for specific locations, test with users (engagement with local businesses/users) – include "quick wins" and "flagship" options	4 months	
	Detailed design of "quick wins" and tendering of contractors for delivery	6 months	Transport Department (supported by independent consultants; procurement specialists)
	Construction and delivery of "quick wins" infrastructure to open as demonstration examples – with promotion.	6 months	Transport Department (supported by independent consultants and project management leads for Contractors; communication specialists)
	User surveys and feedback to inform future design and delivery of SUMP designs	3 months lows 4.)	Transport Department (supported by independent consultants or research institutes)

Next Steps	DCA and Transport Department to identify focal points to develop the initial list of potential pilot transport projects, informed by previous or ongoing studies.
Action Owner(s)	• Transport Department (Dushanbe City Administration) • Transport-related State Communal Unitary Enterprises (SUEs) (4 Units – "Bus-1", "Bus-2", "Bus-3" and "Trolleybus") • Department of Construction and Utilities • Department of Architecture and Urban Planning • SUE "Dushanbe hadamot nakliyotrason"

Stakeholders

Stakeholder Group	Engagement (Inform, Consult, Involve, Collaborate, Empower)
Ministry of Transport	Involve
Transport Department (Dushanbe City Administration)	Empower
Department of Architecture and Urban Planning	Empower
Department of Construction and Utilities	Collaborate
Dushanbe Districts / "Mahalla" Councils/Committees	Consult
Transport-related State Communal Unitary Enterprises (SUEs) (4 Units)	Collaborate
State Unitary Enterprise "Design Institute for Transport Infrastructure"	Involve
Traffic Police / Transport Inspection Agency	Consult
SUE "Smart City"	Involve
SUE "Dushanbe hadamot nakliyotrason" of local executive bodies of state power of Dushanbe	Consult
Vulnerable population representatives (e.g., NGOs, civil society groups)	Involve
Universities and research institutes – e.g., departments of planning and transport engineering	Consult

Indicative Project Costs

CapEx [€]	OpEx over 5 years [€]	Development / Advisory Costs [€]
Non-motorised transport pilot: 200,000 Public transport accessibility pilot: 250,000 Road pilot: 10,000,000 **Total: 10,450,000**	Estimated at 2-3% of investment cost:	**650,000**

			1,306,250	
Potential Financing Instruments and Sources	**Instrument**	**Source**		**Amount € / Share %**
	Grant	International Development Partner (e.g., international development bank or bilateral donor)		650,000 (Advisory Costs) / 100%
	Own-Source	City Government		500,000 (CapEx) / 4.8%
	Equity/Own-Source	State Unitary Enterprises		500,000 (CapEx) / 4.8%
	Concessional Loan	International development partner (e.g., international development bank or bilateral donor)		9,450,000 (CapEx) / 90.2%
Revenue Opportunities	☐ No	☒ Yes →	Dushanbe may create a public bicycles programme which could lead to opportunities for revenue for the city from the user charge. Improved public transport may also lead to increased trips and fair revenues. Greening and other improvements to roads can create increased land values, which may be captured through taxes or betterment levies.	
Impact Measures (Quantitative and Qualitative)	State Indicators	• Average annual concentration of PM2.5 • Average annual concentration of PM10 • Average daily concentration of SO2 • Average daily concentration of NOx • Open green space area ratio per 100 000 inhabitants • Percentage of public infrastructure at risk		
	Pressure Indicators	• Share of total passenger car fleet run by electric, hybrid fuel cell, Liquefied Petroleum Gas (LPG) and Compressed Natural Gas (CNG) energy (total and by type • Transport modal share in total trips (cars, motorcycles, taxi, bus, metro, tram, bicycle, pedestrian) • Kilometres of road dedicated exclusively to public transit per 100 000 population • Kilometres of bicycle path per 100000 population • Share of population having access to public transport within 15 min by foot • Average commuting distance / Average commuting time• Proportion of the population living within 20 minutes to everyday services (grocery stores, clinics, etc.)		
	Estimated Carbon Emissions Reduction	• Depending on the specific nature of the sub-projects, this action may not result in absolute carbon emissions reductions, as the benefits e.g. from increased non-motorised transport, may be offset by the higher travel-speed and convenience of increased bus and car transport		
	Physical Annual Savings	• See above pressure indicators.		
	Climate Resilience Benefits	• The pilot projects may include the use of nature-based solutions for the management of hazards such as flooding or heat waves. These pilot projects can demonstrate how transport infrastructure can act as protecting infrastructure for other infrastructure and people in the city.		
	Reductions in Operating Expenditures	• The improvement of transport infrastructure and the bus fleet can create reductions in operating expenditures for bus companies. Maintenance costs will be likely reduced. By providing alternative modes of transport, the buses in the city should run without excess in capacity in rush hours which will reduce the likelihood of premature maintenance needs.		
	Other Indicators / Social and Economic Benefits	• Given the labour-intensive nature of the construction works for this action, an estimated 100 jobs may be created from the investment. • Increased access of vulnerable populations in Dushanbe to transport which has implications for their social, psychological, and economic well-being.		

		• The increase in road safety has positive implications regarding quality of life in Dushanbe and the avoidance of premature deaths. • An increase in walkability in the city can have health benefits for the population of Dushanbe. • An improved transport system – particularly around non-motorised modes – can also be attractive to visitors/tourists coming to Dushanbe, with potentially increased revenues.
Potential Project Risks	**Area**	**Risks**
	Social	• The needs of vulnerable populations (women, children, the elderly, people with disabilities) are not effectively captured and attended. The use of 'smart' technologies for transport could impact negatively non-technologically literate individuals.
	Environmental	• As the demand and use for road transport grows, additional space is required to the detriment of other public areas such as pedestrian sidewalks or green spaces. The rapid construction of transport infrastructure in response to urbanisation may increase spatial fragmentation and may convert green space to grey infrastructure.
	Economic	• Increased tariffs or taxes could have a negative economic impact on lower-income households. • Participating state unitary enterprises and/or private companies may not be willing to contribute own sources to piloting the activities. • Lack of finance may prevent the scaling up of pilots that have proven effective.
	Other	• Due to socio-economic aspirations from Dushanbe citizens, private car ownership and use might not see a reduction. • Swift planning and execution of pilot projects may require exceptional approvals outside of the usual government review processes.

11 Prepare a local sustainable mobility and e-mobility plan for the city centre

Sector	☒ Transport		
Action Type	☒ Policy ('Soft')		
GCAP Action Classification	☒ Strategies, plans, and programmes		
Priority Environmental Challenges Addressed	• Emissions from growing and ageing vehicle fleet • Limited incentives for clean transport and non-motorised mobility		
Strategic Objective Supported	Improve transport planning and investment to support an integrated and safe transport system that enables better connectivity, improved access to a variety of motorised and non-motorised transport modes, as well as reduced carbon emissions and air pollution.		
Linkage to Existing Policies/Plans	• Dushanbe Socio-Economic Development Program 2025 • Dushanbe Urban Master Plan • National Development Strategy (2016) • Transport Sector Master Plan (National Plan)		
Description	The local sustainable mobility and e-mobility plan for the city centre will support the implementation of the new Sustainable Urban Mobility Plan (SUMP) for the city overall (Transport Sector Action 9) and other planning documents such as the Dushanbe Urban Master Plan. The plan specifically for the city centre will provide more detailed local area planning, projects and business models/funding opportunities for the following initiatives: (i) Promotion of active modes of transport (e.g., walking and cycling), (ii) Establishment of multi-modal transport hubs around the rail passenger terminal of the city, and "Korvon", "Sahovat" and "Kushoniyon" markets (taking into account the medium-term planned national government-executed light-rail system with its pilot route of 12km along Karaboev Avenue), (iii) Creation of policy and financial incentives for electric cars, (iv) Establishment of electric vehicle charging infrastructure. Solar PV installed to charge EVs in areas with available rooftops should be considered (v) Development of micro and shared mobility facilities (e.g., public bikes/e-scooters parking stations), (vi) Development of effective parking and traffic management systems, and (vii) Establishment of innovative business models for private sector engagement in the transport sector. The plan should also consider to disincentivise internal combustion engines (ICEs) e.g. restrictions or additional charges for driving old diesel cars which contribute significantly to air pollution.		
Rationale and Linkage to Other GCAP Actions / Existing Projects/Work	Since the early 2000s, Dushanbe has experienced a rapid expansion in the use of private motor vehicles. Simultaneously, the public transport system has been deteriorating. This has negative consequences for the city. There is a need to rethink urban mobility in Dushanbe that can help promote more sustainable modes of transport. Additionally, there are insufficient policy and financial incentives for electric cars in Dushanbe and Tajikistan which are limiting their adoption. Responding to ideas around increased construction of car parking in inner-city Dushanbe, this Action will look into multi-modal options for more sustainable transport urgently needed in an increasingly dense city centre given Dushanbe's mono-centric spatial pattern. This action is related to the current work sponsored by the EBRD for the establishment of a Public Transport Development Strategy (PTDS) for Dushanbe[37]. This action is also related to Energy Sector Action 1, Transport Sector Actions 9, 10, and 12, and Land Use and Biodiversity Sector Action 23. With regard to Energy Sector Action 1, consideration can be given to the potential integration of electric vehicle charging infrastructure into the upgrading/installation of lampposts.		
Cross-Cutting Themes / Co-benefits	**Climate Action**	**Gender and Social Inclusion**	**Smart Maturity**
	☐ Directly targeted ☒ Some elements *Reason*:	☐ Directly targeted ☒ Some elements *Reason*:	☐ Directly targeted ☒ Some elements *Reason*:

[37] Dushanbe Public Transport. Project number – 39989. https://www.ebrd.com/work-with-us/projects/psd/dushanbe-public-transport.html

<table>
<tr><td></td><td>This action promotes the use of non-motorised transport avoiding emissions of GHGs related to travel inside Dushanbe.</td><td>This action can promote the development of public and non-motorised transport in the city that better fulfils the needs of women and children, the elderly and disabled individuals.</td><td>Smartness will play a crucial role in transport planning and management with the use of information and communication technologies (ICTs) such as real time information, Automated Fare Collection, Passenger information system, Automated Teller Machines. In the future, a City-wide Digital Twin (Action 27) may be used as a powerful tool for transport planning.</td></tr>
<tr><td>Status of Preparation</td><td colspan="3">☒ Project idea</td></tr>
<tr><td>Implementation Process and Timeline</td><td colspan="3">
<table>
<tr><th>Step</th><th>Duration</th><th>Task Owner / Support Required</th></tr>
<tr><td>Develop local sustainable mobility and e-mobility plan for the city centre – identify priority locations for investment, including key planned development sites for incorporating infrastructure up front</td><td>9 months</td><td>Transport Department (supported by Department of Architecture and Urban Planning, operations [incl. trolley buses])</td></tr>
<tr><td>Review car parking and pricing options for car parking management plan; including infrastructure for electric vehicles; prioritised access or reduce prices for ultra-low emission vehicles</td><td>6 months (in parallel to previous step)</td><td>Transport Department (supported by Department of Architecture and Urban Planning; independent consultants; engagement with users)</td></tr>
<tr><td>Undertake study on possible incentives for electric vehicles uptake</td><td>4 months (in parallel to previous step)</td><td>Transport Department (supported independent consultants; engagement with users on options)</td></tr>
<tr><td>Early engagement with power grid network entities for connections – reviewing capacity and upgrades required for locations – develop energy plan</td><td>6 months (in parallel to previous step)</td><td>Transport Department (supported by city energy companies and independent consultants)</td></tr>
<tr><td>Prepare design plan for charging and micro/shared mobility services</td><td>6 months</td><td>Transport Department (supported by Department of Architecture and Urban Planning; independent consultants; engagement with users)</td></tr>
<tr><td>Identify mechanisms for leveraging private sector finance</td><td>3 months</td><td>Transport Department (supported by Department of Architecture and Urban Planning; independent consultants; engagement with private sector)</td></tr>
<tr><td>Feedback evidence and plans into design and delivery of SUMP and associated infrastructure</td><td>3 months</td><td>Transport Department (supported by independent consultants)</td></tr>
</table>
</td></tr>
<tr><td>Next Steps</td><td colspan="3">DCA and Transport Department to identify focal points to develop the concept note/terms of reference on the local sustainable an e-mobility plan for the city centre for initial consultations within the relevant departments to initiate process to apply for funding and procure the study.</td></tr>
<tr><td>Action Owner(s)</td><td colspan="3">• Transport Department (Dushanbe City Administration)
• Transport-related State Communal Unitary Enterprises (SUEs) (4 Units – "Bus-1", "Bus-2", "Bus-3" and "Trolleybus")
• SUE “Dushanbe hadamot nakliyotrason”</td></tr>
<tr><td>Stakeholders</td><td colspan="3">
<table>
<tr><th>Stakeholder Group</th><th>Engagement (Inform, Consult, Involve, Collaborate, Empower)</th></tr>
<tr><td>Ministry of Transport</td><td>Consult</td></tr>
<tr><td>Transport Department (Dushanbe City Administration)</td><td>Empower</td></tr>
</table>
</td></tr>
</table>

	Department of Architecture and Urban Planning	Empower
	Department of Energy and Industry	Involve
	Dushanbe Districts / “Mahalla” Councils/Committees	Involve
	Transport-related State Communal Unitary Enterprises (SUEs) (4 Units)	Collaborate
	Traffic Police / Transport Inspection Agency	Consult
	SUE “Smart City”	Involve
	SUE “Dushanbe hadamot nakliyotrason” of local executive bodies of state power of Dushanbe	Consult
	Consumers Union of Tajikistan	Consult
	Universities and research institutes – e.g., departments of planning and transport engineering	Involve
	Vulnerable population representatives (e.g., NGOs, civil society groups)	Involve

Indicative Project Costs	**CapEx [€]**	**OpEx over 5 years [€]**	**Development / Advisory Costs [€]**
	N/A	N/A	400,000

Potential Financing Instruments and Sources	**Instrument**	**Source**	**Amount € / Share %**
	Own-Source	Municipal Government	40,000 (Advisory Costs) / 10%
	Grant	International Development Partner (e.g., bilateral donor)	360,000 (Advisory Costs) / 90%

Revenue Opportunities	☐ No	☒ Yes →	The innovative business models developed through this action have the potential to create new revenue opportunities for both the private and the public sector in Dushanbe, e.g., linked to bicycle hire schemes, electric vehicle charging infrastructure fees, car parking, as well as additional business/shop space within/alongside multi-modal transport hubs.

Impact Measures (Quantitative and Qualitative)		
	State Indicators	• Average annual concentration of PM2.5 and PM10 • Average daily concentration of SO2 and NOx • Annual CO2 equivalent emissions per capita
	Pressure Indicators	• Share of total passenger car fleet run by electric, hybrid fuel cell, Liquefied Petroleum Gas (LPG) and Compressed Natural Gas (CNG) energy (total and by type) • Transport modal share in total trips • Kilometres of road dedicated exclusively to public transit per 100 000 population • Kilometres of bicycle path per 100000 population • Share of population having access to public transport within 15 min by foot • Proportion of the population living within 20 minutes to everyday services (grocery stores, clinics, etc.)
	Estimated Carbon Emissions Reduction	• Given the nature of this action, no direct carbon emissions reductions are expected.
	Physical Annual Savings	• See pressure indicators above. While the study itself will not directly result in physical savings, it can inform decision-making to improve operation and maintenance, as well as management approaches towards different transport modes in the city centre, with the aim of reduced natural resource use (principally fuel) and reduced air pollution.
	Climate Resilience Benefits	• Resilience-building solutions, e.g., nature-based solutions, can be incorporated into the new transport infrastructure. • The increase in multi-modal options also reduces the transport system’s resilience to shocks and stresses due to reduced dependence on individual transport modes.

	Reductions in Operating Expenditures	• The improvement of transport infrastructure and the bus fleet can create reductions in operating and maintenance expenditures for bus companies. • A more integrated public transport system can also help reduce operating costs for all the public transport companies in the city.
	Other Indicators / Social and Economic Benefits	• Increased access of vulnerable populations in Dushanbe to transport which has implications for their social, psychological, and economic well-being. Increase in walkability in the city can have health benefits for the population of Dushanbe. • Improved transport options and system in Dushanbe's inner-city can greatly contribute to the experience and attraction of tourists to the city, with potentially increased revenues. • Given the nature of this action, no new jobs are likely to be created.
Potential Project Risks	**Area**	**Risks**
	Social	• The needs of vulnerable populations are not effectively addressed. There could be social conflicts generated from the need of relocating population for the construction of new transport infrastructure.
	Environmental	• As the demand and use for road transport grows, additional space is required to the detriment of other public areas such as pedestrian sidewalks or green spaces. • The rapid construction of transport infrastructure in response to urbanisation may increase spatial fragmentation and may convert green space to grey infrastructure.
	Economic	• The investments done by the city in transport infrastructure might hinder investments in other crucial sectors. • Increased tariffs or taxes could have a negative economic impact on lower-income households. • Incentives on electric vehicles might benefit only the wealthiest part of the population which can afford to change their vehicles. • Some of the transport options may struggle to move from piloting to scaled-up provision depending on available investment (concessional) finance and appropriate risk-sharing between public and private sector.
	Other	• Due to socio-economic aspirations from Dushanbe citizens, private car ownership and use might not see a reduction. • Promotion of electric vehicles is linked to the national regulatory and policy frameworks, which requires updating to allow Dushanbe at the city level to scale up uptake of those options.

12 Implement a fleet renewal and EV charging infrastructure programme for urban transport and e-mobility

Sector	☒ Transport		
Action Type	☒ Investment ('Hard')		
GCAP Action Classification	☒ Capital Investment		
Priority Environmental Challenges Addressed	• Emissions from growing and ageing vehicle fleet • Limited incentives for clean transport and non-motorised mobility		
Strategic Objective Supported	Improve transport planning and investment to support an integrated and safe transport system that enables better connectivity, improved access to a variety of motorised and non-motorised transport modes, as well as reduced carbon emissions and air pollution.		
Linkage to Existing Policies/Plans	• Dushanbe Socio-Economic Development Program 2025 • Dushanbe Urban Master Plan • National Development Strategy (2016) • Transport Sector Master Plan (National Plan)		
Description	Dushanbe will implement a fleet renewal programme for urban transport and e-mobility, covering trolleybuses, battery trolleybuses and electric bus fleets (along with facilities and systems including the expansion of Real Time Information Systems (RTI) and Automated Fare Collection Systems (AFC)), for optimised use of the existing street trolleybus charging network, as well as the development of open-access electric vehicle (car) charging infrastructure in the city, to support wider electrification of taxis and commercial fleets, as well as private vehicles. This will include relevant investment studies (feasibility, design, due diligence, etc.) to support the fleet renewal programme. The action will be based on initial lessons learned from the very recent roll-out of e-taxis in Dushanbe. Solar PV installed to charge EVs, e.g. at bus depots with available rooftops, should be considered.		
Rationale and Linkage to Other GCAP Actions / Existing Projects/Work	The public transport system in Dushanbe has been deteriorating with an aging fleet of trolleybuses and large buses, with the number of buses/minibuses decreasing over the last years. In addition, insufficient policy and financial incentives for electric cars in Dushanbe and Tajikistan is limiting their adoption. A renewal and electrification of both public and private transport in Dushanbe could greatly contribute to the city's challenges around GHG emissions and poor air quality. This action is related to the current work sponsored by the EBRD for the establishment of a Corporate Development Programme for Trolleybus Companies in Dushanbe[38]. This action is also related to Energy Sector Action 1, Transport Sector Actions 9, 10, and 11, and Land Use and Biodiversity Sector Action 23. With regard to Energy Sector Action 1, consideration can be given to the potential integration of electric vehicle charging infrastructure into the upgrading/installation of lampposts.		
Cross-Cutting Themes / Co-benefits	**Climate Action**	**Gender and Social Inclusion**	**Smart Maturity**
	☒ Directly targeted ☐ Some elements *Reason*: The action supports the change from internal combustion motor vehicles to electric vehicles to reduce associated GHGs emissions.	☐ Directly targeted ☒ Some elements *Reason*: Electrifying public and private transport in the city contributes to improved air quality, benefitting vulnerable residents suffering under respiratory diseases (especially children and elderly).	☐ Directly targeted ☒ Some elements *Reason*: The electrification of vehicles gives a potential platform to the 'smartification' of transport systems in the city. This includes the expansion of Real Time Information Systems (RTI) and Automated Fare Collection Systems (AFC).
Status of Preparation	☒ Project idea		

Implementation Process and Timeline

Step	Duration	Task Owner / Support Required
Strategic network review – including route planning, infrastructure options and review of ticketing	5 months	Transport Department (supported by Department of Architecture and Urban Planning; independent consultants; operators)
Fleet and vehicle replacement review	4 months	Transport Department (supported by Department of Architecture and Urban Planning; independent consultants; vehicle manufacturers and operators)
Depot and infrastructure review – including access to power grid	4 months (in parallel to previous step)	Transport Department (supported by city energy companies and independent consultants)
Infrastructure planning and preliminary design: planning; preliminary design; consultation and due diligence (including operators and risk management)	8 months	Transport Department (supported by Department of Architecture and Urban Planning; independent consultants; operators and engineers/designers)
Detailed Design; tendering of contractors for delivery and operation	12 months	Transport Department (supported by independent consultants; procurement specialists)
Vehicle purchasing and fleet replacement	12 months	Transport Department (supported operators and independent consultants)
Construction of infrastructure incl. depots and charging/fuelling infrastructure required to run fleet etc. and “activation” or promotion of improvements	12 months	Transport Department (supported by independent consultants and project management leads for Contractors; communication specialists)

Next Steps

DCA and Transport Department to identify focal points to develop the strategic network review and identify possible funding sources for ensuing steps.

Action Owner(s)

- Transport Department (Dushanbe City Administration)
- Transport-related State Communal Unitary Enterprises (SUEs) (4 Units – "Bus-1", "Bus-2", "Bus-3" and "Trolleybus")
- Department of Energy and Industry
- SUE “Dushanbe hadamot nakliyotrason”

Stakeholders

Stakeholder Group	Engagement (Inform, Consult, Involve, Collaborate, Empower)
Ministry of Transport	Collaborate
Transport Department (Dushanbe City Administration)	Empower
Department of Architecture and Urban Planning	Empower
Department of Energy and Industry	Collaborate
Transport-related State Communal Unitary Enterprises (SUEs) (4 Units)	Empower
Transport Inspection Agency	Consult
SUE “Smart City”	Involve
SUE “Dushanbe hadamot nakliyotrason” of local executive bodies of state power of Dushanbe	Consult
Universities and research institutes – e.g., departments of planning and transport engineering	Involve
Vulnerable population representatives (e.g., NGOs, civil society groups)	Consult

<table>
<tr><td>Indicative Project Costs</td><td>CapEx [€]</td><td>OpEx over 5 years [€]</td><td>Development / Advisory Costs [€]</td></tr>
<tr><td></td><td>Bus fleet renewal:
300,000 each x 50 busses (first phase): 15,000,0000
Electric vehicle charging infrastructure – busses: 40,000 each x 15 stations (first phase): 600,000
Electric vehicle charging infrastructure – cars: 5,000 each x 40 stations (first phase): 200,000
Financial incentive programme for electric vehicle uptake (estimated at 1,000 cars, first phase): 5,000,000
Total: 20,800,000</td><td>Estimated at 2-3% of investment costs:

Bus fleet renewal and charging infrastructure: 1,950,000

Electric vehicle charging infrastructure for cars: 25,000

Total: 1,975,000</td><td>750,000</td></tr>
<tr><td>Potential Financing Instruments and Sources</td><td colspan="3">
<table>
<tr><th>Instrument</th><th>Source</th><th>Amount € / Share %</th></tr>
<tr><td colspan="3">Actual amounts to be confirmed based on above caveats</td></tr>
<tr><td>Grant</td><td>International Development Partner (e.g., international development bank or bilateral donor)</td><td>750,000 (Advisory Costs) / 100%</td></tr>
<tr><td>Grant</td><td>International Development Partner (e.g., international development bank or bilateral donor)</td><td>3,160,000 (CapEx) / 20%</td></tr>
<tr><td>Concessional Loan for infrastructure</td><td>International Development Partner (e.g., international development bank or bilateral donor), with national government guarantee</td><td>7,900,000 (CapEx) / 50%</td></tr>
<tr><td>Equity</td><td>State unitary enterprises</td><td>4,740,000 (CapEx) / 30%</td></tr>
<tr><td colspan="3">For financial incentive programme:</td></tr>
<tr><td>Concessional Results-Based (Policy)</td><td>International Development Partner (e.g., international development bank or bilateral donor)</td><td>4,000,000 (CapEx) / 80%</td></tr>
<tr><td>Own-Source</td><td>National government</td><td>1,000,000 (CapEx) / 20%</td></tr>
</table>
</td></tr>
<tr><td>Revenue Opportunities</td><td colspan="3">☐ No ☒ Yes →
There are opportunities for all the operators of the public transport system for obtaining additional revenue from improving the bus fleet to supply the demand of public transport in Dushanbe.
The city also has opportunities to obtain revenue from charging for the use of electric vehicle infrastructure by private cars and commercial operators (e.g., taxis).</td></tr>
<tr><td>Impact Measures (Quantitative and Qualitative)</td><td>State Indicators</td><td colspan="2">• Average annual concentration of PM2.5
• Average annual concentration of PM10
• Average daily concentration of SO2
• Average daily concentration of NOx
• Annual CO2 equivalent emissions per capita</td></tr>
<tr><td></td><td>Pressure Indicators</td><td colspan="2">• Share of total passenger car fleet run by electric, hybrid fuel cell, Liquefied Petroleum Gas (LPG) and Compressed Natural Gas (CNG) energy (total and by type)
• Transport modal share in total trips (cars, motorcycles, taxi, bus, metro, tram, bicycle, pedestrian)
• Frequency of bus service
• Share of industrial energy consumption from renewable energy</td></tr>
</table>

		• Annual average number of electrical interruptions per year, per customer • Proportion of total energy derived from RES as a share of total city energy consumption (in TJ; compared to benchmark of 20% (links to EU target)
	Estimated Carbon Emissions Reduction	• 4,521 annual tCO2e; based on the replacement of petrol and diesel-powered vehicles with EV, with 50 busses and 1,000 cars in phase 1 only
	Physical Annual Savings	• See pressure indicators above. Key savings are linked to reduced fossil fuel consumption and improved fleet efficiency.
	Climate Resilience Benefits	• There are no evident climate resilience benefits from this action. Possibly the introduction of decentralised charging points may support a more resilient supply system under conditions of heat stress or other disaster impacts (e.g., earthquakes).
	Reductions in Operating Expenditures	• The improvement of the bus fleet can create reductions in operating expenditures for bus companies. Maintenance costs will be likely reduced. • It is possible that private car owners that migrate to an electric vehicle could find reductions in the costs of operating their vehicles if electricity is cheaper than fuel.
	Other Indicators / Social and Economic Benefits	• It is expected that the investments through this action could result in the creation of 50 new jobs linked to the EV infrastructure services and maintenance. • Other benefits include the increased access of social and economic vulnerable populations in Dushanbe to transport. This will have implications for their social, psychological, and economic well-being. • Electrification of the transport system – particularly with improved air quality – can also be conducive to increase the attractiveness of Dushanbe to visitors/tourists, with potentially increased revenues.
Potential Project Risks	**Area**	**Risks**
	Social	• Incentives for electric and hybrid vehicles might benefit only the wealthiest part of the population which can afford to change their vehicles.
	Environmental	• The decommission of old buses might not follow adequate environmental procedures.
	Economic	• Increased tariffs or taxes could have a negative economic impact on lower-income households. •
	Other	• Due to socio-economic aspirations from Dushanbe citizens, private car ownership and use might not see a reduction. • Promotion of electric vehicles is linked to the national regulatory and policy frameworks, which requires updating to allow Dushanbe at the city level to scale up uptake of those options.

4.5. GCAP Buildings Actions

In Dushanbe's buildings sector, 4 actions have been prioritised that jointly address challenges and opportunities around affordability, energy efficiency, infrastructure upgrading/expansion, and financial support mechanisms for both retrofitting and new build activities in the public and private sector. As several of the actions are described as pilot phases to be followed by scaled-up investments beyond the GCAP's 5-year timeframe, their capital expenditures are estimated to have a relatively modest 10% share in the overall GCAP budget. Similarly, their estimated carbon reductions potential is much lower than that of other GCAP actions; however, if the different physical interventions are scaled up across Dushanbe's extensive housing stock, the contribution of the buildings sector to the city's carbon emission reductions could become significant. Due to the labour-intensive nature of the construction sector, the prioritised actions may contribute to 33% of the overall estimated new jobs from the GCAP actions.

13 Develop and adopt a comprehensive programme for increased energy-efficient affordable housing

Sector	☒ Buildings	
Action Type	☒ Investment ('Hard')	
GCAP Action Classification	☒ Capital Investment	☒ Strategies, plans, and programmes ☒ Investment-related feasibility study
Priority Environmental Challenges	• Poor quality building stock for old Soviet-style buildings • Shortage of new build/energy efficient affordable housing • Lack of building-level data • Limited and poorly maintained community facilities	
Strategic Objective Supported	Optimise community orientated upgrading in aging apartment blocks for universally accessible and affordable housing alongside increased awareness and incentives for green building investments.	
Linkage to Existing Policies/Plans	• Socio-Economic Development Programme (2025) • Dushanbe Master Plan • District and Action Area Plans (where available) • Housing and Communal Services Reform (2010-2025) • Several building and environmental regulations • Programme for the Development of Housing and Communal Services, Tajikistan (2021-2014), No. 53.	
Description	This action will support energy efficient affordable housing policies, plans and activities to ensure better delivery of affordable housing across Dushanbe (including improved insulation/thermal comfort and use of on-site renewable energy, e.g. rooftop solar PV) through: (i) Ensuring the public and private development investment/construction sectors are able to respond to consumer demand in the short and medium-term (up to 10 years), in both new development areas and restored apartment block areas. (ii) Ensuring policy implementation and allocation practices/procedures, including a land management/zoning context and building regulations which are controlled and incentivised. (iii) Ensuring a mandatory requirement for the provision of green space/local recreation facilities in new affordable housing developments and generally in newly planned residential development areas Phase 1: Apply a policy framework, which: (i) Incorporates building design options for affordable housing, which adopt sustainable standards in green building construction, energy efficiency (insulation/thermal comfort), energy carbon reduction (use of renewables), and operation and maintenance (O&M), which are financially viable. Update the building codes and other policy and practice documentation, including green building code principles and practice as appropriate.	

<table>
<tr><td></td><td colspan="3">(ii) Includes review of building code(s) enforcement regime for better compliance and municipal capacity (including financial support) to implement.
(iii) Ensures affordable housing needs can be matched by local community standards of provision for education, health, and local outdoor recreation, plus local employment opportunities and local public transport options;
(iv) Reviews public sector performance in the provision of affordable housing and including: specific reference to the SUE “Affordable Housing”, which is tasked with provision of new affordable housing at lower than market rates; and social/community representation.
(v) Works with stakeholders generally, and low-income families in particular, to ensure a better supply and demand in the provision of energy efficient affordable housing, embracing the needs and investment capacity of critically low-income groups. The latter should include measures which ensure better levels of consistency for the allocation of preferential mortgage loans. This may include consideration of a “state register of beneficiaries” who are eligible to receive housing and systemised to prevent long delays in housing provision to poor/low-income applicants.
(vi) Develop revised regulatory and legal context/documentation for obtaining mortgages, with particular reference to low-income families.
(vii) Incorporate the potential to incentivise the provision of affordable housing, including tax incentives, low-cost loans, and social subsidies. Additional public financing and subsidies are implied.
(viii) Specifically addresses gender/disability issues in the design and implementation.
<u>Phase 2: Identify specific short-term site opportunities to support and incentivise energy efficient affordable housing investments</u>, through pilot projects in (i) a planned new development area, primarily funded and developed the private development sector; and (ii) a restored apartment block area, where there are multiple funding options, including the use of PPP and pre-commercial procurement (PCP) modalities.
<u>Phase 3 (beyond timeframe of the GCAP; not costed in this action)</u>: Following the piloting of different approaches and solutions, the energy-efficient affordable housing programme can be upscaled across Dushanbe, likely providing different support mechanisms for publicly owned residential buildings and privately owned residential buildings. Given the extensive need for housing upgrades/retrofitting and new builds, it is estimated that Phase 3 could apply to a large scale of buildings across the city – with an estimated 20 public and 20 private buildings supported each year at an approximate resource envelope of €80 million per year.</td></tr>
<tr><td>Rationale and Linkage to Other GCAP Actions / Existing Projects/Work</td><td colspan="3"><u>Rationale:</u> There are significant supply and demand constraints in the supply of affordable housing, in a socially equitable and environmentally green way. It is understood there are no preferential mortgages for affordable housing projects. Thus, the municipality has is not meet the demand from low-income families and there are significant backlogs experienced by the applicants.
<u>Links to Other GCAP Actions</u>: Buildings Sector Actions 14, 15, 16</td></tr>
<tr><td rowspan="2">Cross-Cutting Themes / Co-benefits</td><td>Climate Action</td><td>Gender and Social Inclusion</td><td>Smart Maturity</td></tr>
<tr><td>☒ Directly targeted
☐ Some elements
<u>Reason</u>:
Improved insulation and cooling and enforcement of energy efficiency measures and building codes will reduce emissions.</td><td>☒ Directly targeted
☐ Some elements
<u>Reason</u>:
Matching demand backlogs for the provision of affordable housing to low-income families.</td><td>☒ Directly targeted
☐ Some elements
<u>Reason</u>:
New households should be 'smart ready' and any intervention for smart metering (electricity, heat, water) should be considered within a wider intervention on underlying networks.</td></tr>
<tr><td>Status of Preparation</td><td colspan="3">☒ Project idea</td></tr>
<tr><td>Implementation Process and Timeline</td><td colspan="3"><table>
<tr><th>Step</th><th>Duration</th><th>Task Owner / Support</th></tr>
<tr><td><u>Phase 1: Planning</u>
Assess existing situation and consultation</td><td>3 months</td><td>DCA Land Management Committee</td></tr>
</table></td></tr>
</table>

	Identify key challenges/issues, objectives & consultation	3 months	DCA Main Department of Architecture and Planning
	Develop recommendations and Reporting and consultation	3 months	
	Phase 2: Investment Implement pilot project: new housing (design)	6 months	In association with new housing project
	Implement pilot project: retrofitting (Design)	3 months	In association with basic utilities upgrading for apartment block housing
	Pilot Projects Implementation	2 years	DCA with private contractors

Next Steps	Seek grant funding for Phase 1 following DCA approval of the Dushanbe GCAP
Action Owner(s)	DCA/Main Department of Architecture and Planning. DCA/Land Management Committee for Investments and State Property Management.

Stakeholders

Stakeholder Group	Engagement (Inform, Consult, Involve, Collaborate, Empower)
Municipal and District Governance	Involve
State Unitary Enterprises/Joint Stock Companies	Involve
Mahallas and Local Community Organisations	Consult
Private Development Sector	Consult
Local Universities and Research Institutes – architecture and real estate departments	Consult
Urban low-income households	Involve
NGOs	Involve

Indicative Project Costs

CapEx [€]	OpEx over 5 years [€]	Development / Advisory Costs [€]
1 New Building (est. 40 units): 2,500,000 1 Retrofitted Building (est. 40 units): 1,500,000 **Total (2 Pilots Only): 4,000,000** *Scaling up into an investment programme for additional sites possible (see above description of Phase 3).*	Estimated at 2-3% of CapEx: New Building: 250,000 Retrofitted Building: 350,000 **Total (2 Pilots Only): 600,000**	Phase 1: 250,000 Phase 2: 400,000 (200,000 for new project and 200,000 for retrofitting project) **Total (2 Pilots Only): 650,000**

Potential Financing Instruments and Sources

Instrument	Source	Amount € / Share %
Own source	Municipal government budget	250,000 (advisory costs) / 33%
Grant	International development partner (e.g., development bank or bilateral donor)	400,000 (advisory costs) / 67% 400,000 (CapEx) / 10%
Equity investment	Private developer or state unitary enterprise (PPP model possible)	600,000 (CapEx) / 15%
Concessional loan	International finance institution, likely with guarantee from national government	3,000,000 (CapEx) / 75%

Revenue Opportunities	☐ No	☒ Yes →	Revenues from rent (with improved payment performance given better living conditions); spin-off revenues from the expansion of urban service provision into new urban areas leading to: (i) opportunity for increased billing numbers, matching increased

			user numbers (water, electricity, gas); and (ii) opportunity for better tariff collection performance, incorporating use of smart technologies.
Impact Measures (Quantitative and Qualitative)	State Indicators		• Annual CO2 equivalent emissions per capita / per unit GDP
		Pressure Indicators	• Electricity consumption in buildings • Heating / cooling consumption in residential buildings fossil fuels • Proportion of total energy derived from renewable energy sources as a share of total electricity consumption in Dushanbe
		Estimated Carbon Emissions Reduction	• 44 annual tCO2e, with significant higher reductions if pilot is scaled up in a Phase 3 (as described above) • Reduction estimate based on lighting upgrade, double-glazing, roof insulation, pipework insulation, external wall insulation, heat demand reduction, boiler improvements, and reduced carbon intensity of electricity
		Physical Annual Savings	• See above pressure indicators – savings expected in electricity, water, heating/cooling consumption given improved infrastructure quality and thermal comfort
		Climate Resilience Benefits	• Improved thermal comfort contributing to reduced heat stress or cold stress on residents
		Reductions in Operating Expenditures	• Green design and smart technologies contributing to lower operating expenditures for infrastructure provision
		Other Indicators / Social and Economic Benefits	• Given the labour intensity of this action, the creation of 100 new jobs may be possible. • More equitable access and shorter wait list periods for low-income families • Increased gender sensitivity in the provision of housing • Potential savings in the provision of alternative temporary housing accommodation and reduced construction of informal housing • Possible market growth opportunity for private developers and state unitary enterprises given the backlog in new and retrofitted housing
Potential Project Risks	**Area**	**Risks**	
		Social	• Affordable housing programme may not match the needs of socially disadvantaged households
		Environmental	• Environmental/green building standards may not be achieved within the context of affordable housing financing criteria and/or due to lack of expertise/experience in construction contractors.
		Economic	• Inability of public or private sector to sufficiently scale up investments into a city-wide programme beyond the 2 pilot projects
		Other	• Institutional and capacity constraints in the public and private sectors, hindering affordable housing delivery

14 Carry out area-based infrastructure upgrading and energy-efficient retrofitting pilot programme for older multi-storey apartment block neighbourhoods

Sector	☒ Buildings	
Action Type	☒ Investment ('Hard')	
GCAP Action Classification	☒ Capital Investment	☒ Plans, and programmes etc ☒ Investment-related feasibility study
Priority Environmental Challenges Addressed	• Increasing energy demand from heating and cooling needs. • Increasing emissions and pollution from boiler houses. • Poor quality building stock of old Soviet-style housing.	
Strategic Objective Supported	Optimise community orientated upgrading in aging apartment blocks for universally accessible and affordable housing alongside increased awareness and incentives for green building investments	
Linkage to Existing Policies/Plans	• Socio-Economic Development Programme (2025) • Dushanbe Master Plan – 5 year plans for housing reconstruction in selected apartment block areas • District and Action Area Plans (where available) • Programme for Development of Housing and Communal Services, Tajikistan (2021-2024) • Building and environmental regulations	
Description	This action is set within the context of the Dushanbe Master Plan which contains the 5-year plan for housing reconstruction, including a series of Soviet era (mainly 3-4 storey walk-up blocks) apartments. The value of more detailed District Master Plans, in providing better context neighbourhood based urban regeneration should also be recognised. It is proposed to select a priority area(s) as a pilot(s) for implementation of a Pilot Local Area Regeneration Project(s). This will provide a foundation for a 'Local Area Based and Comprehensive, Longer Term Urban Regeneration Programme', which combines apartment block renovation with broader based local area regeneration, including (i) provision of 24-hour uninterrupted water and power supplies, sustainable heating and passive cooling systems (with improved thermal comfort through better insulation), supported wherever feasible by rooftop solar PV, on-site access to sustainable wastewater and solid waste management systems; and (ii) linking the benefits of building upgrading to parallel investment in local community needs such as education, health, local outdoor recreation, local employment opportunity and local public transport. It is anticipated the local area based design concept will optimise the use of solar energy in the apartment blocks (heating/cooling systems), other related community buildings (e.g. local schools) and in the open areas, including street/open space solar lighting. In the wider environmental policy context consideration can be given to the provision of vehicular charging points serving local communities, where optimal charging point/user ratios can be achieved. Coupling Solar PV and EV charging points should also be considered to ensure demand for energy from EVs is supplied by renewables. Pilot Area(s) Plan(s) should ensure: (i) medium/long-term structural and environmental apartment stability, (ii) the application of sustainable standards in green building construction and operation; (iii) the proposed arrangements to secure investment cost effectiveness; and (iv) O&M arrangements and cost-effectiveness, including local community and individual contributions; (iv) review of the institutional and financing arrangements to ensure an integrated approach to the planning, programming, financing, implementation and management of Pilot Local Area Regeneration Projects; for instance through a distinct Urban Regeneration Authority. As a primary focus for investment the following areas have been identified by city stakeholders: • Blocks to the southwest of Jomi Avenue/Borbad Street; blocks between Saadi Sherozi Avenue, Mayakovsky Avenue, Shestopalov Street, and Karaboev Avenue	

<table>
<tr><td></td><td colspan="3">Design implementation and subsequent management of the Pilot Area Plan(s) should be built around: (i) community-led engagement at neighbourhood and apartment block levels; and (ii) inclusive planning and investment across sectors. In addition to block-by-block Homeowners Associations scheme design and implementation should benefit from an overarching area-based Community Group, possibly formed out of the Homeowners Associations Consideration maybe given to parallel neighbourhood (and apartment block) special funds for investment in local community facilities provision, landscape upgrading/ maintenance and social uplift initiatives. Note: In contrast to Buildings Action 13, which targets housing affordability for low-income households, this action covers a broad range of residents and income groups.</td></tr>
<tr><td>Rationale and Linkage to Other GCAP Actions / Existing Projects/Work</td><td colspan="3">Rationale: Generally, the Soviet-era apartment blocks are obsolescent and lack the provision of sustainable utilities (i.e. water supply, wastewater management facilities, and heating and cooling facilities). The local area setting across Dushanbe often lacks local area-based community and employment facilities and usable green areas.
It is understood that integrated local area-based regeneration of this type is a relatively new concept, requiring the careful integration of diverse sectors and interests, requiring high level stakeholder coordination and funding, such that the pilot area(s) concept is strongly recommended.
Links Other GCAP Actions: Buildings Sector Actions 13, 15, 16</td></tr>
<tr><td rowspan="2">Cross-Cutting Themes / Co-benefits</td><td>Climate Action</td><td>Gender and Social Inclusion</td><td>Smart Maturity</td></tr>
<tr><td>☒ Directly targeted
☐ Some elements
<u>Reason</u>:
Improved insulation and cooling, enforcement of energy efficiency measures reduces emissions and mitigation of the urban eat island effect reduces warming.</td><td>☒ Directly targeted
☐ Some elements
<u>Reason</u>:
Improved basic infrastructure provision.
Improved social inclusiveness at neighbourhood level. Inclusion of different stakeholders in consultation.</td><td>☐ Directly targeted
☒ Some elements
<u>Reason</u>:
Selected low-cost provision and use of green technologies (e.g. smart meters).
New/retrofitted households should be 'smart ready' and any intervention for smart metering (electricity, heat, water) should be considered within a wider intervention on underlying networks.</td></tr>
<tr><td>Status of Preparation</td><td colspan="3">☒ Project idea</td></tr>
<tr><td>Implementation Process and Timeline</td><td colspan="3">
<table>
<tr><th>Step</th><th>Duration</th><th>Task Owner / Support Required</th></tr>
<tr><td><u>Phase 1: Project Preparation</u>
Assess existing situation and consultation</td><td>3 months</td><td rowspan="5">DCA/Department of Construction and Utilities
DCA/Local Authority for Architecture and Urban Planning
DCA/Land Management Committee

DCA/Land Management Committee/Mahalla(s) and Homeowners Associations</td></tr>
<tr><td>Identify key challenges/issues, Confirm objectives and consultation</td><td>3 months</td></tr>
<tr><td>Conduct Priority Areas evaluation Confirmation of Priority Areas and Pilot Area(s)</td><td>3 months</td></tr>
<tr><td>Conduct stakeholder evaluation and make arrangements for participation in project design, implementation and management</td><td>3 months</td></tr>
<tr><td>Recommendations and final reporting and consultation</td><td>3 months</td></tr>
</table>
</td></tr>
</table>

	Phase 2: Investment (Hard) Pilot Project design and specification	6 months	DCA/Land Management Committee/Mahalla(s) and Homeowners Associations; private contractor
	Pilot Project tendering	6 months	DCA/Local Authority for Architecture and Urban Planning
	Pilot Project implementation	2 years	DCA/Land Management Committee/Mahalla(s) and Homeowners Associations; private contractor

Next Steps	Seek grant funding for Phase 1 following DCA approval of the Dushanbe GCAP
Action Owner(s)	DCA/Department of Construction and Utilities – Joint Lead DCA/Land Management Committee – Joint Lead

Stakeholders

Stakeholder Group	**Engagement (Inform, Consult, Involve, Collaborate, Empower)**
Municipal and District Government, including DCA/Local Authority for Architecture and Urban Planning and Main Department of Environmental Protection	Involve
State Unitary Enterprises/Joint Stock Companies	Involve
Mahallas and Local Community Organisations	Collaborate
Private Development Sector	Consult
Local universities and research institutes – architecture, planning, and real estate departments	Consult, Involve and Collaborate
Project-affected communities	Consult
NGOs	Consult

Indicative Project Costs

CapEx [€]	**OpEx over 5 years [€]**	**Development / Advisory Costs [€]**
Total Pilot Project (including building, infrastructure, and neighbourhood improvements): **4,000,000** *Based on lessons learned, pilot to be adjusted and scaled up – corresponding costs have not been reflected here as this goes beyond the GCAP's 5-year timeframe.*	Estimated at 2-3% of CapEx: **Total (Pilot Only): 600,000**	Phase 1: 250,000 Phase 2: 300,000 **Total (Pilot Only): 550,000**

Potential Financing Instruments and Sources

Instrument	**Source**	**Amount € / Share %**
Own source	Municipal government budget	100,000 (advisory costs) / 18%
Grant	International development partner (e.g. development bank or bilateral donor)	450,000 (advisory costs) / 82% 500,000 (CapEx) / 12.5%
Equity investment	Private developer or state unitary enterprise	300,000 (CapEx) / 7.5%
Concessional loan	International finance institution, likely with guarantee from national government	3,200,000 (CapEx) / 80%
Loan (Pilot Project)	IFA//Municipal Finance	To be determined

Revenue Opportunities	☐ No	☒ Yes →	Increased revenues from expansion of utilities and community service provision, plus better tariff collection rates, incorporating smart technologies. Potentially higher tax revenues from increased property values in upgraded neighbourhood.

Impact Measures (Quantitative and Qualitative)	State Indicators	• Annual CO_2 equivalent emissions per capita / per unit GDP
	Pressure Indicators	• Electricity consumption in buildings

		• Heating cooling consumption in buildings fossil fuels residential buildings fossil fuels • Proportion of total energy derived from renewable energy sources as a share of total electricity consumption in Dushanbe
	Estimated Carbon Emissions Reduction	• 7 annual tCO2e, with significant higher reductions if pilot is scaled up • Reduction estimate based on lighting upgrade, double-glazing, roof insulation, pipework insulation, external wall insulation, heat demand reduction, boiler improvements, and reduced carbon intensity of electricity
	Physical Annual Savings	• See above pressure indicators – savings expected in electricity, water, heating/cooling consumption given improved infrastructure quality and thermal comfort
	Climate Resilience Benefits	• Action is to be linked to programmes for sustainable infrastructure provision (e.g. energy generation and heating (e.g. solar power), water and wastewater management, solid waste collection, clean building technologies and greener local transport, as well as reduced urban heat island effect and indirect benefits to residents' health
	Reductions in Operating Expenditures	• Scope for building renovation programme, realising sustainable and smart technologies leading to the potential for optimal operating expenditures
	Other Indicators / Social and Economic Benefits	• Given the labour intensity of this action, the creation of 100 new jobs may be possible. • Improved living standards and provision/upgrading of local community facilities and open space facilities, including the needs of low-income families. • Possible improved business opportunities and job creation in upgraded neighbourhoods.
Potential Project Risks and Mitigation Options	**Area**	**Risks**
	Social	• Community concensus to integrated local area based regeneration is not achieved.
	Environmental	• Sustainable environmental/green building standards cannot be met by reference to energy/power supply factors (e.g. coal use in boiler houses). • Provision of sustainable district heating may not be cost-effective. • Building structure upgrading to match green design standards may be constrained, also due to lack of expertise/experience in construction contractors
	Economic	• Some community stakeholders/occupiers are not able finance the costs of the apartment block retrofitting programme. • Operating expenditures for improved community facilities and green spaces is not secured, leading to an increasing deterioration again.
	Other	• Coordinating constraints regarding multi-sector programming and financing to achieve an integrated/inclusive approach to urban regeneration on a local area/neighbourhood basis, which maybe difficult to achieve. This is highlighted by the potential constraints of coordinating water, wastewater, heating and cooling infrastructure upgrading as part of the retrofitting programme, given the multitude of involved departments, enterprises, and community stakeholders.

15 Update permission process and provide incentives to scale up and strengthen compliance with energy-efficient (EE) building construction and retrofitting in accordance with local EE codes

Sector	☒ Buildings	
Action Type	☒ Policy ('Soft')	
GCAP Action Classification	☒ Other Investment	☒ Standards, guidelines, and regulations
Priority Environmental Challenges Addressed	• Increasing energy demand from heating and cooling needs. • Increasing emissions and pollution from boiler houses. • Poor quality building stock of old Soviet-style housing. • Private sector investment in new housing not optimising opportunities for "green building" construction and technologies.	
Strategic Objective Supported	Support the transition towards a resilient energy system that enables reliable electricity and heating services and access to resource-efficient technologies with reduced environmental impacts.	
Linkage to Existing Policies/Plans	• Socio-Economic Development Programme (2025) • Dushanbe Master Plan • District and Action Area Plans (where available) • Programme for Development of Housing and Communal Services, Tajikistan (2021-2024) • Building and environmental regulations	
Description	This action will revise and set updated processes, guidance, regulations/legislation and incentives, leading to better compliance and increased pace of green building construction and retrofitting. The action will have three interconnected parts: (i) Regulatory and Procedural Context Process, which will consist of a legislative/regulatory review. This should include the current range of building, planning and environmental controls, their respective levels of enforcement (i.e., actual compliance with existing controls) and their applicability to achieving green building aims and objectives, including green building standards, design norms and international best practice applied to the Tajik context. This will encompass the development and use of a local EE Code(s) incorporating any relevant existing advisory/regulatory provision (dependent on national legislation). Cross-sectoral aspects, related to the development control for green building development will be considered; this should include mandatory requirement for obtaining energy efficiency certificates and passing energy audits for commercial organisations and industrial facilities. Optimal use of natural energy resources, especially solar power, be included for new buildings and for retrofitting. Incorporating electric vehicle readiness e.g. charging points in building retrofits and new buildings through regulatory processes should be considered. (ii) Incentives Development, which will review/assess the need for incentives to help speed up green building construction/retrofitting and specify the need and form of any legislative/regulatory change that maybe required, in coordination with relevant national agencies. This will cover the current level of effectiveness of any existing incentives at national and local levels and the potential for additional incentives or adjusted design of existing incentives, applicable to key stakeholders in the buildings sector. Incentives relevant to Dushanbe can be (i) financial (e.g. property tax rebate; discounted loans; government equity loans; shared ownership schemes; increasing block tariffs for higher consumption levels); and (ii) regulatory (e.g. planning bonus – allowance of additional houses/densities in return for higher environmental standards; tax reduction allowances with lower import duties on green technology products and tax breaks for use of green technologies; faster planning permit processing). (iii) Capacity Development, which will make recommendations on enhancing capacity of government and state unitary enterprises/joint stock companies to manage and achieve the full range of green building objectives, including compliance and control mechanisms. For instance, the introduction of new green building standards will require supportive training programmes for auditor and construction businesses.	

<table>
<tr><td>Rationale and Linkage to Other GCAP Actions / Existing Projects/Work</td><td colspan="3">Rationale: The roll out of green initiatives in the buildings sector is not yet maximised by Government, state unitary enterprises, or joint stock companies and the private sector in the context of (i) building design and construction, including EE provision and use of solar power for both new buildings and retro-fitting where there is little or no legislative/regulatory context; (ii) use of green technologies where there are inadequate incentives to attract green investments, and (iii) capacity in the building sector is lacking in both public and private sector actors and organisations.
Links to Other GCAP Actions: This action leads directly into Buildings Sector Action 13 and 16.</td></tr>
<tr><td rowspan="2">Cross-Cutting Themes / Co-benefits</td><td>Climate Action</td><td>Gender/Social Inclusion</td><td>Smart Maturity</td></tr>
<tr><td>☒ Directly targeted
☐ Some elements
Reason:
Setting and complying with a climate oriented regulatory context and incentivising investment in energy-efficient building construction and retrofitting.</td><td>☐ Directly targeted
☒ Some elements
Reason:
Setting the context for more sustainable, affordable, and inclusive buildings.</td><td>☐ Directly targeted
☒ Some elements
Reason:
Incentives should be included for smart integration within the codes. Also, smart device opportunity for green living and resource efficiency.</td></tr>
<tr><td>Status of Preparation</td><td colspan="3">☒ Project idea</td></tr>
<tr><td>Implementation Process and Timeline</td><td colspan="3">
<table>
<tr><th>Step</th><th>Duration</th><th>Task Owner / Support Required</th></tr>
<tr><td>Assess existing situation</td><td>3 months</td><td rowspan="5">Main Department of Environmental Protection (Dushanbe)

Main Department of Architecture and Planning/Local Authority for Architecture and Urban Planning</td></tr>
<tr><td>Identify key challenges/issues, confirm objectives, and conduct consultation: (i) Regulatory and procedural context and (ii) incentivisation.</td><td>4 months</td></tr>
<tr><td>Assess private sector implications and incentives (including options evaluation)</td><td>2 months</td></tr>
<tr><td>Conduct consultation</td><td>2 months</td></tr>
<tr><td>Deliver recommendations, final reporting and consultation</td><td>3 months</td></tr>
<tr><td>Implementation through application in selected public buildings and in cooperation with private sector interests.</td><td>Initial phase 1-2 years</td><td>State Unitary Enterprises/Joint Stock Companies: e.g. (i) SUE Housing and Public Utilities; (ii) JSC – OJSC Shb, Dushanbe Private development sector</td></tr>
</table>
</td></tr>
<tr><td>Next Steps</td><td colspan="3">Seek grant funding to implement following DCA approval of the Dushanbe GCAP</td></tr>
<tr><td>Action Owner(s)</td><td colspan="3">Main Department of Architecture and Planning/Local Authority for Architecture and Urban Planning</td></tr>
<tr><td>Stakeholders</td><td colspan="3">
<table>
<tr><th>Stakeholder Group</th><th>Engagement (Inform, Consult, Involve, Collaborate, Empower)</th></tr>
<tr><td>Municipal and District Government, including Main Department of Environmental Protection, and Ministry of Energy and Water Resources</td><td>Involve</td></tr>
<tr><td>State Unitary Enterprises/Joint Stock Companies: e.g. (i) SUE Housing and Public Utilities; (ii) JSC – OJSC Shb, Dushanbe</td><td>Involve</td></tr>
<tr><td>Construction and Architecture Research Institute</td><td>Collaborate</td></tr>
<tr><td>Local architects and environmental engineers</td><td>Collaborate</td></tr>
<tr><td>Local community organisations</td><td>Consult</td></tr>
<tr><td>Private development sector</td><td>Involve</td></tr>
</table>
</td></tr>
<tr><td>Indicative Project Costs</td><td colspan="3">
<table>
<tr><th>CapEx [€]</th><th>OpEx over 5 years [€]</th><th>Development / Advisory Costs [€]</th></tr>
<tr><td>Incentives budget to be informed by feasibility study; could be estimated at 15,000 per applicant x an initial 500 applicants: 7,500,000.</td><td>0 / not applicable</td><td>150,000</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><td></td><td colspan="4">If incentive is shown to be effective, budget could be scaled up correspondingly.</td></tr>
<tr><td>Potential Financing Instruments and Sources</td><td colspan="4"><table>
<tr><th>Instrument</th><th>Source</th><th>Amount € / Share %</th></tr>
<tr><td>Grant</td><td>International development partner (e.g., development bank or bilateral donor)</td><td>150,000 (advisory cost) / 100%</td></tr>
<tr><td>Own-Source</td><td>National Government</td><td>2,500,000 (CapEx) / 33%</td></tr>
<tr><td>Policy (results-based) loan (potentially with an in-built grant element as performance incentive)</td><td>International development partner (e.g., development bank or bilateral donor)</td><td>5,000,000 (CapEx) / 67%</td></tr>
</table></td></tr>
<tr><td>Revenue Opportunities</td><td>☐ No</td><td>☒ Yes →</td><td colspan="2">Post-study implementation may provide revenue opportunities through implementation of key recommendations, potentially with increased tax revenues and/or enforcement penalties.</td></tr>
<tr><td rowspan="8">Impact Measures (Quantitative and Qualitative)</td><td>State Indicators</td><td colspan="3">• Annual CO2 equivalent emissions per capita / per unit GDP</td></tr>
<tr><td>Pressure Indicators</td><td colspan="3">• Electricity consumption in buildings
• Heating cooling consumption in buildings fossil fuels residential buildings fossil fuels
• Proportion of total energy derived from RES as a share of total electricity consumption in Dushanbe</td></tr>
<tr><td>Estimated Carbon Emissions Reduction</td><td colspan="3">• Due to the nature of this action, no direct carbon emissions reductions are expected; however, the indirect benefits would allow for a better carbon performance of the buildings sector in the medium term.</td></tr>
<tr><td>Physical Annual Savings</td><td colspan="3">• See above pressure indicators – savings expected in electricity and heating/cooling consumption given improved infrastructure quality and efficiency</td></tr>
<tr><td>Climate Resilience Benefits</td><td colspan="3">• Setting revised policy and practice context for climate resilience benefits for new building and building retrofitting, e.g. improved thermal comfort contributing to reduced heat stress or cold stress on residents.</td></tr>
<tr><td>Reductions in Operating Expenditures</td><td colspan="3">• Setting context for selective reduction in operating expenditure in buildings.</td></tr>
<tr><td>Other Indicators / Social and Economic Benefits</td><td colspan="3">• Although the action will not directly create new jobs, it could lead to a demand of expertise and workforce in the sector, possibly creating an additional 20 jobs around the services aspects of this action.
• Setting context for improved and affordable living standards and community provision, including for low-income families.
• Growth opportunities for local green building construction and technologies market.</td></tr>
<tr><td>Potential Project Risks and Options</td><td>Sector</td><td colspan="3">Risks</td></tr>
<tr><td>Social</td><td colspan="3">• Affordability of green building technologies in new housing and after retrofitting may not be achievable or affordable, without subsidies.
• Potential violations of homeowner rights in retrofitting process.</td></tr>
<tr><td>Environmental</td><td colspan="3">• Potential loss of ecology/biodiversity in new construction areas.
• Violations in disposal of construction waste.</td></tr>
<tr><td>Economic</td><td colspan="3">• Potential policy and regulatory initiatives/standards may not be affordable to public and private sector interests and not affordable to potential home buyers.
• Lack of control and enforcement mechanisms may lead to lower effectiveness of incentives.</td></tr>
<tr><td>Other</td><td colspan="3">• Institutional/administrative and capacity constraints for the public and private design (including local architects/engineers) and the development control/enforcement agencies to take advantage of these proposed reforms.</td></tr>
</table>

16 Incentivise and invest in energy-efficient upgrading and retrofitting of public and private buildings

Sector	☒ Buildings	
Action Type	☒ Investment ('Hard')	
GCAP Action Classification	☒ Capital Investment	☒ Awareness, demonstration, training, and capacity building
Priority Environmental Challenges Addressed	• Increasing energy demand from heating and cooling needs. • Increasing emissions and pollution from boiler houses. • Poor quality building stock of old Soviet-style housing. • Private sector investment in new housing not optimising opportunities for green building construction and technologies.	
Strategic Objective Supported	Support the transition towards a resilient energy system that enables reliable electricity and heating services and access to resource-efficient technologies with reduced environmental impacts.	
Linkage to Existing Policies/Plans	• Socio-Economic Development Plan (2025) • Dushanbe Master Plan • District and Action Area Plans (where available) • Programme for Development of Housing and Communal Services, Tajikistan (2021-2024) • Building and environmental regulations	
Description	The action will first be concentrated on improving investment in: (i) public sector owned buildings; and (ii) medium-high density housing, including Soviet-style apartment blocks. An investment programme will build on any existing/committed municipal investments in solar/renewable energy for buildings and other opportunities to invest in the short-term improvement of energy efficiency. Demonstration project components will be identified, implemented and monitored, where there are two interlinked parts: (i) Public/Government Owned Buildings; and (ii) Privately Owned Buildings. Previous green building examples in the public sector, tend to be outdated, for example the "Peoples Friendship Centre (2007/08). **Public Sector:** In the public/government sector it is recommended to prioritise municipal buildings, where the environmental benefits can be easily demonstrated and are beneficial to local/city-wide users. This could include an initial programme geared to (i) public kindergartens, schools and colleges; (ii) hospitals/medical facilities and (iii) sports and cultural facilities. Where retrofitting is needed, the design and implementation should normally be part of the overall regeneration package proposed for such areas (refer to Buildings Sector Action 14). This may include recognition of the potential for application of solar and other renewable energy sources, potentially on an individual apartment block or local neighbourhood basis, depending on cost effectivity and other factors. In this context the role of the Home Owners Associations in decision making and ongoing management capacity will be important. **Private Sector:** This first round of action should also provide best practice leaders and catalysts for a similar range of beneficial investment by the private sector into the residential and business building stock. Thus, DCA should work with the private sector interests to identify mutually agreeable green building projects to showcase energy efficiency improvements, with priority given to: (i) new housing/affordable housing development; and (ii) high profile facilities with high usage levels. Any such showcase projects should be built around and be informed by the Buildings Sector (Buildings Sector Action 15 refers). This action should be supported by an awareness and capacity building programme addressing both public and private sector skills development needs. As a primary focus for investment the following areas have been identified by city stakeholders: • Retrofitting: Blocks to the southwest of Jomi Avenue/Borbad Street; blocks between Saadi Sherozi Avenue, Mayakovsky Avenue, Shestopalov Street, and Karaboev Avenue	

<table>
<tr><td></td><td colspan="3">

- New builds: peri-urban land towards the western periphery of the city, from M41/Ismoil Somoni Avenue in the North via RJ048 in the middle towards P3 in the south.

In an ensuing second phase, this action could be scaled up across Dushanbe. For public sector buildings, individual targets could be set for types and managing entities of buildings (e.g., kindergartens; schools; hospitals). For the private sector, an on-lending mechanism could be investigated, from an international finance institution through Tajik banks, modelled after the successful experience of the Green Economy Financing Facility.
</td></tr>
<tr><td>Rationale and Linkage to Other GCAP Actions / Existing Projects/Work</td><td colspan="3">Rationale: Progress towards the application of energy efficient building technologies is slow and would benefit from a range of “best practice” demonstration projects, which can be catalysts in the application of better energy efficiency, upgrading and retrofitting. The action shows particular potential in the private sector housing market where local stakeholders noted an increasing demand for energy-efficient flats.
Links to Other GCAP Actions: Primary links to Buildings Sector Action 13, 14 and 15</td></tr>
<tr><td rowspan="2">Cross-Cutting Themes / Co-benefits</td><td>Climate Action</td><td>Gender and Social Inclusion</td><td>Smart Maturity</td></tr>
<tr><td>☒ Directly targeted
☐ Some elements
Reason:
Improved insulation and cooling technologies and enforcement of energy efficiency measures will reduce emissions and mitigation of the urban heat island effect will reduce heating.</td><td>☐ Directly targeted
☒ Some elements
Reason:
Higher accessibility to green building products, with reference to energy affordability, and clean energy solutions, including for vulnerable households and for social infrastructure users.</td><td>☐ Directly targeted
☒ Some elements
Reason:
Smart device provision for green living and resource efficiency.</td></tr>
<tr><td>Status of Preparation</td><td colspan="3">☒ Project idea
☒ Under implementation to be scaled up/expanded [applicable to some ongoing projects]</td></tr>
<tr><td>Implementation Process and Timeline</td><td colspan="3">
<table>
<tr><th>Step</th><th>Duration</th><th>Task Owner / Support Required</th></tr>
<tr><td><u>Phase 1: Planning</u>
Confirmation of outputs from Buildings Sector Action 15</td><td>2 months</td><td rowspan="8">Main Department of Architecture and Planning/Local Authority for Architecture and Urban Planning</td></tr>
<tr><td>Identify demonstration projects in public sector / pre-feasibility.</td><td>2 months</td></tr>
<tr><td>Awareness campaign (intermittent)</td><td>6 months</td></tr>
<tr><td>Prepare/confirm implementation timetable</td><td>3 months</td></tr>
<tr><td>Liaise with private sector stakeholders and assist in identifying demonstration projects</td><td>3 months</td></tr>
<tr><td>Capacity building programme: Public sector – Phase 1 (intermittent)</td><td>2 months</td></tr>
<tr><td><u>Phase 2: Implementation</u>
Demonstration Projects: Design and specification for public sector buildings</td><td>3 months</td></tr>
<tr><td>Demonstration projects tendering</td><td>6 months</td></tr>
<tr><td>Demonstration projects implementation</td><td>1-2 years</td><td>Private Sector Contractors / SUE</td></tr>
<tr><td>Capacity Building Programme:
Public Sector – Phase 2 (intermittent)
Capacity Building Programme:
Private Sector (intermittent)</td><td>2 months

2 months</td><td>Main Department of Architecture and Planning/Local Authority for Architecture and Urban Planning</td></tr>
</table>
</td></tr>
</table>

	Demonstration Projects: Design and specification for private sector buildings	6 months	Private Sector Contractors / SUE
	Apply/approve financial and other incentives from government	2 months	Main Department of Architecture and Planning/Local Authority for Architecture and Urban Planning
	Demonstration Projects design and implementation	1-2 years	Private Sector Contractors / SUE

Next Steps	Seek grant funding for Phase 1 following DCA approval of the Dushanbe GCAP.
Action Owner(s)	Main Department of Architecture and Planning/Local Authority for Architecture and Urban Planning.

Stakeholders

Stakeholder Group	**Engagement (Inform, Consult, Involve, Collaborate, Empower)**
Municipal and District Government**s**, including Department for Committee for Environmental Protection and Department of Construction and Utilities.	Involve
State Unitary Enterprises/Joint Stock Companies: e.g. (i) SUE Housing and Public Utilities; (ii) JSC – OJSC Shb, Dushanbe	Involve
Mahallas and Local Community Organisations	Consult
Private Development Sector	Involve

Indicative Project Costs

CapEx [€]	**OpEx over 5 years [€]**	**Development / Advisory Costs [€]**
Energy-efficiency measures include thermal insulation of outside walls, roof/terraces and floors, as well as energy-efficient windows, outside doors, LED lighting, and boilers at a combined average cost of €460/m2 2 Kindergartens (est. 500m2 x 2), 2 Schools (est. 1,000m2 x 2), 2 Colleges (est. 1,000m2 x 2), 2 hospital/medical facilities (est. 1,500m2 + 500m2), 2 sports/cultural facilities (est. 500m2 x 2) [total est. 8,000m2]: 3,680,000 10 private sector buildings (est. 1,500m2 x 10): 6,900,000 **Overall Total: 10,580,000** *Note: Second phase for scaling up has not been costed as it is beyond the GCAP's implementation timeframe.*	Estimated at 2-3% of CapEx: 10 Public Sector Buildings: 460,000 10 Private Sector Buildings: 862,500 **Overall Total: 1,322,5000**	10 public buildings: 200,000 10 private buildings: 700,000 Capacity building programme: 80,000 **Overall Total: 980,000**

Potential Financing Instruments and Sources

Instrument	**Source**	**Amount € / Share %**
Capacity Building Programme	International development partner (e.g., development bank or bilateral donor)	80,000 (Advisory Costs) / 100%
Public Buildings		
Grant	International development partner (e.g., development bank or bilateral donor)	200,000 (Advisory Costs) / 100% 680,000 / (CapEx) / 18%
Own-Source	National and/or City Government	500,000 (CapEx) / 13.6%

	Equity	State unitary enterprises	500,000 (CapEx) / 13.6%
	Concessional Loan	International finance institution (IFI), likely with guarantee from national government	2,000,000 (CapEx) / 54%
	Private Buildings		
	Own-Source	Private developers	700,000 (Advisory Costs) / 100%
	Grant	National (or City) Government	690,000 (CapEx) / 10%
	Equity	Private developers	1,210,000 (CapEx) / 17.5%
	Concessional Loan	International finance institution (IFI), likely with onlending through local banks	5,000,000 (CapEx) 72.5%

Revenue Opportunities	☐ No	☒ Yes →	Significant increased revenue sources from public and community investments are unlikely, but reduced operational cost/lower energy consumption has the potential to reduce grid energy demand. Post-study implementation may provide revenue opportunities through implementation of green building technologies and increased property values (and taxes) and rent payment performance. Consideration should be given to Energy Service Company (ESCO) implementation mechanism whereby the ESCO assesses, implements, and finances energy efficiency measures, with expected energy cost savings providing the return on investment to the company, assisted with government grants e.g., for lower-income households / building tenants or credit lines or availability payments dependent on market maturity and uptake.

Impact Measures (Quantitative and Qualitative)	State Indicators	• Annual CO2 equivalent emissions per capita / per unit GDP
	Pressure Indicators	• Electricity consumption in buildings • Heating cooling consumption in buildings fossil fuels residential buildings fossil fuels • Proportion of total energy derived from renewable energy sources as a share of total electricity consumption in Dushanbe
	Estimated Carbon Emissions Reduction	• 394 annual tCO2e, with significant higher reductions if pilot is scaled up • Reduction estimate based on lighting upgrade, double-glazing, roof insulation, pipework insulation, external wall insulation, heat demand reduction, boiler improvements, and reduced carbon intensity of electricity
	Physical Annual Savings	• See above pressure indicators – savings expected in electricity and heating/cooling consumption given improved infrastructure quality and efficiency
	Climate Resilience Benefits	• Improved thermal comfort contributing to reduced heat stress or cold stress on user of buildings, in particular e.g. children in educational facilities.
	Reductions in Operating Expenditures	• Widespread reduction in facility operating expenditure as a result of improved energy efficiency.
	Other Indicators / Social and Economic Benefits	• It can be estimated that this action may allow for the creation of 100 new jobs. • Improving standards of social infrastructure provision for local communities, including low-income families. • Growth opportunities for local energy efficiency construction and technologies market.
Potential Project Risks	**Area**	**Risks**
	Social	• Potential community benefits may not be optimised by priority investment in some types of public buildings.

		• Energy efficiency improvements to private buildings may result in rent increases pushing our lower-income users.
	Environmental	• Environmental risks in building retrofitting include use of poorly selected cooling technologies (e.g. air conditioning), and over-heating of poorly ventilated buildings
	Economic	• Potential investment may be constrained by economic and financial factors, by comparison with conventional technologies and construction designs (e.g. use of coal as a cheap energy generation resource).
	Other	• Institutional/administrative and capacity constraints for the public and private design (including local architects/engineers) and the development control/enforcement agencies to take advantage of these proposed reforms.

4.6. GCAP Industries Actions

The 3 prioritised actions for Dushanbe's industries sector focus on the potential of a green economy transition and the interlinkages between industrial activities and land uses in the city. With just a 1% share in the capital expenditure envelope and 3% share in estimated job creation of the overall GCAP, the industries actions play a smaller role in the GCAP. While not creating carbon emissions reductions directly, they have the potential to unlock several avenues for low-carbon development in the city, particularly through private sector investments and entrepreneurship.

17 Devise a strategy and set up a fund and innovation platform to increase green-oriented entrepreneurship and industrial development

Sector	☒ Industries	
Action Type	☒ Investment ('Hard')	
GCAP Action Classification	☒ Other Investment	☒ Strategies, plans, and programmes ☒ Awareness, demonstration, training, and capacity building
Priority Environmental Challenges Addressed	• Limited policies and practices around greening industry and promoting sustainable production	
Strategic Objective Supported	Collaborate with private sector and civil society in a green economy transition based on improved policy frameworks, investment support, enhanced data collection and monitoring of industrial emissions, and effective regulatory enforcement.	
Linkage to Existing Policies/Plans	• Dushanbe Socio-Economic Development Program 2025 • Law "On State Industrial Policy" No 1415 (2017) • Law on Environmental Monitoring: No707 (2011) • Law of Industrial Safety of Hazardous Production Facilities: No14 (2004) • The Concept of Industrial Development of the Republic of Tajikistan: No 523 (2003)	
Description	Dushanbe City will (i) devise a strategy, (ii) set up a fund, and (iii) develop an innovation platform to increase green-oriented entrepreneurship and industrial development. The strategy should support the development of improved local policy frameworks, investment support, enhanced data collection and monitoring of industrial emissions, and effective regulatory enforcement. The fund and the innovation platform should focus on promoting green innovations that can improve current industries or develop new ones in Dushanbe. The fund and platform should be designed in a way that allows socially and economically vulnerable populations to participate in green-oriented entrepreneurship and industrial development, e.g. to enable increased participation of women in Dushanbe's private sector. The activities promoted by the fund and the innovation platform may include: • Targeted capacity building for current industries (e.g., fat/oil and dairy plants, or the cement industries) on (i) environmental monitoring, (ii) transitioning to greener industrial practices, and for existing SMEs on (iii) green-oriented entrepreneurship; • An accelerator programme for green start-ups; and • Hackathons for the development of green-oriented start-ups or for the development of technological innovations that can help current industries in Dushanbe become greener.	
Rationale and Linkage to Other GCAP Actions / Existing Projects/Work	Current lack of sustainability/green policies at the local level to align industry practices with nationally determined contributions (NDCs) or international best practice. Consequently, the GCAP provides an opportunity to drive implementation/application of best available green technologies and practices. Many Dushanbe industries were established during the Soviet period, and so may still be using facilities, operations, and maintenance policies which are now sub-standard and have detrimental environmental impacts. Additionally, there is no evidence of computer-	

<table>
<tr><td></td><td colspan="3">integrated manufacturing or technologies to optimise manufacturing, production levels, material use, or supply chain logistics. Therefore, there are significant opportunities for innovation and green-oriented development in the industry sector of Dushanbe.
This action is related to Industry Sector Action 18 and Land Use and Biodiversity Sector Action 26.</td></tr>
<tr><td rowspan="2">Cross-Cutting Themes / Co-benefits</td><td>Climate Action</td><td>Gender and Social Inclusion</td><td>Smart Maturity</td></tr>
<tr><td>☐ Directly targeted
☒ Some elements
Reason:
The fund and innovation platform will allow for industry in Dushanbe to become greener which will lead to an industry that emits less GHGs.</td><td>☐ Directly targeted
☒ Some elements
Reason:
The fund and platform will have the objective to promote entrepreneurship from women and other vulnerable populations.</td><td>☒ Directly targeted
☐ Some elements
Reason:
The innovation promoted by the fund and platform should have elements of “smartness” than can improve the smart maturity of industries and businesses in Dushanbe.</td></tr>
<tr><td>Status of Preparation</td><td colspan="3">☒ Project idea</td></tr>
<tr><td>Implementation Process and Timeline</td><td colspan="3">
<table>
<tr><th>Step</th><th>Duration</th><th>Task Owner / Support Required</th></tr>
<tr><td>Establish the team responsible for developing the innovation strategy creating a new working group</td><td>1 month</td><td>Department of Energy and Industry (supported by the Ministry of Industry and New Technologies and the Chamber of Commerce and Industry of Tajikistan)</td></tr>
<tr><td>Assess the current state of green innovation policies and funding sources in Dushanbe and Tajikistan</td><td>1 month</td><td>Department of Energy and Industry (supported by the Ministry of Industry and New Technologies and the Chamber of Commerce and Industry of Tajikistan)</td></tr>
<tr><td>Develop a concept note for the new innovation strategy, fund and platform (including identified funding sources)</td><td>2 months</td><td>Department of Energy and Industry (supported by the Ministry of Industry and New Technologies, and the Department of Economics, Finance and Forecasting)</td></tr>
<tr><td>Develop the new innovation strategy for Dushanbe</td><td>3-6 months in parallel with next step</td><td rowspan="2">Department of Energy and Industry (supported by all relevant stakeholders)</td></tr>
<tr><td>Develop the fund and innovation platform to increase green-oriented entrepreneurship and industrial development</td><td>3-6 months (in parallel with previous step)</td></tr>
<tr><td>Plan and hold launch event under the innovation platform and implement delivery plan</td><td>Launch: Month 9
Events: Ongoing</td><td>Department of Energy and Industry</td></tr>
<tr><td>Monitor the impact of the first phase of the innovation strategy and platform (after 6 months, 12 months, 24 months)</td><td>Ongoing</td><td>Department of Economics, Finance and Forecasting (supported by Department of Energy and Industry)</td></tr>
</table>
</td></tr>
<tr><td>Next Steps</td><td colspan="3">DCA and Department of Energy and Industry to identify a team to develop the concept note on the innovation strategy for initial consultations within the relevant departments and stakeholders to initiate process to apply for funding and procure the study.</td></tr>
<tr><td>Action Owner(s)</td><td colspan="3">New Working Group (as part of the Department of Energy and Industry)</td></tr>
<tr><td>Stakeholders</td><td colspan="3">
<table>
<tr><th>Stakeholder Group</th><th>Engagement (Inform, Consult, Involve, Collaborate, Empower)</th></tr>
<tr><td>Department of Energy and Industry</td><td>Empower</td></tr>
<tr><td>Ministry of Industry and New Technologies</td><td>Consult</td></tr>
</table>
</td></tr>
</table>

	Chamber of Commerce and Industry of the Republic of Tajikistan	Involve
	Department of the Committee for Environmental Protection	Collaborate
	Department of Economics, Finance and Forecasting	Collaborate
	Dushanbe Ecology Department	Involve
	State Unitary Enterprises (SUEs) for Construction	Collaborate
	SUE “Smart City”	Collaborate
	Consumers Union of Tajikistan	Consult
	Institute of Water, Hydropower, Engineering and Ecology	Collaborate
	Private sector businesses	Empower
	Universities and research institutes – departments for business/commerce, management, and industry/manufacturing	Consult
	Vulnerable population representatives (e.g., NGOs, civil society groups)	Involve

Indicative Project Costs	**CapEx [€]**	**OpEx over 5 years [€]**	**Development / Advisory Costs [€]**
	Initial 1,500,000 per year for first 2 years **Total: 3,000,000**	Estimated at 2-3% of investment costs: **150,000** [only for first 2 years given duration of action]	**250,000**

Potential Financing Instruments and Sources	**Instrument**	**Source**	**Amount € / Share %**
	Grant	International development partner (likely bilateral donor or private-sector oriented organisation such as IFC)	250,000 (Advisory Costs) / 100%
	Own-Source	National and city government	300,000 (CapEx) / 10%
	Own-Source or equity investment	State unitary enterprise	200,000 (CapEx) / 7%
	Grant or concessional loan	International development partner (likely bilateral donor or private-sector oriented organisation such as IFC), possibly with on lending through local bank(s)	2,500,000 (CapEx) / 83%

Revenue Opportunities	☐ No	☒ Yes →	• Innovation can bring revenue opportunities for industries in Dushanbe. • Revenues from taxes from new industrial activities and commerce. • Opportunities from equity from new start-ups created under acceleration programme fund.

Impact Measures (Quantitative and Qualitative)		
	State Indicators	• Average annual concentration of PM2.5 & PM10 • Number of contaminated sites • Annual CO2 emissions per unit of GDP
	Pressure Indicators	• Heavy metals (Pb) emission intensity of manufacturing industries • Fossil fuel combustion in industrial processes, per unit of industrial GDP • Share of industrial energy consumption from renewable energy • Share of industrial waste recycled as a share of total industrial waste produced • Percentage of industrial wastewater that is treated according to applicable national standards
	Estimated Carbon Emissions Reduction	• Given the nature of this action no direct carbon emission reductions are expected.

	Physical Annual Savings	• See above pressure indicators. Savings could be achieved across natural resource use (water, timber, energy) and materials (cement, plastic, etc.)
	Climate Resilience Benefits	• N/A
	Reductions in Operating Expenditures	• Innovations in current industrial processes in Dushanbe can result in reductions in operating expenditures.
	Other Indicators / Social and Economic Benefits	• Increased access of socially and economically vulnerable populations in Dushanbe to the industry sector as entrepreneurs and innovators, or new income opportunities through job creation (estimated at 30 jobs initially).
Potential Project Risks	**Area**	**Risks**
	Social	• A risk of exclusion and lack of buy-in from the wider community. • Technological innovations in the industry sector might create redundancies in the work force leaving some individuals unemployed if just transition measures are not put in place.
	Environmental	• New technologies and innovations may have unexpected or unknown effects to the environment. A larger industry in Dushanbe might put more pressure upon natural resources and land in the city.
	Economic	• The city may not find a sustainable source of funding for the innovation fund and platform. Economic benefits from the new industries may not remain in Dushanbe if financed by external/foreign investors. • The creation of start-ups and new industries might be limited to people who already have access to capital and there may be limited job creation. • If initial fund capitalization is based on donor grant financing, medium-term sustainability of fund may be at risk.
	Other	• Current industries may not be interested in greening their activities due low resource costs. • Critical policies are delayed/undermined by national policy approaches or lack of regulations/incentives – limiting the impact and effectiveness of a city-level strategy.

18 Develop green procurement processes for improved environmental performance in public and private sector

Sector	☒ Industries
Action Type	☒ Policy ('Soft')
GCAP Action Classification	☒ Standards, guidelines, and regulations
Priority Environmental Challenges Addressed	– Limited policies and practices around greening industry and promoting sustainable production
Strategic Objective Supported	• Collaborate with private sector and civil society in a green economy transition based on improved policy frameworks, investment support, enhanced data collection and monitoring of industrial emissions, and effective regulatory enforcement.
Linkage to Existing Policies/Plans	• Law of the Republic of Tajikistan "On public procurement of goods, works and services" dated March 3, 2006 • National Development Strategy of Tajikistan until 2030. • Address on Major Aspects of Tajikistan's Foreign and Domestic Policies by the President of the Republic of Tajikistan, Leader of the Nation, H.E. Emomali Rahmon (December 21,2021) • Green Economy Development Strategy • Law of the Republic of Tajikistan on energy saving and energy efficiency (dated September 19, 2013, № 1018). • Decree of the Government of the Republic of Tajikistan dated June 1, 2007 No. 319 "On the establishment of a qualification commission for assigning the status of a "qualified procuring entity" • Decree of the Government of the Republic of Tajikistan dated October 2, 2010 No. 500 "On approval of the rules for opening tenders when purchasing goods, works and services for state investment projects in the Republic of Tajikistan".
Description	This action aims to embed sustainable procurement best practices into DCA procurement processes and supply chains. The Planning and Public Procurement Sector of DCA will assemble a technical working group with a range of stakeholders that represent key buyers and sellers in Dushanbe public procurement this may include DCA Departments, SUEs, private companies. This technical working group will help oversee, guide and provide technical input into this action. The action will be comprised of 2 Phases: Phase 1: Review and develop sustainable procurement processes A. Review the 'status quo' procurement processes and policies of DCA based on their effectiveness in embedding sustainable and green best practice, including the assessment of due diligence processes, tendering/buying criteria, safeguards and key performance indicators. B. Identify the gaps in current processes and develop new processes to build sustainable and green best practice into these areas. This could include (i) Tendering process – these should detail environmental measures in the scoring criteria e.g. green-house gas emissions (ii) Due diligence – can suppliers demonstrate their goods and service are sustainable and that their business processes contribute to a green Dushanbe (iii) KPIs – Identify where environmental KPIs can be included in a contract to ensure suppliers meet the specific environmental standards stipulated, and specify impact on suppliers of failing to comply with new environmental requirements. The revised system will introduce specific environmental requirements in the public procurement system in line with the EU voluntary Green Public Procurement criteria. Phase 2: Educate and communicate A. Code of Conduct Document: Develop buyer and supplier code of conduct document to make the buyers and the supply chain aware of the new drive for greener more sustainable goods and services. This will detail (i) the new procurement processes and how tendering and buying will factor in sustainability as a key priority, (ii) the expected behaviours and standards which are required

<table>
<tr><td></td><td colspan="3">from suppliers e.g. environmentally friendly products, GHG emissions, pollution and handling of waste and labour standards.
B. Training for Municipal Staff: Updating processes will require a range of training and change management to ensure that the new processes are understood and embedded.</td></tr>
<tr><td>Rationale and Linkage to Other GCAP Actions / Existing Projects/Work</td><td colspan="3">Procurement regulations and processes in Dushanbe remain behind international standards, although reform is underway, and there is currently no green procurement policy to enable DCA to influence the sustainability of supply chains.
This action is related to Industries Sector Action 17, Solid Waste Sector Actions 20, 21 and 22.</td></tr>
<tr><td rowspan="2">Cross-Cutting Themes / Co-benefits</td><td>Climate Action</td><td>Gender and Social Inclusion</td><td>Smart Maturity</td></tr>
<tr><td>☒ Directly targeted
☐ Some elements
Reason:
Green procurement processes will enable to procurement of goods which are less environmentally damaging and produce lower GHG emissions through the product lifecycle.</td><td>☐ Directly targeted
☒ Some elements
Reason:
The revised processes should include environmental and social metrics, which will hopefully improve social inclusion and gender equality.</td><td>☐ Directly targeted
☒ Some elements
Reason:
Green procurement often encourages digital innovation alongside updated supply chain processes, services, and products.</td></tr>
<tr><td>Status of Preparation</td><td colspan="3">☒ Project idea</td></tr>
<tr><td>Implementation Process and Timeline</td><td colspan="3">
<table>
<tr><th>Step</th><th>Duration</th><th>Task Owner / Support Required</th></tr>
<tr><td>Establish a technical working group responsible for revising procurement.</td><td>1 month</td><td>DCA Planning and Public Procurement Sector / Agency for Public Procurement of Goods, Works and Services</td></tr>
<tr><td>Phase 1: Review and develop sustainable procurement processes</td><td>9 months</td><td>DCA Planning and Public Procurement Sector / Agency for Public Procurement of Goods, Works and Services / Technical Working Group</td></tr>
<tr><td>Approve new procurement processes and policies</td><td>6 months</td><td>Lower chamber of Parliament / Majlisi Namoyandagon / Majlisi Oli of the Republic of Tajikistan</td></tr>
<tr><td>Phase 2: Educate and communicate</td><td>6 months</td><td>Agency for Public Procurement of Goods, Works and Services under the Government of the Republic of Tajikistan/SUE Smart City</td></tr>
</table>
</td></tr>
<tr><td>Next Steps</td><td colspan="3">• Identify key taskforce members responsible for revising the procurement process and policies.</td></tr>
<tr><td>Action Owner(s)</td><td colspan="3">• DCA Planning and Public Procurement Sector / Agency for Public Procurement of Goods, Works and Services</td></tr>
<tr><td>Stakeholders</td><td colspan="3">
<table>
<tr><th>Stakeholder Group</th><th>Engagement (Inform, Consult, Involve, Collaborate, Empower)</th></tr>
<tr><td>Department of Energy and Industry</td><td>Consult</td></tr>
<tr><td>Ministry of Industry and New Technologies</td><td>Inform</td></tr>
<tr><td>Department of the Committee for Environmental Protection</td><td>Collaborate</td></tr>
<tr><td>Department of Economics, Finance and Forecasting</td><td>Involve</td></tr>
<tr><td>Department of Construction and Utilities</td><td>Involve</td></tr>
<tr><td>State Unitary Enterprises (SUEs) for Construction</td><td>Collaborate</td></tr>
<tr><td>Consumers Union of Tajikistan</td><td>Consult</td></tr>
<tr><td>Local NGOs</td><td>Consult</td></tr>
<tr><td>Private Companies</td><td>Involve</td></tr>
</table>
</td></tr>
<tr><td>Indicative Project Costs</td><td>CapEx [€]</td><td>OpEx over 5 years [€]</td><td>Development / Advisory Costs [€]</td></tr>
</table>

<table>
<tr><td></td><td colspan="3">N/A | N/A | 250,000</td></tr>
<tr><td>Potential Financing Instruments and Sources</td><td colspan="3"><table>
<tr><th>Instrument</th><th>Source</th><th>Amount € / Share %</th></tr>
<tr><td>Own-Source</td><td>Municipal Government</td><td>50,000 (Advisory Costs) / 20%</td></tr>
<tr><td>Grant</td><td>National Government</td><td>50,000 (Advisory Costs) / 20%</td></tr>
<tr><td>Grant</td><td>International development partner (e.g., bilateral donor or United Nations or European Union)</td><td>150,000 (Advisory Costs) / 60%</td></tr>
</table></td></tr>
<tr><td>Revenue Opportunities</td><td>☐ No ☒ Yes →</td><td colspan="2">• Improved procurement processes will appeal to new suppliers and customers, with new revenue opportunities.</td></tr>
<tr><td rowspan="8">Impact Measures (Quantitative and Qualitative)</td><td>State Indicators</td><td colspan="2">• Water Exploitation Index
• Annual CO2 equivalent emissions per capita
• Annual CO2 emissions per unit of GDP</td></tr>
<tr><td>Pressure Indicators</td><td colspan="2">• Share of city enterprises with ISO50001/EMAS certification or similar
• Total value of projects with green building certification as a share of the total value of projects granted a building permit per year
• Share of industrial energy consumption from renewable energy
• Share of industrial waste recycled as a share of total industrial waste produced
• Percentage of industrial wastewater that is treated according to applicable National standards
• Water consumption per capita
• Water consumption per unit of city GDP</td></tr>
<tr><td>Estimated Carbon Emissions Reduction</td><td colspan="2">• Due to the nature of this action, no direct carbon emissions reductions are expected. However, in the medium/long term, green procurement would result in a reduced footprint of municipal operations and related supply chains.</td></tr>
<tr><td>Physical Annual Savings</td><td colspan="2">• See pressure indicators above. Savings can be manifold depending on the goods and services procured. Generally, reduction in natural resource and other material use should be feasible.</td></tr>
<tr><td>Climate Resilience Benefits</td><td colspan="2">• N/A, due to the nature of this action.</td></tr>
<tr><td>Reductions in Operating Expenditures</td><td colspan="2">• Improved procurement processes will streamline the process and create efficiencies.
• Green procurement goods and services should provide for better lifecycle value, thus creating operating savings over several years, even though initial procurement costs may be higher.</td></tr>
<tr><td>Other Indicators / Social and Economic Benefits</td><td colspan="2">• Improvements in procurement will lead to improved international competitiveness.
• Improved processes and training will improve municipal capacity.
• If the government drives demand for green goods and services, it can help create a market, with growing opportunities for local and international businesses of different sizes.
• Although not directly creating new jobs, green procurement can provide a basis for job creation in related industries.
• Green procurement will support and enable other GCAP actions, e.g. with regard to the intended green development and energy efficiency objectives in the buildings and transport sectors.</td></tr>
<tr><td>Potential Project Risks</td><td>Area</td><td colspan="2">Risks</td></tr>
<tr><td></td><td>Social</td><td colspan="2">• Public dissatisfaction with increased DCA spending on sustainable products.
• Potential for unemployment in industries and supply chains which produce products which fall outside of the green procurement standards.</td></tr>
</table>

	Environmental	• Risk of greenwashing if criteria for green goods and services are not clearly laid out / aligned with international standards and/or control is lacking.
	Economic	• Procurement of sustainable goods and services could be more expensive in terms of upfront costs. • Where local suppliers may lag behind in the production of green goods and services, international providers may take an increasing market share to the detriment of local incomes in the private sector.
	Other	• N/A

19 Improve separation of sensitive land uses from significant polluting users

Sector	☒ Industries
Action Type	☒ Policy ('Soft')
GCAP Action Classification	☒ Strategies, plans, and programmes
Priority Environmental Challenges Addressed	• Limited policies and practices around greening industry and promoting sustainable production • Air, water, and soil polluting industries within urban boundaries
Strategic Objective Supported	Collaborate with private sector and civil society in a green economy transition based on improved policy frameworks, investment support, enhanced data collection and monitoring of industrial emissions, and effective regulatory enforcement.
Linkage to Existing Policies/Plans	• Dushanbe Socio-Economic Development Program 2025 • The Concept of Industrial Development of the Republic of Tajikistan: No 523 (2003) • Dushanbe Master Plan
Description	• This multi-pronged action must balance the need to reduce polluting emissions impacting on sensitive neighbourhoods through land use management as well as incentivising a shift towards cleaner industry. The main land use/industrial stationary sources for chemical pollutant emissions in Dushanbe include cement plants (e.g., OJSC Tochikcement) and boiler houses, as well as small workshops that process and incinerate various waste types. • Noting that land use zoning should not simply push industry to the periphery of the city, especially where major infrastructure such as transport (e.g., railways) already exists and can continue to enable the efficient and sustainable movement of goods and people, the following steps are recommended: • Phase 1: Assessment of the most polluting land uses within the city boundary should be carried out noting the emission type, location, proximity to incompatible/sensitive land uses, as well as number of jobs concerned. • Phase 2: Analysis on identifying the industrial sites where relocation would or would not be advisory, and for the latter where processes to improve efficiency and reduce emissions are possible to implement in situ. It will also identify sites that may be acting as pollution sources' and should be considered for decommissioning and transfer to alternative land uses. Although, any initiative to move polluting industrial uses away from residential areas, care must be taken to maintain and enhance a sustainable mix of employment uses within the residential areas, or in commuting distance. Ensure policy approach is reflected in updates to existing land use plans. Identification of sites will also include expansion of sanitary protection zones around industrial facilities. • Phase 3: While the action is implemented, capacity building and awareness raising will be rolled out for DCA and relevant state unitary enterprises and joint stock companies to emphasise pollution prevention, linkages to environmental permitting and support resource efficiency within the city's jurisdiction. • Two follow-on studies may be considered to (i) identify responsive processes for promoting clean industrial development, and (ii) processes to decommission, decontaminate and re-use industrial sites. Particularly the latter could provide significant urban renewal opportunities within inner-city areas in Dushanbe, thus linking to other GCAP actions around affordable housing and green neighbourhood development (Buildings Sector Actions 13 and 14).
Rationale and Linkage to Other GCAP Actions / Existing Projects/Work	In Dushanbe, pollution from the cement industry and coal handling and preparation plants (CHPPs) has been significant and impacts on residents' health. Single use zoning causing urban sprawl, in addition to a high proportion of state unitary enterprises which require modernisation, needs to be addressed.

<table>
<tr><td></td><td colspan="3">The action is related to Transport Sector Actions 9,10, 11 and 12, and Buildings Sector Actions 13 and 14. The Action may benefit from Industry Sector Action 17 and Land-Use and Biodiversity Action 26..</td></tr>
<tr><td rowspan="2">Cross-Cutting Themes / Co-benefits</td><td>Climate Action</td><td>Gender and Social Inclusion</td><td>Smart Maturity</td></tr>
<tr><td>☐ Directly targeted
☒ Some elements
Reason:
This action should act overall to reduce carbon emissions in the long term by building a pattern of land uses that improve efficiency and therefore emissions.</td><td>☒Directly targeted
☐ Some elements
Reason:
This action will reduce pollution in residential areas likely occupied by marginalised communities and reduce health risks from pollution in residential neighbourhoods.</td><td>☐ Directly targeted
☒ Some elements
Reason:
Geo-spatial mapping and data analysis which is linked to Lan-use and Biodiversity Action 26 of industrial sites, emissions and jobs can provide useful information to inform socio-economic analysis which supports decision makers to develop targeted and inclusive green economic and spatial development strategies.</td></tr>
<tr><td>Status of Preparation</td><td colspan="3">☒ Project idea</td></tr>
<tr><td>Implementation Process and Timeline</td><td colspan="3">
<table>
<tr><th>Step</th><th>Duration</th><th>Task Owner / Support Required</th></tr>
<tr><td colspan="3">Phase 1</td></tr>
<tr><td>Set up Working Group</td><td>1 month</td><td>Department of Energy and Industry</td></tr>
<tr><td>Assess most polluting industries</td><td>3 months</td><td>Department of Energy and Industry, possibly supported by consulting firm</td></tr>
<tr><td>Assess legislative context</td><td>1 month</td><td rowspan="2">Department of Energy and Industry</td></tr>
<tr><td>Update legislative framework to align with proposed land use zoning</td><td>4 months</td></tr>
<tr><td colspan="3">Phase 2</td></tr>
<tr><td>Analysis of industrial sites</td><td>6 months</td><td>Main Department of Architecture and Planning, possibly supported by consulting firm</td></tr>
<tr><td>Identify industrial site locations</td><td>3 months</td><td>Department of Energy and Industry</td></tr>
<tr><td>Consider options for sustainable transport patterns</td><td>3 months</td><td>Transport Department</td></tr>
<tr><td>Amend existing land use plans</td><td>3 months</td><td>Main Department of Architecture and Planning</td></tr>
<tr><td colspan="3">Phase 3</td></tr>
<tr><td>Implementation of relocation</td><td>36 months</td><td rowspan="3">Department of Energy and Industry/ Transport Department</td></tr>
<tr><td>Capacity Building and Awareness Raising</td><td>12 months</td></tr>
<tr><td>Provide capacity development and training to staff</td><td>Ongoing</td></tr>
</table>
</td></tr>
<tr><td>Next Steps</td><td colspan="3">Set up a working group with key representatives from DCA, state unitary enterprises, and joint stock companies in Dushanbe to develop a TOR for developing the study to map out industrial sites, job density and land use compatibility.</td></tr>
<tr><td>Action Owner(s)</td><td colspan="3">• Department of Energy and Industry</td></tr>
<tr><td>Stakeholders</td><td colspan="3">
<table>
<tr><th>Stakeholder Group</th><th>Engagement (Inform, Consult, Involve, Collaborate, Empower)</th></tr>
<tr><td>Committee for Environmental Protection</td><td>Collaborate</td></tr>
<tr><td>Ministry of Industry and New Technologies</td><td>Collaborate</td></tr>
<tr><td>Department of Economics, Finance and Forecasting</td><td>Consult</td></tr>
</table>
</td></tr>
</table>

	Department of Construction and Utilities	Consult
	Department of Women and Family Affairs	Consult
	State Unitary Enterprises (SUEs) for Construction	Consult
	Private sector businesses / industries	Involve
	Vulnerable population representatives (e.g., NGOs, civil society groups)	Involve

Indicative Project Costs	**CapEx [€]**	**OpEx over 5 years [€]**	**Development / Advisory Costs [€]**
	N/A	N/A	250,000

Potential Financing Instruments and Sources	**Instrument**	**Source**	**Amount € / Share %**
	Own-Source	City Government	100,000 (Advisory Costs) / 40%
	Grant	International development partner (e.g., bilateral donor)	150,000 (Advisory Costs) / 60%

Revenue Opportunities		
☐ No	☒ Yes →	Although the action in itself does not directly provide revenue opportunities, the relocation of industries could attract new business and increased industrial activity with corresponding tax income, while urban renewal interventions in the inner-city could positively impact on property and land values and provide additional tax income for the city.

Impact Measures (Quantitative and Qualitative)		
	State Indicators	• Number of contaminated sites • Annual CO2 equivalent emissions per capita • Annual CO2 emissions per unit of GDP • Biochemical Oxygen Demand (BOD) in rivers and lakes • Ammonium NH4 concentration in rivers and lakes • Average annual/daily concentration of PM2.5, PM10, SO2 and NOx
	Pressure Indicators	• Heavy metals (Pb) emission intensity of manufacturing industries • Fossil fuel combustion in industrial processes, per unit of industrial GDP • Share of industrial energy consumption from renewable energy
	Estimated Carbon Emissions Reduction	• No direct carbon emissions reductions result from this action.
	Physical Annual Savings	• See above pressure indicators. Savings will only be achieved if relocation of industries is accompanied by green processes and technologies, as well as resulting land use that does not trigger increased number or length of trips (e.g., for commuting to industrial jobs).
	Climate Resilience Benefits	• Careful zoning of polluting industries away from residential areas reduces the impacts of pollution and supports healthy ecosystems and biodiversity close to residential areas, particularly if supported by a shift to green industrial policy. This in turns supports resilience e.g., with regard to green spaces and reduced urban heat island effect.
	Reductions in Operating Expenditures	• With industry focussed in specific areas of the city, industrial (large capacity) infrastructure can be utilised and spatially extended/provided more efficiently. New industrial areas offer potential for critical mass supporting closed-loop industrial ecosystems.
	Other Indicators / Social and Economic Benefits	• Zoning of industry will reduce harmful pollution impacting communities, potentially supporting the integrity and liveability of residential neighbourhoods in Dushanbe. • No direct job creation is expected from this action.

Potential Project Risks	**Area**	**Risks**
	Social	• Zoning, if not planned properly, could force small businesses and industry to be relocated far from residents. • Forced relocation could occur where industries are relocated. • There could be loss of employment due to the closure of industry and businesses.

		• Risk of dispersing existing close-knit social networks arising from workplaces in close proximity to housing.
	Environmental	• Without appropriate consideration, zoning could relocate polluting industries and therefore create new localised environmental issues elsewhere.
	Economic	• Large-scale planned relocation of industries and supporting new public transport infrastructure could become a financial burden. Relocation of industry may reduce investment in particular industries or locations.
	Other	• Changes to existing land use plans (including the Dushanbe Master Plan) are not easily implemented in a complex governance setting. As such, more extensive re-zoning may be held up in institutional review and approval processes, while actual land uses 'on the ground' create new challenges.

4.7. GCAP Solid Waste Actions

In the solid waste sector, 3 actions have been prioritised to tackle the waste management hierarchy, key infrastructure needs, as well as issues around construction waste in Dushanbe. The investment needs in the sector are massive and the costs of the 3 actions are estimated to account for 29% of the overall GCAP budget. Their potential contribution to the overall carbon emissions reductions is also high at 61%. Additionally, the waste sector actions may contribute to 11% of the estimated new jobs from the GCAP actions.

20 Develop and implement a system for diverting waste from landfill including sorting, recycling and recovery

Sector	☒ Solid Waste	
Action Type	☒ Policy ('Soft')	
GCAP Action Classification	☒ Capital Investment	☒ Investment-related feasibility study
Priority Environmental Challenges Addressed	• Outdated or hazardous solid waste disposal and management practices	
Strategic Objective Supported	Enable strategic solid waste management through waste recycling, appropriate treatment and disposal, and application of standards that safeguard communities and the environment from air, water, and land pollution.	
Linkage to Existing Policies/Plans	• Dushanbe Urban Water Supply and Sanitation Project • Integrated Urban Development Project • National Development Strategy • Tajikistan Municipal Development Strategy • Dushanbe City Socio-economic Development Programme (to 2025) • Dushanbe Development Strategy (to 2050) • The concept of reform of housing and communal services in the Republic of Tajikistan for the period 2010-2025	
Description	EBRD are currently finalising the scope for technical and due diligence studies to assess feasibility and best-practice approaches for recovery and management of household waste in Dushanbe. During the study, a socio-economic assessment will be undertaken to understand the current situation in terms of informal waste pickers; the assessment will identify alternative employment opportunities within the new system. Throughout the feasibility and system design, informal recycling companies will be engaged to integrate all actors into the formal system. Components to be considered in the feasibility study: 1) A city-wide system for sorting and separating waste at household level, including separating dry (paper, card, plastic, metal, glass, etc) and wet (organic) waste. 2) Improved physical collection infrastructure will be upgraded including the purchase of new collection vehicles and if applicable, establishing new waste transfer stations. Technical feasibility studies will consider smart opportunities including route optimisation and sensor-based collection infrastructure to reduce collection related emissions and operational costs. 3) Options for recycling through material recovery facilities, including anaerobic digestion and composting for biological waste. 4) Options for processing and recovery of residual waste and material recovery including different configurations of mechanical-biological treatment (MBT) plants. Consideration should be given to production Refuse Derived Fuel (RDF), creating opportunities for sustainable energy sources.	

<table>
<tr><td></td><td colspan="3">5) Identifying solutions that would ensure the current informal waste pickers are integrated into the new system and are given sufficient training/opportunity to ensure improved livelihoods opportunities.
(The study will also include preliminary design of a new sanitary landfill and closure of the existing landfill – see Waste Sector Action 22)
Once the feasibility and relevant due diligence studies are complete, the proposed city-wide system will be implemented. This will include the development of a sorting and separation system, investment in physical infrastructure, the identified material recovery facility and systems for processing and waste recovery. After the feasibility study a capacity assessment will identify any gaps in Svalka Tverdobitovikh Otkhodov and DCA's ability to implement and deliver the new system. Appropriate capacity building sessions will be delivered, and continuously, for relevant departments. A civil society awareness raising initiative will complement the implementation to build support for the new system and to encourage source-separation of waste at the household level. This initiative will need to reach all the potential users of the recycling system, to ensure uptake and proper use of the system.</td></tr>
<tr><td>Rationale and Linkage to Other GCAP Actions / Existing Projects/Work</td><td colspan="3">Dushanbe lacks a formal system for sorting, collecting, recycling and processing of household waste. Recycling is done on an informal basis by local waste pickers working in hazardous conditions due to the lack of waste separation. Given the current environmental and operational challenges at Dushanbe's main landfill site, the city's projected population growth, and the likely increase in waste production, a waste reduction and recycling approach is urgently needed to help the city better manage its waste.
This action is linked to Solid Waste Sector Action 22.</td></tr>
<tr><td rowspan="2">Cross-Cutting Themes / Co-benefits</td><td>Climate Action</td><td>Gender and Social Inclusion</td><td>Smart Maturity</td></tr>
<tr><td>☒ Directly targeted
☐ Some elements
<u>Reason</u>: The processing of waste enables the reuse and extension of produce lifespan, reducing production-related emissions. Reducing waste going to landfill will also reduce landfill emissions of greenhouse gases.</td><td>☐ Directly targeted
☒ Some elements
<u>Reason</u>: Improved waste separation and processing will reduce exposure of informal waste pickers, often from marginalised groups to hazardous material.</td><td>☐ Directly targeted
☒ Some elements
<u>Reason</u>: A formal waste collection process lays the foundation for the implementation of a smart waste monitoring system and route optimisation solutions.</td></tr>
<tr><td>Status of Preparation</td><td colspan="3">☒ Concept note / pre-feasibility study</td></tr>
<tr><td>Implementation Process and Timeline</td><td colspan="3">
<table>
<tr><th>Step</th><th>Duration</th><th>Task Owner / Support Required</th></tr>
<tr><td>Feasibility study and technical due diligence.</td><td>8 months</td><td>EBRD / SUE "Svalka Tverdobitovikh Otkhodov"</td></tr>
<tr><td>Loan preparation</td><td>3 months</td><td>EBRD</td></tr>
<tr><td>Capacity Assessment of Solid Waste Management capabilities</td><td>2 months</td><td rowspan="2">SUE "Svalka Tverdobitovikh Otkhodov"</td></tr>
<tr><td>Review and revise legislation on Solid Waste Management</td><td>6 months</td></tr>
<tr><td>Procurement of detailed design, tender support and construction supervision services.</td><td>4 months</td><td rowspan="2">SUE "Svalka Tverdobitovikh Otkhodov" / EBRD</td></tr>
<tr><td>Procurement of contractor for physical infrastructure, material recovery facilities etc.</td><td>4 months</td></tr>
<tr><td>Implement system for sorting, collection, recycling and processing of solid waste.</td><td>3 years</td><td rowspan="2">SUE "Svalka Tverdobitovikh Otkhodov" / EBRD / Consultants</td></tr>
<tr><td>Plan and initiate awareness raising campaign.</td><td>1 year (together with previous step)</td></tr>
</table>
</td></tr>
</table>

	Project monitoring	3 years (together with previous step)	

Next Steps

Tender combined feasibility study for landfill design/remediation (Waste sector Action 22) and municipal solid waste management system improvements, including outline design and technical due diligence for loan preparation.

Action Owner(s)

State Unitary Enterprise (SUE) "Svalka Tverdobitovikh Otkhodov"

Stakeholders

Stakeholder Group	Engagement (Inform, Consult, Involve, Collaborate, Empower)
State Unitary Enterprise (SUE) "Svalka Tverdobitovikh Otkhodov"	Empower
State Unitary Enterprise “Polygon MSW”	Collaborate
Committee for Environmental Protection under the Government of the Republic of Tajikistan	Involve
Dushanbe City Administration	Collaborate
NGO "PESHSAF" & “Little Earth”	Collaborate
Consumers Union of Tajikistan	Inform
NGO “Nature protection team”	Collaborate
The Union for the Development of the Private Sector of Tajikistan	Involve

Indicative Project Costs

CapEx [€]	OpEx over 5 years [€]	Development / Advisory Costs [€]
27,250,000	Estimated at 2-3% of investment costs: **4,125,000**	**1,500,000**

Potential Financing Instruments and Sources

Instrument	Source	Amount € / Share %
Grant	International Development Partner (e.g., international development bank or bilateral donor)	1,500,000 (Advisory Costs) / 100%
Own-Source for informal waste pickers programme and awareness raising initiative	City Government	2,700,000 (CapEx) / 10%
Grant for informal waste pickers programme and awareness raising initiative	International Development Partner (e.g., international development bank or bilateral donor)	2,700,000 (CapEx) / 10%
Concessional loan for physical infrastructure	International Development Partner (e.g., international development bank or bilateral donor), guaranteed by national government	19,150,000 (CapEx) / 70%
Equity for physical infrastructure	State Unitary Enterprise	2,700,000 (CapEx) / 10%

Revenue Opportunities

☐ No	☒ Yes →	
		Improved collection and processing of waste may allow to increase tariffs. Enforcing penalties for improper sorting and illegal dumping will also generate revenue for the municipality. Waste recycling and processing can also provide additional revenue opportunities for involved companies, depending on the value of the waste type concerned.

Impact Measures (Quantitative and Qualitative)

State Indicators	• Annual CO2 equivalent emissions per capita • Annual CO2 emissions per unit of GDP • Ammonium NH4 concentration in rivers and lakes
Pressure Indicators	• Share of population with weekly municipal solid waste (MSW) collection • Proportion of MSW that is sorted and recycled total and by type of waste e.g., paper, glass, batteries, PVC, bottles and metals

		• Percentage of MSW which is disposed of in open dumps, controlled dumps or bodies of water or is burnt • Percentage of collected MSW composted
	Estimated Carbon Emissions Reduction	• 60,100 annual tCO2e; based on 40% reduction of household waste being sent to landfill and being recycled instead
	Physical Annual Savings	• See above pressure indicators. Key savings related to reduced land use for landfilling, reduced wear-down of equipment at landfill site due to reduced waste amounts; potentially reduced air pollution from improved waste treatment; reduced energy use if on-site waste-to-energy options are utilised.
	Climate Resilience Benefits	• An efficient collection process can mitigate illegal dumping in Dushanbe, reducing environmental pollution and therefore encouraging healthy ecosystems which benefit urban resilience. • Better collection of waste can also reduce blockages in drainage systems and therefore reduce flood risk.
	Reductions in Operating Expenditures	• Reducing waste sent to landfill will reduce the operational costs of the landfill and extend the lifespan of the landfill. • Better waste separation will also benefit the more effective operations of equipment and reduced wear-down, allowing for lower maintenance expenditures.
	Other Indicators / Social and Economic Benefits	• Source separation of waste will increase the safety and security of informal waste pickers operating at the landfill site. • Low level of job creation may be possible through this action (estimated 20 jobs).
Potential Project Risks	**Area**	**Risks**
	Social	• The current recycling system is primarily operated by the informal sector of waste pickers; without consideration in the formal system, livelihoods and incomes could be lost. • Poor, vulnerable, and marginalised communities could be excluded from the new formal waste collection infrastructure.
	Environmental	• Without improved landfill facilities and waste treatment there could remain a localised negative environmental impact to soil, water and air quality.
	Economic	• Increased tariffs could have a negative economic impact on lower-income households. • If tariff increases cannot be realised, the commercial sustainability of involved operators may be at risk.
	Other	• Improper management of waste collection and processing could negatively impact public perceptions of solid waste management in the city. • Procurement processes could lead to criminal organisations' involvement in solid waste management. • Changing governments could result in different political agendas leading to abandonment of the new system.

21 Launch construction and demolition waste recycling and reuse across the city

Sector	☒ Solid Waste		
Action Type	☒ Investment ('Hard')		
GCAP Action Classification	☒ Capital Investment	☒ Investment-related feasibility study	
Priority Environmental Challenges Addressed	• Outdated or hazardous solid waste disposal and management practices		
Strategic Objective Supported	Enable strategic solid waste management through waste recycling, appropriate treatment and disposal, and application of standards that safeguard communities and the environment from air, water, and land pollution.		
Linkage to Existing Policies/Plans	• Dushanbe Urban Water Supply and Sanitation Project • Integrated Urban Development Project • National Development Strategy • Tajikistan Municipal Development Strategy • Dushanbe City Socio-economic Development Programme (to 2025) • Dushanbe Development Strategy (to 2050) • The concept of reform of housing and communal services in the Republic of Tajikistan for the period 2010-2025		
Description	This action will launch a recycling and reuse process for construction and demolition waste to encourage development of a circular economy in the construction sector in Dushanbe. The action will include the construction of specific drop off locations for household construction waste in addition to drop-off sites for commercial construction and demolition waste. The action includes: 1) Investment in physical infrastructure: for collection, including transportation, facilities for processing, sorting and separating materials into single streams, crushers and screeners, and a site for stockpiling and recycling. 2) Establish market for recycled material: for recycled products, which is key to the success of the intervention. Establishing this market will be contingent upon the quality of recycled materials being produced. This will be achieved by: (i) Mandating the use of recycled construction material products for public works, (ii) Increased enforcement including penalties for illegal dumping of construction and demolition waste, (iii) Launching an accompanying awareness raising initiative among private sector construction companies and households. 3) Integrating smart aspects: to be considered during the feasibility study for optimising the collection of construction and demolition waste. This might include an app for construction companies or households to connect with collection / processing / disposal companies as required.		
Rationale and Linkage to Other GCAP Actions / Existing Projects/Work	Illegally dumped waste in Dushanbe is primarily comprised of construction and demolition waste, which can contain hazardous material, causing a challenge for the city government to manage, with significant costs incurred through the collection and disposal of such waste. Given Dushanbe's spatial expansion and construction boom, there is also a clear rationale for recycling and reusing construction waste materials to reduce the overall carbon footprint of the construction/buildings sector in the city. This action is linked to the ongoing EBRD solid waste project and Solid Waste Actions 20 and 22.		
Cross-Cutting Themes / Co-benefits	**Climate Action**	**Gender and Social Inclusion**	**Smart Maturity**
	☒ Directly targeted ☐ Some elements *Reason*: Materials used in construction, such as concrete, are known to be carbon-intensive throughout their lifecycle. Recycling and	☐ Directly targeted ☐ Some elements *Reason*: N/A	☒ Directly targeted ☐ Some elements *Reason*: Collection of construction waste will be a smart process, optimising disposal of construction waste. Using an app,

	reusing materials will reduce the demand for new construction materials and therefore eliminate unnecessary GHG emissions.		construction companies will be able to connect with local disposal companies when required.

Status of Preparation

☒ Project idea

Implementation Process and Timeline

Step	Duration	Task Owner / Support Required
Complete feasibility study to identify market options and undertake technical due diligence.	6 months	SUE "Svalka Tverdobitovikh Otkhodov" State Unitary Enterprise "Polygon MSW"
Identify and allocate land for collecting, storing and processing construction and demolition waste.	2 months	
Capacity Assessment of Solid Waste Management capabilities	2 months	
Review and revise legislation on Solid Waste Management	6 months	
Tender for purchasing of collection and treatment equipment.	4 months	
Provide training to internal staff	1 month (and ongoing)	
Launch construction and demolition system.	6 months	SUE "Svalka Tverdobitovikh Otkhodov" / Consultants
Establish monitoring and evaluation system.	4 months	

Next Steps

Complete feasibility study to identify market options and consider opportunities to integrate smart aspects.

Action Owner(s)

State Unitary Enterprise (SUE) "Svalka Tverdobitovikh Otkhodov"

Stakeholders

Stakeholder Group	Engagement (Inform, Consult, Involve, Collaborate, Empower)
State Unitary Enterprise (SUE) "Svalka Tverdobitovikh Otkhodov"	Empower
State Unitary Enterprise "Polygon MSW"	Collaborate
Committee for Environmental Protection under the Government of the Republic of Tajikistan	Involve
SUE Khojagii manziliyu kommunali	Collaborate
Dushanbe City Administration	Empower
NGO "PESHSAF"	Collaborate
Consumers Union of Tajikistan	Inform
NGO "Nature protection team"	Collaborate
The Union for the Development of the Private Sector of Tajikistan	Involve

Indicative Project Costs

CapEx [€]	OpEx over 5 years [€]	Development / Advisory Costs [€]
5,000,000	Estimated at 2-3% of investment costs: 750,000	450,000

Potential Financing Instruments and Sources

Instrument	Source	Amount € / Share %
Grant	International Development Partner (e.g., international development bank or bilateral donor)	450,000 (Advisory Costs) / 100%
Own source	Municipal government	500,000 (CapEx) / 10%
Equity	State unitary enterprise	500,000 (CapEx) / 10%

	Grant	International Development Partner (e.g., international development bank or bilateral donor)	500,000 (CapEx) / 10%
	Concessional loan	International Development Partner (e.g., international development bank or bilateral donor), guaranteed by national government	3,500,000 (CapEx) / 70%
Revenue Opportunities	☐ No ☒ Yes →	Recycling of construction and demolition waste will create a market for the sale and use of recycled products which can be sold to generate income.	
Impact Measures (Quantitative and Qualitative)	State Indicators	• Average annual concentration of PM2.5 • Average annual concentration of PM10 • Annual CO2 equivalent emissions per capita • Annual CO2 emissions per unit of GDP	
	Pressure Indicators	• Percentage of MSW which is disposed of in open dumps, controlled dumps or bodies of water or is burnt	
	Estimated Carbon Emissions Reduction	• 25,600 annual tCO2e; based on a recycling rate of 50% of current annual construction waste, with corresponding reduction in waste being sent to landfill	
	Physical Annual Savings	• See above pressure indicators. Savings may be related to reduced land use for landfilling and reduced new material use in construction, contributing to reduced emissions and pollution.	
	Climate Resilience Benefits	• Recycling and reuse of construction waste will reduce illegal dumping across Dushanbe which currently exacerbates disaster risk by blocking drainage systems, as well as roads (evacuation routes and supply infrastructure), which are essential for climate resilience.	
	Reductions in Operating Expenditures	• Encouraging reuse and recycling of construction material will reduce the operational costs of the landfill and extend its lifespan while reducing municipal budget currently committed to managing illegal dumpsites.	
	Other Indicators / Social and Economic Benefits	• Improvements to the public realm with reduced illegal dumping, with corresponding positive impact for local ecosystems and biodiversity. • Creation of more formal employment opportunities in the waste management sector, estimated at 30 new jobs. • Improved safety and security of informal waste pickers. • Innovations in the construction waste recycling and reuse market can allow for new business opportunities, and potential for job creation.	
Potential Project Risks	**Area**	**Risks**	
	Social	• Increase in traffic in the vicinity of recycling facilities. • Current informal users of illegally dumped construction waste will need to access formal sources, which may be unaffordable.	
	Environmental	• Noise and dust emissions from construction and demolition material processing (Mitigate by appropriate site location and environmental control measures).	
	Economic	• Lack of market for recycled materials due to low quality of outputs (perceived or actual) (can be mitigated by good supervision of works and encouraging use of materials on government projects). • Enforcement for construction waste recycling could increase construction costs to private developers, further inhibiting provision of affordable housing in Dushanbe.	
	Other	• N/A	

22 Construct new sanitary landfill site, and close and remediate the existing landfill site

Sector	☒ Solid Waste	
Action Type	☒ Investment ('Hard')	
GCAP Action Classification	☒ Capital Investment	☒ Investment-related feasibility study
Priority Environmental Challenges Addressed	• Outdated or hazardous solid waste disposal and management practices	
Strategic Objective Supported	• Enable strategic solid waste management through waste recycling, appropriate treatment and disposal, and application of standards that safeguard communities and the environment from air, water, and land pollution.	
Linkage to Existing Policies/Plans	• Dushanbe Urban Water Supply and Sanitation Project • Integrated Urban Development Project • National Development Strategy • Tajikistan Municipal Development Strategy • Dushanbe City Socio-economic Development Programme (to 2025) • Dushanbe Development Strategy (to 2050) • The concept of reform of housing and communal services in the Republic of Tajikistan for the period 2010-2025	
Description	Remediation of the Shohmansur District landfill will be undertaken, which will involve excavation of materials, capping and extraction and utilisation of landfill gas for energy. The site will then be restored to green and recreational space and provide an opportunity for biodiversity net gain in line with Land Use and Biodiversity Sector Action 24. EBRD are currently developing the scope for technical feasibility study to identify a suitable location and design of a new sanitary landfill compliant with European Union environmental standards. Within the site identification, the area selected will include sufficient sanitary protection zones around the landfill. The new sanitary landfill will be constructed including: 1) Upgrading physical infrastructure including road network; 2) Adequate double lining, water and gas inner drainage system and to collect and treat leachate; and 3) A landfill gas treatment system for collecting and utilising landfill gases, such as methane. The feasibility study will also identify appropriate options for waste processing including mechanical-biological treatment and organic waste treatment such as composting or anaerobic digestion (under Waste sector Action 20).	
Rationale and Linkage to Other GCAP Actions / Existing Projects/Work	The current landfill is not compliant with EU standards and has insufficient capacity for waste in Dushanbe, particularly in light of the population growth expected in the city over the coming years. The action is linked to Solid Waste Sector Actions 20 and 21, and Land Use and Biodiversity Sector Action 24.	
Cross-Cutting Themes / Co-benefits	**Climate Action**	**Gender and Social Inclusion** / **Smart Maturity**
	☒ Directly targeted ☐ Some elements *Reason*: Collection of landfill gases will prevent the release of GHGs. Remediation of existing landfill site can also allow for improved stability against landslide risks, exacerbated by extreme weather events.	☐ Directly targeted ☒ Some elements *Reason*: A new landfill site compliant with EU environmental standard will reduce the health risk from hazardous waste to informal waste pickers.
		☐ Directly targeted ☒ Some elements *Reason*: Smart options will be considered in the feasibility study and might include waste level sensors, truck weighing mechanisms and solar powered compactors.
Status of Preparation	☒ Concept note / pre-feasibility study	
Implementation Process and Timeline	**Step** / **Duration** / **Task Owner / Support Required**	

	Feasibility study and technical due diligence.	8 months	EBRD / SUE "Svalka Tverdobitovikh Otkhodov"
	Loan preparation	3 months	EBRD
	Procurement of detailed design, tender support, and construction supervision services.	4 months	SUE "Svalka Tverdobitovikh Otkhodov" / EBRD
	Procurement of contractor for physical infrastructure, etc.	4 months	
	Construct new landfill	24 months	SUE "Svalka Tverdobitovikh Otkhodov" / EBRD / Consultants
	Close and remediate existing landfill	12 months (to commence after commissioning of new landfill)	

Next Steps	Tender combined feasibility study for landfill design/remediation and municipal solid waste management improvements (Waste sector Action 20), including outline design and technical due diligence for loan preparation.
Action Owner(s)	State Unitary Enterprise (SUE) "Svalka Tverdobitovikh Otkhodov"

Stakeholders

Stakeholder Group	Engagement (Inform, Consult, Involve, Collaborate, Empower)
State Unitary Enterprise (SUE) "Svalka Tverdobitovikh Otkhodov"	Empower
State Unitary Enterprise “Polygon MSW”	Collaborate
Committee for Environmental Protection under the Government of the Republic of Tajikistan	Involve
SUE Khojagii manziliyu kommunali	Involve
Dushanbe City Administration	Empower
NGO "PESHSAF"	Involve
Consumers Union of Tajikistan	Inform
NGO “Nature protection team”	Involve

Indicative Project Costs

CapEx [€]	OpEx over 5 years [€]	Development / Advisory Costs [€]
New landfill site construction: 38,250,000 (15-year lifetime, total design capacity approximately 2.5M tonnes) Old landfill site aftercare/remediation: 4,500,000 **Total: 42,750,000**	New landfill site operation: **2,125,000**	**750,000**

Potential Financing Instruments and Sources

Instrument	Source	Amount € / Share %
Grant	International development partner (e.g., international development bank or bilateral donor)	750,000 (Advisory Costs) / 100%
Grant	National government	3,000,000 (CapEx) / 13%
Own source	City government	1,000,000 (CapEx) / 4%
Equity	State unitary enterprise	1,000,000 (CapEx) / 4%
Grant	International development partner (e.g., international development bank or bilateral donor)	2,500,000 (CapEx) / 9%
Concessional loan	International development partner (e.g., international development bank or bilateral donor), guaranteed by national government	35,250,000 (CapEx) / 73%

Revenue Opportunities	☐ No	☒ Yes →	Materials separated at the landfill can be repurposed and recycled to generate income.
Impact Measures (Quantitative and Qualitative)	State Indicators		• Average daily concentration of SO2 • Average daily concentration of NOx • Biochemical Oxygen Demand BOD in rivers and lakes • Ammonium NH4 concentration in rivers and lakes • Concentration of mercury in soil • Concentration of cadmium in soil • Annual CO2 equivalent emissions per capita
	Pressure Indicators		• Proportion of MSW that is sorted and recycled total and by type of waste e.g., paper, glass, batteries, PVC, bottles and metals • Percentage of MSW which is disposed of in open dumps, controlled dumps or bodies of water or is burnt • Percentage of MSW landfilled, disposed of in EU compliant sanitary landfills • Remaining life of current landfills
	Estimated Carbon Emissions Reduction		• Carbon emissions reductions from this action are unclear at this stage and will depend on the design of the new landfill site, as well as the net outputs linked to any gas treatment and use.
	Physical Annual Savings		• See pressure indicators above. Waste recycling may allow for reduced scale/pace in land use at landfill site. Remediation of old landfill would create land for new uses, which may constitute an indirect physical saving.
	Climate Resilience Benefits		• A new sanitary landfill will have a lower environmental impact, reducing pollution and therefore support resilient ecosystems to reduce risk from climate-related natural hazards. • The new landfill will be more resilient to natural hazards such as landslides and floods. • Remediation of old landfill site can also allow for improved stability against landslide risks, exacerbated by extreme weather events.
	Reductions in Operating Expenditures		• New landfill site following EU environmental standards will reduce environmental pollution and associated costs of tackling pollution. • Improved landfill capacity may reduce illegal dumping and costs incurred from related clean up.
	Other Indicators / Social and Economic Benefits		• Construction of, and future operation of the new landfill will generate economic growth and provide employment opportunities, roughly estimated at 50 jobs. • The improved landfill will improve safety and security of informal waste pickers.
Potential Project Risks	**Area**		**Risks**
	Social		• The landfill is operated by the informal sector of waste pickers; without consideration in the new landfill design and construction, livelihoods and incomes will be lost.
	Environmental		• The new landfill will likely have a negative localised impact on the environment including potentially the conversion of green space into an anthropogenic use. • If remediation of old landfill site is not executed properly, negative environmental impacts can persist for decades.
	Economic		• Without increase in waste collection tariffs, operation of new landfill site – also in light of large-scale loan liabilities – may not be commercially viable or sustainable.
	Other		• N/A

4.8. GCAP Land Use and Biodiversity Actions

The 4 prioritised actions on land use and biodiversity target different opportunities in Dushanbe with regard to integrated urban development, planning capacities, data collection and monitoring, as well as natural capital enhancement. The actions only have a small 1% share in the estimated capital expenditure costs of the GCAP, but they come with the potential of contributing a 3% share to the carbon emissions reductions. Their job creation potential is limited, unless the actions are followed with large-scale expansion of activities across the city.

23 Devise municipal staff capacity development programme on sustainable urban development

Sector	☒ Land Use and Biodiversity
Action Type	☒ Policy ('Soft')
GCAP Action Classification	☒ Awareness, demonstration, training, and capacity building ☒ Organisational measure
Priority Environmental Challenges Addressed	• Illegal or poorly planned speculative development • Unauthorised quarries • Polluting land uses • Need for more development control and sustainable land use strategy
Strategic Objective Supported	Improve the conservation, enhancement, and efficient use of land resources to reduce greenhouse gas emissions and strengthen resilience to climate change and disaster risks alongside stronger development control and enhanced stakeholder engagement.
Linkage to Existing Policies/Plans	• Dushanbe City Socio-Economic Development Program to 2025 (Strengthening of urban planning and construction activities and improve the environment and ecology) • Dushanbe Master Plan • District and Action Area Plans (where available) • Housing and Communal Services Reform (2010-2025) • Building and environmental regulations
Description	This multi-facetted programme will look at legislation, taxation, guidelines, and interdepartmental coordination to provide solutions to problems associated with the current land management, land planning and development control systems in Dushanbe and include: **Better Forward Planning**, focusing on: (i) ensuring the Dushanbe Master Plan provides a more transparent, viable and sustainable spatial planning baseline that includes green spaces, culturally important spaces etc., in order for (ii) Local Area/District Plans and Urban Design Guidance to be used to guide and control the nature and scale of private spatial development across the city. This should also include "Developer Briefs", which outline standards and guidelines for developer compliance in the provision of affordable housing, community facilities and open (green) space for the public benefit. **Streamlined Development Management**, focusing on a review of: (i) development/planning control; (ii) building control/regulations; (ii) environmental controls/climate change considerations. This review will include: (i) decision-making powers, committees, and structures; (ii) application systems/processes; (iii) decision-making systems and appeals; (iv) approval and conditioning; and (v) evaluation.
Rationale and Linkage to Other GCAP Actions / Existing Projects/Work	Dushanbe faces substantial limitations in its existing land planning and land management systems. This includes lack of transparency in planning and the distribution of land resources, corruption in the distribution of land, the randomness of urban development, lack of urban design direction; lack of integration of environment/climate resilience standards/objectives; few instruments for addressing socio-economic issues. This Action links to Land Use and Biodiversity Sector Actions 24, 25, 26, Buildings Sector Actions 13 and 14, Transport Sector Action 9, and Industries Sector Action 19

<table>
<tr><td>Cross-Cutting Themes / Co-benefits</td><td>Climate Action</td><td>Gender and Social Inclusion</td><td>Smart Maturity</td></tr>
<tr><td></td><td>☐ Directly targeted
☒ Some elements
Reason:
Improvements in land management and development control support more efficient development models protection of peri-urban green space, including maintaining/ promoting connectivity with urban green space, and help mitigate and adapt to impacts of climate change.</td><td>☐ Directly targeted
☒ Some elements
Reason:
Transparency in planning systems helps to ensure improved participatory processes as well as enabling city governments to develop guidelines and fiscal instruments to ensure that development gains promote equity and promote social inclusion. The training activities should seek equal participation opportunities for all staff.</td><td>☐ Directly targeted
☒ Some elements
Reason:
Improved transparency in land use planning is key to supporting common information and databases for smart urban development approaches. Current planning system can also benefit from scaled-up digitization and digitalization (e.g., linked to Action 26).</td></tr>
<tr><td>Status of Preparation</td><td colspan="3">☒ Project idea</td></tr>
<tr><td>Implementation Process and Timeline</td><td colspan="3"><table>
<tr><th>Step</th><th>Duration</th><th>Task Owner / Support Required</th></tr>
<tr><td>Identify focal points in DCA and Land Management Committee to develop Concept Note</td><td>1 month</td><td rowspan="4">Dushanbe City Authority & Dushanbe City Land Management Committee</td></tr>
<tr><td>Develop TOR and procure consultancy services to deliver programme</td><td>2 months</td></tr>
<tr><td>Review legislation, and taxation systems in Dushanbe and identify limitations in legal and institutional areas</td><td>3 months</td></tr>
<tr><td>Conduct an examination of existing regulatory legal acts in terms of green planning, building up on GCAP External Framework Report</td><td>2 months</td></tr>
<tr><td>Carry out engagement process with state unitary enterprises and private developers to assess barriers and opportunities for streamlined processes</td><td>3 months</td><td rowspan="3">Dushanbe City Land Management Committee
Dushanbe City Department of Architecture and Planning</td></tr>
<tr><td>Develop recommendations for legislative reviews, tax incentives, masterplan transparency considerations and improved development approval processes</td><td>3 months</td></tr>
<tr><td>Develop urban design guidelines, example “Developer Brief” and ‘planning gain’ principles with supported case studies for piloting in Dushanbe</td><td>3 months</td></tr>
</table></td></tr>
<tr><td>Next Steps</td><td colspan="3">DCA and Land Management committee to identify focal points to develop the concept note on this process for initial consultations within the relevant departments to initiate process to apply for funding and procure the study.</td></tr>
<tr><td>Action Owner(s)</td><td colspan="3">Dushanbe City Authority & Dushanbe City Land Management Committee</td></tr>
<tr><td>Stakeholders</td><td colspan="3"><table>
<tr><th>Stakeholder Group</th><th>Engagement (Inform, Consult, Involve, Collaborate, Empower)</th></tr>
</table></td></tr>
</table>

	Dushanbe City Authority	Involve
	Dushanbe City Land Management Committee	Collaborate
	Dushanbe City Department of Architecture and Planning	Involve
	Dushanbe City Committee for Environmental Protection	Involve
	General Department of Environmental Protection of Dushanbe	Involve
	Department of Public Works of Dushanbe	Involve
	SUE "Smart City"	Involve
	SUE "Restoration of Real Estate (Registration of Real Estate)	Involve
	Local Community Organisations	Consult
	Private Construction/Development Sector	Consult

Indicative Project Costs	**CapEx [€]**	**OpEx over 5 years [€]**	**Development / Advisory Costs [€]**
	N/A	N/A	250,000

Potential Financing Instruments and Sources	**Instrument**	**Source**	**Amount € / Share %**
	Grant	National (or City) Government	125,000 (Advisory Costs) / 50%
	Grant	International Development Partner (e.g., bilateral donor)	125,000 (Advisory Costs) / 50%

Revenue Opportunities	☐ No	☒ Yes →	Likelihood of increased amount of development levies for city authorities

Impact Measures (Quantitative and Qualitative)		
	State Indicators	• Concentration of PM2.5, PM10, SO2, NOx in air • Open green space area ratio per 100 000 inhabitants • Share of green space areas within urban limits • Inter-connectivity between existing/planned urban green spaces • Connectivity with peri-urban green spaces • Abundance of bird species / other species
	Pressure Indicators	• Population density on urban land • Percentage of urban development that occurs on existing urban land rather than on greenfield land
	Estimated Carbon Emissions Reduction	• No direct carbon emissions reductions are expected from this action.
	Physical Annual Savings	• See above pressure indicators. Key consideration is the efficient use of land as a natural resource. Indirect savings could result from improved green space management and related stormwater operation and maintenance costs, etc.
	Climate Resilience Benefits	• Increased greening and greenspace leading to reduction in urban heat island effect and increased flood resilience, with corresponding positive impacts on residents' health.
	Reductions in Operating Expenditures	• Indirectly, if improved land management results in reduced operation and maintenance costs for infrasturcture (e.g. stormwater systems; water supply/reuse for irrigation; heating/cooling costs).
	Other Indicators / Social and Economic Benefits	• Strengthened processes and incentives can support more efficient and effective sustainable urban development interventions across the city, which may reduce related costs of involved stakeholders and attract more investment. • Putting land to its best and sustainable use can result in improved land values and related tax incomes. • No direct job creation is expected from this action.

Potential Project Risks	**Area**	**Risks**
	Social	• Action does not effectively consider the needs of marginalised or vulnerable groups in legislation, processes, and guidelines,

		potentially allowing development processes to displace or further marginalise such groups.
	Environmental	• Environmental and ecological requirements are not adequately factored to the project recommendations, leaving gaps for potential exploiting, and limiting the green improvement impact of the intended project outcomes.
	Economic	• Land management and development control measures become overbearing and discourage investment in sound development.
	Other	• Current low level of digital literacy in planning units may slow down adaptation of available technologies to streamline and make more efficient planning, approval, and monitoring processes.

24 Devise community green space conservation and biodiversity upgrading programme for targeted local area investments utilising nature-based solutions

Sector	☒ Land Use and Biodiversity	
Action Type	☒ Investment ('Hard')	
GCAP Action Classification	☒ Capital Investment	☒ Strategies, plans, and programmes
Priority Environmental Challenges Addressed	• Reduction in tree cover and green space in Dushanbe • Need for enhancing under-utilised land for ecological diversity • Polluting land uses	
Strategic Objective Supported	Improve the conservation, enhancement, and efficient use of land resources to reduce greenhouse gas emissions and strengthen resilience to climate change and disaster risks alongside stronger development control and enhanced stakeholder engagement.	
Linkage to Existing Policies/Plans	• Dushanbe City Socio-Economic Development Program to 2025 (Strengthen of urban planning and construction activities & improve the environment and ecology) • Dushanbe Master Plan • District and Action Area Plans (where available) • Building and environmental regulations	
Description	The programme should identify and catalogue the green spaces and ecological networks across Dushanbe (supported by the use of satellite imagery and GIS) to provide a clear understanding of the existing greenspace system. The programme should consider the current conditions and types of users across the spaces to identify a programme of priority upgrades with corresponding pilot projects for investment that is linked to an overall city greening strategy. The programme should consider (i) conserving existing green space, (ii) developing areas for new green spaces, and (iii) creating/re-creating green links and connecting to green spaces on the city fringe (also considering green-blue interlinkages with rivers and canals). This will provide opportunities for a green network throughout the city and integration of nature-based solutions which will have ecological, environmental, and social, as well as climate mitigation and adaption benefits. The programme should identify pilot projects for investment in the 82 and 102 Micro Districts and the Circus District, Sohili Street and the Dushanbe - Bokhtar highway as well as extending the green shield to substantial tracts of land adjacent to the Victory (Pobeda) Park considering native species which contribute to biodiversity, which is at risk of being affected by the proliferation of unmanaged fly-tipping, unauthorised development, and cement plants. Priority should be given to land the city government (or national government) already owns. The pilots can include (depending on the site) improvements and protection of existing sites, conversion of brownfield sites, localised neighbourhood greening – with a specific focus on offering opportunities for participation and decision-making by women. This can also be upscaled to additional sites such as the suburban areas where illegal or poorly planned speculative development and polluting land uses tend to proliferate, to optimise the value of under-used/vacant urban land and protect potential ecological assets. A robust environmental baseline is recommended for including in the Dushanbe Master Plan, which will assist with this aspiration, particularly where the Master Plan ensures that impacts and potential loss of greenspace is considered in planning applications, and that there is an overall strategy / policy to avoid loss of greenspace (at a minimum) and preferably for there to be an active policy to increase greenspaces and ecological connectivity, ideally resulting in biodiversity net gain. Ultimately, there should be a drive to include the presence of open green spaces in the draft Resolution of the Chairman of Dushanbe, as mandatory for the developer in any design and construction process.	
Rationale and Linkage to Other GCAP Actions / Existing Projects/Work	Improved quality and quantity of green space and green corridors between them is integral to supporting biodiversity within the city of Dushanbe. It can deliver wide ranging quality of life and environmental benefits for the city e.g., air quality, improved ground water replenishment and contribute to a healthy lifestyle by providing space for leisure activities,	

<table>
<tr><td></td><td colspan="3">while protecting natural habitats. Given the rapid urban growth underway in the city, a green space upgrading programme will also help to reduce unplanned conversion of open space and help direct new spatial development.
This Action links to Land Use and Biodiversity Sector Actions 23, 25, 26, as well as Water Sector Action 8.</td></tr>
<tr><td rowspan="2">Cross-Cutting Themes / Co-benefits</td><td>Climate Action</td><td>Gender and Social Inclusion</td><td>Smart Maturity</td></tr>
<tr><td>☒ Directly targeted
☐ Some elements
Reason:
The green conservation and upgrading of areas offer opportunity for integrating nature-based solutions and green infrastructure to support climate mitigation and adaptation, as well as interlink with blue infrastructure solutions (Water Sector Action 8).</td><td>☐ Directly targeted
☒ Some elements
Reason:
Improved access to green space can have substantial impact on inclusion of women, children, and elderly, as well as social wellbeing of a city’s residents. Those groups should be actively involved in the design and decision-making for the activities.</td><td>☐ Directly targeted
☒ Some elements
Reason:
Improvement of green infrastructure asset database supported with up-to-date geo-spatial data, linked to environmental monitoring systems (linked to Action 26)</td></tr>
<tr><td>Status of Preparation</td><td colspan="3">☒ Concept note / pre-feasibility study</td></tr>
<tr><td>Implementation Process and Timeline</td><td colspan="3">
<table>
<tr><th>Step</th><th>Duration</th><th>Task Owner / Support Required</th></tr>
<tr><td>Through a participatory process, identify local issues and needs using data audit and consultation</td><td>4 months</td><td>Dushanbe City Department for Landscape Improvement
Department of the Committee for Environmental Protection</td></tr>
<tr><td>Record green assets and identify ownership, primary uses and potential viability, using GIS where appropriate</td><td>3 months</td><td>Dushanbe City Department for Landscape Improvement
Dushanbe City Department of Architecture and Planning
Potentially supported by consulting firm or research institute</td></tr>
<tr><td>Leverage data collected from other relevant sectors and identify local policies and areas in the Dushanbe Masterplan that overlap with the strategy</td><td>1 month</td><td>Dushanbe City Department for Landscape Improvement
Department of the Committee for Environmental Protection</td></tr>
<tr><td>Assess viability of transformation of non-agricultural urban/peri-urban land and consider land acquisition by the municipality</td><td>1 month</td><td rowspan="2">Dushanbe City Department for Landscape Improvement
Dushanbe City Department of Architecture and Planning</td></tr>
<tr><td>Prepare green space conservation and biodiversity upgrading strategy and identify priority pilot areas for investments in line with stakeholder priorities</td><td>3 months</td></tr>
<tr><td>Implement pilot projects such as the Victory (Pobeda) Park and carry out post-completion surveys to improve further implementation</td><td>6 months</td><td>Dushanbe City Department for Landscape Improvement
State Unitary Enterprise for park complexes and gardens</td></tr>
<tr><td>Build on lessons learnt and identify potential opportunities for extending and enhancing city-wide green space and biodiversity improvements</td><td>2 months</td><td>Dushanbe City Department for Landscape Improvement
Department of the Committee for Environmental Protection</td></tr>
</table>
</td></tr>
<tr><td>Next Steps</td><td colspan="3">Review and map existing green space and biodiversity related projects and identify opportunities and focal points for initiating the procurement of the green space conservation and biodiversity programme(s).</td></tr>
<tr><td>Action Owner(s)</td><td colspan="3">Dushanbe City Department for Landscape Improvement and Department of the Committee for Environmental Protection</td></tr>
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<tr><td>Stakeholders</td><td colspan="3">
<table>
<tr><th>Stakeholder Group</th><th>Engagement (Inform, Consult, Involve, Collaborate, Empower)</th></tr>
<tr><td>Dushanbe City Department for Landscape Improvement</td><td>Empower</td></tr>
<tr><td>Dushanbe City Department of the Committee for Environmental Protection</td><td>Empower</td></tr>
<tr><td>Dushanbe City Department of Architecture and Planning</td><td>Empower</td></tr>
<tr><td>Dushanbe City Land Management Committee</td><td>Collaborate</td></tr>
<tr><td>SUE for park complexes and gardens</td><td>Collaborate</td></tr>
<tr><td>NGO “Little Earth”</td><td>Involve</td></tr>
<tr><td>NGO “YGPE” – Environmental Organization</td><td>Involve</td></tr>
<tr><td>National Biodiversity and Biosafety Centre</td><td>Involve</td></tr>
</table>
</td></tr>
<tr><td>Indicative Project Costs</td><td>CapEx [€]</td><td>OpEx over 5 years [€]</td><td>Development / Advisory Costs [€]</td></tr>
<tr><td></td><td>Total: 1,500,000
(i) 300,000
(ii) 500,000
(iii) 700,000</td><td>Estimated at 2-3% per annum of investment costs: 250,000 (although reduced costs possible with in-kind contribution from citizens and businesses)</td><td>250,000</td></tr>
<tr><td>Potential Financing Instruments and Sources</td><td colspan="3">
<table>
<tr><th>Instrument</th><th>Source</th><th>Amount € / Share %</th></tr>
<tr><td>Grant</td><td>International development partner (e.g., bilateral donor or United Nations)</td><td>250,000 (Advisory Costs) / 100%</td></tr>
<tr><td>Grant</td><td>International development partner (e.g., bilateral donor or United Nations)</td><td>500,000 (CapEx) / 33%</td></tr>
<tr><td>Grant</td><td>National Government</td><td>500,000 (CapEx) / 33%</td></tr>
<tr><td>Own-Source</td><td>Municipal Government</td><td>500,000 (CapEx) / 33%</td></tr>
</table>
</td></tr>
<tr><td>Revenue Opportunities</td><td colspan="3">☒ No ☐ Yes →</td></tr>
<tr><td>Impact Measures (Quantitative and Qualitative)</td><td>State Indicators</td><td colspan="2">• Concentration of PM2.5, PM10, SO2, NOx in air
• Open green space area ratio per 100 000 inhabitants
• Inter-connectivity between existing/planned urban green spaces
• Connectivity with peri-urban green spaces
• Abundance of bird species / other species</td></tr>
<tr><td></td><td>Pressure Indicators</td><td colspan="2">• Population density on urban land
• Percentage of urban development that occurs on existing urban land rather than on greenfield land</td></tr>
<tr><td></td><td>Estimated Carbon Emissions Reduction</td><td colspan="2">• 116,800 tCO2e over the lifetime of vegetation
• 3,900 annual tCO2e; based on an average 30-year tree lifespan
• Note: Trees will require several years to mature for full carbon sequestration effects to materialise</td></tr>
<tr><td></td><td>Physical Annual Savings</td><td colspan="2">• See above pressure indicators. Savings may be achieved e.g. from more efficient irrigation of green spaces through water recycling and reuse; or through improved non-motorised transportation resulting in lower fuel consumption per capita.</td></tr>
<tr><td></td><td>Climate Resilience Benefits</td><td colspan="2">• Reduced urban heat island effect and improved flood resilience, with corresponding positive impacts on residents’ health.</td></tr>
<tr><td></td><td>Reductions in Operating Expenditures</td><td colspan="2">• If resource use for operation and maintenance of green spaces is done more efficiently, operating expenditures may be reduced. In-kind support from citizens and businesses (‘sponsorship’ / ‘adoption’ of green spaces) may also lower operating expenditures shouldered by the city government.</td></tr>
<tr><td></td><td>Other Indicators / Social and Economic Benefits</td><td colspan="2">• Increased access to greenspace and biodiversity can support widespread improvement in health, reduction of morbidity and mortality in urban residents.</td></tr>
</table>

		• Increase in property values near green spaces can lead to increased tax income. • The interventions may allow for the creation of local employment linked to green space operation and maintenance, estimated at 10 new jobs.
Potential Project Risks	**Area**	**Risks**
	Social	• Displacement of informal settlements and low-income households living in peri-urban fringes.
	Environmental	• Potential proliferation of invasive species could occur if non-native species are used and a focus upon ensuring local biodiversity is not followed.
	Economic	• Limited resources to deliver green space upgrading and biodiversity pilots to sufficient quality.
	Other	• Institutional/administrative and capacity constraints for the public and private design and implementation agencies.

25 Strengthen development control and land management towards ecologically-rich and climate-resilient neighbourhood-scale planning

Sector	☒ Land Use and Biodiversity		
Action Type	☒ Policy ('Soft')		
GCAP Action Classification	☒ Strategies, plans, and programmes		
Priority Environmental Challenges Addressed	• Illegal or poorly planned speculative development • Unauthorised quarries • Polluting land uses • Limited ecological / agricultural preservation and water conservation • Need for more development control and sustainable land use strategy		
Strategic Objective Supported	Improve the conservation, enhancement, and efficient use of land resources to reduce greenhouse gas emissions and strengthen resilience to climate change and disaster risks alongside stronger development control and enhanced stakeholder engagement		
Linkage to Existing Policies/Plans	• Dushanbe City Socio-Economic Development Program to 2025 (Strengthen of urban planning and construction activities & improve the environment and ecology) • Dushanbe Master Plan • District and Action Area Plans (where available) • Housing and Communal Services Reform (2010-2025) • Building and environmental regulations		
Description	Deliver a capacity building programme in parallel with revision and update of relevant plans to ensure diverse range of municipal representatives engage with integrated planning processes and mainstream objectives, scope, and limitations across the various sectors and departments. This should be coordinated by DCA's Smart City state unitary enterprise with support from the Department of Architecture and Planning and engagement with institutes such as Design and Research Institute "Fazo" with officers from each department receiving the capacity development. An applied learning curricula should be delivered for up to 50 technical officers, primarily focusing on: (i) Integration between department responsibilities and improved transparency, (ii) Inclusive urban environment including gender dynamics and for persons with disabilities; (iii) Incorporation of energy efficiency and renewable energy and net zero building construction; (iv) Affordable housing delivery; and (v) Integrating urban climate resilience. This should be supported with study tours to cities which demonstrate a transparent system of integrated urban development where all levels of stakeholders are able to engage with planning processes. This will support broader understanding and support better coordination of activities, improved development control and incentivise wider investment in key priority areas across the city.		
Rationale and Linkage to Other GCAP Actions / Existing Projects/Work	There is a need to improve coordination and capacity of the departments of DCA to facilitate better effectiveness in managing the rapid urban growth challenges in relation to housing, urban services and green space provision facing Dushanbe which is expected to double in population size in the next 15 years. Given the challenges the city faces in terms of data and information management, this will also be key to supporting GCAP monitoring and evaluation going forward. Given the complex set of cross-cutting challenges, municipal staff require upskilling in a variety of areas to better assess and devise solutions to unsustainable urban development. This Action links with Land-Use and Biodiversity Sector Actions 23, 24, and 26		
Cross-Cutting Themes / Co-benefits	**Climate Action**	**Gender and Social Inclusion**	**Smart Maturity**
	☐ Directly targeted ☒ Some elements *Reason*: Strengthening integrated planning capacity will help mainstream climate	☐ Directly targeted ☒ Some elements *Reason*: As gender inequalities are still prevalent in Dushanbe, gender and diversity themes	☐ Directly targeted ☒ Some elements *Reason*: Geospatial data and analysis resources should be considered as key

<table>
<tr><td></td><td>action related planning interventions in Dushanbe</td><td>should be integrated into components of the curriculum.</td><td>enabling elements within the capacity strengthening programme</td></tr>
<tr><td>Status of Preparation</td><td colspan="3">☒ Concept note / pre-feasibility study</td></tr>
<tr><td>Implementation Process and Timeline</td><td colspan="3">
<table>
<tr><th>Step</th><th>Duration</th><th>Task Owner / Support Required</th></tr>
<tr><td>Identify key technical officers in relevant departments for training</td><td>1 month</td><td>State unitary enterprise Smart City</td></tr>
<tr><td>Carry out assessment of gaps in current training/curricula in partnership with local institutes</td><td>2 months</td><td>State unitary enterprise Smart City and Dushanbe City Department of Architecture and Planning</td></tr>
<tr><td>Procure services of a capacity building partner</td><td>2 months</td><td>state unitary enterprise Smart City, with external partner</td></tr>
<tr><td>Work with international partners and local institutes to develop new curricula and identify potential case study cities</td><td>3 months</td><td>State unitary enterprise Smart City and Dushanbe City Department of Architecture and Planning, supported by international and local partners</td></tr>
<tr><td>Roll out training programme and carry out study tours</td><td>12 months</td><td>State unitary enterprise Smart City and Dushanbe City Department of Architecture and Planning, with partners</td></tr>
</table>
</td></tr>
<tr><td>Next Steps</td><td colspan="3">Identify focal point for capacity strengthening within State unitary enterprise Smart City to initiate key departments to identify technical officers and identify budgets for procuring training.</td></tr>
<tr><td>Action Owner(s)</td><td colspan="3">State unitary enterprise Smart City and Dushanbe City Department of Architecture and Planning</td></tr>
<tr><td>Stakeholders</td><td colspan="3">
<table>
<tr><th>Stakeholder Group</th><th>Engagement (Inform, Consult, Involve, Collaborate, Empower)</th></tr>
<tr><td>State Unitary Enterprise Smart City</td><td>Empower</td></tr>
<tr><td>Dushanbe City Authority</td><td>Collaborate</td></tr>
<tr><td>Dushanbe City Department of Architecture and
Planning</td><td>Empower</td></tr>
<tr><td>Dushanbe City Land Management Committee</td><td>Empower</td></tr>
<tr><td>Dushanbe City Committee for Environmental Protection</td><td>Empower</td></tr>
<tr><td>State unitary enterprise for park complexes and gardens</td><td>Consult</td></tr>
<tr><td>Design and Research Institute "Fazo"</td><td>Consult</td></tr>
<tr><td>State Design Institute for Land Management "Tojikzaminsoz"</td><td>Consult</td></tr>
<tr><td>Research Center under the State Committee for Land Management and Geodesy</td><td>Inform</td></tr>
</table>
</td></tr>
<tr><td>Indicative Project Costs</td><td colspan="3">
<table>
<tr><th>CapEx [€]</th><th>OpEx over 5 years [€]</th><th>Development / Advisory Costs [€]</th></tr>
<tr><td>50,000 (potentially supported by in-kind contributions of participating partner institutions)</td><td>500,000</td><td>150,000</td></tr>
</table>
</td></tr>
<tr><td>Potential Financing Instruments and Sources</td><td colspan="3">
<table>
<tr><th>Instrument</th><th>Source</th><th>Amount € / Share %</th></tr>
<tr><td>Grant</td><td>International development partner (e.g., bilateral donor or United Nations)</td><td>150,000 (Advisory Costs) / 100%</td></tr>
<tr><td>Grant</td><td>National government</td><td>25,000 (CapEx) / 50%</td></tr>
<tr><td>Own-Source</td><td>City government</td><td>25,000 (CapEx) / 50%</td></tr>
</table>
</td></tr>
</table>

Revenue Opportunities	☒ No ☐ Yes →	
Impact Measures (Quantitative and Qualitative)	State Indicators	• Concentration of PM2.5, PM10, SO2, NOx in air • Open green space area ratio per 100 000 inhabitants • Share of green space areas within urban limits and inter-connectivity between urban and peri-urban green spaces • Percentage of public infrastructure at risk • Abundance of bird species / other species
	Pressure Indicators	• Population density on urban land • Percentage of urban development that occurs on existing urban land rather than on greenfield land • Proportion of the population living within 20 minutes to everyday services grocery stores clinics etc.
	Estimated Carbon Emissions Reduction	• Given the nature of this action, no direct carbon emissions reduction are expected.
	Physical Annual Savings	• See above pressure indicators. Learning programme itself will not result in physical savings, but improved skills of staff allows for better decision-making, positively impacting resource use
	Climate Resilience Benefits	• Improved integration of energy and resource efficient interventions within the city's infrastructure plans • Improved consideration of climate-proofing measures in city's land and infrastructure planning
	Reductions in Operating Expenditures	• Improved interdepartmental efficiencies allowing for increased productivity
	Other Indicators / Social and Economic Benefits	• Improved awareness and integration of inclusive urban development processes to underpin broader socio-economic outcomes • Increased investment by other (private) actors into sustainable land/site development across the city • No direct job creation is expected from this action.
Potential Project Risks	**Area**	**Risks**
	Social	• Selection or referral for training and study tours is not a merit-based process
	Environmental	• Learned best practice is applied to Dushanbe without adaptation to local environmental setting and biodiversity sensitivities
	Economic	• Insufficient funding opportunities for ensuring sustainable impact of capacity building activities
	Other	• Difficulties of interdepartmental interaction in organising capacity building courses, as well as visa challenges around study tours etc.

26 Improve environmental practices through systematic environmental data collection, monitoring, and online platform

Sector	☒ Land Use and Biodiversity		
Action Type	☒ Investment ('Hard')		
GCAP Action Classification	☒ Capital Investment	☒ Awareness, demonstration, training, and capacity building ☒ Monitoring, data collection, analysis, and studies	
Priority Environmental Challenges Addressed	• Illegal or poorly planned speculative development • Unauthorised quarries • Polluting land uses • Reduction in tree cover and green space in Dushanbe		
Strategic Objective Supported	Improve the conservation, enhancement, and efficient use of land resources to reduce greenhouse gas emissions and strengthen resilience to climate change and disaster risks alongside stronger development control and enhanced stakeholder engagement.		
Linkage to Existing Policies/Plans	• Dushanbe City Socio-Economic Development Program to 2025 (Strengthen of urban planning and construction activities & improve the environment and ecology) • Building and environmental regulations		
Description	Leverage the ongoing installation of environmental monitoring equipment by the Committee of Environmental Protection across 5 sites in the city by increasing the number of sites to 10 and developing an online data platform and archive for collating and managing the data. Key additional sites would include several along the Varzob River. The platform should be linked to the state unitary enterprise (SUE) Smart City platform, with functionality for detailed monitoring by DCA and the Committee for Environmental Protection, as well as integrating environmental reporting data from industries (e.g., cement factories). This will enable the monitoring of air, soil, and water quality. It is suggested to be a GIS-based platform that collects, stores and monitors/evaluates environmental data to enable localised management and support gradual feeding in of additional geospatial data such as land use and development activities to enable assessment of impacts on the environment. It will be a block towards better data-integration and data-based decision making, with many opportunities to build on it. This will also support initiatives to develop open governance and maximise opportunities for local community awareness, as well as future planning, project development and implementation. In addition to the platform, investment in environmental monitoring equipment and its installation across other parts of the city can provide additional data inputs into the monitoring and analysis. Added value options could include forecasting pollution levels (e.g., if the air quality data was linked to weather data) and providing alerts of health effects and recommended remediation actions to take during episodes of high pollution. The platform should be made publicly available to increase transparency.		
Rationale and Linkage to Other GCAP Actions / Existing Projects/Work	The establishment of a centralised database will help to ensure that planning for the city is strategic and well-informed given that the current availability of data in Dushanbe represents a particular challenge. Several sectors suffer under no or limited data collection, or available data is not shared with public or private actors to inform their decision-making. Furthermore, in cases where data is collected, it is often limited in its scope, not spatialised and/or not indicator-based. This Action links to Energy Sector Action 3, Transport Sector Action 9, and Industries Action 19. Strong link with Smart City Action 27.		
Cross-Cutting Themes / Co-benefits	**Climate Action**	**Gender and Social Inclusion**	**Smart Maturity**
	☐ Directly targeted ☒ Some elements *Reason*: Improved capacity to ensure conservation of critical ecological assets in	☐ Directly targeted ☒ Some elements *Reason*: Highlight key areas/sources of pollution which should lead to targeted interventions to	☒ Directly targeted ☐ Some elements *Reason*: This will directly influence and improve the city's ability to regularly monitor

<table>
<tr><td></td><td>Dushanbe and early warning system capabilities improved.</td><td>reduce pollution hotspots and enable better health outcomes, particularly for vulnerable populations.</td><td>and respond to impacts upon key ecological assets, based on increased digital capabilities.</td></tr>
<tr><td>Status of Preparation</td><td colspan="3">☒ Under implementation to be scaled up/expanded</td></tr>
<tr><td>Implementation Process and Timeline</td><td colspan="3">
<table>
<tr><th>Step</th><th>Duration</th><th>Task Owner / Support Required</th></tr>
<tr><td>Identify detailed functions of monitoring equipment under installation and existing SUE Smart City data platform</td><td>1 month</td><td rowspan="6">SUE Smart City and Dushanbe City Committee for Environmental Protection</td></tr>
<tr><td>Review existing data sources and studies focusing on environment e.g., GCAP to identify a wide range of data sources</td><td>1 month</td></tr>
<tr><td>Assess common needs for monitoring by DCA and Committee for Environmental Protection</td><td>2 months</td></tr>
<tr><td>Develop brief and outline resource requirements for potential platform expansion/integration and archiving protocols</td><td>1 month</td></tr>
<tr><td>Procure and implement pilot monitoring system with initial testing phase</td><td>6 months</td></tr>
<tr><td>Upscale monitoring and release relevant information to authorities and public for awareness raising</td><td>6-12 months</td></tr>
</table>
</td></tr>
<tr><td>Next Steps</td><td colspan="3">Work with SUE Smart City to engage Committee for Environmental Protection and identify detailed functions of monitoring equipment under installation and existing, and initiate assessment of monitoring needs.</td></tr>
<tr><td>Action Owner(s)</td><td colspan="3">SUE Smart City and Dushanbe City Committee for Environmental Protection</td></tr>
<tr><td>Stakeholders</td><td colspan="3">
<table>
<tr><th>Stakeholder Group</th><th>Engagement (Inform, Consult, Involve, Collaborate, Empower)</th></tr>
<tr><td>SUE Smart City</td><td>Empower</td></tr>
<tr><td>Dushanbe City Committee for Environmental Protection</td><td>Collaborate</td></tr>
<tr><td>Agency for Hydrometeorology</td><td>Collaborate</td></tr>
<tr><td>Laboratory of Analytical Control of Environmental Pollution</td><td>Collaborate</td></tr>
<tr><td>National Biodiversity and Biosafety Centre</td><td>Involve</td></tr>
<tr><td>NGO “Little Earth”</td><td>Consult</td></tr>
<tr><td>NGO “YGPE” – Environmental Organization</td><td>Consult</td></tr>
<tr><td>Universities and research institutes – e.g., departments of environmental management, biology, geography</td><td>Involve</td></tr>
</table>
</td></tr>
<tr><td>Indicative Project Costs</td><td colspan="3">
<table>
<tr><th>CapEx [€]</th><th>OpEx over 5 years [€]</th><th>Development / Advisory Costs [€]</th></tr>
<tr><td>Platform: 75,000
Monitoring equipment: 150,000
Total: 225,000</td><td>Est. at 2-3% of investment cost: 30,000</td><td>200,000</td></tr>
</table>
</td></tr>
<tr><td>Potential Financing Instruments and Sources</td><td colspan="3">
<table>
<tr><th>Instrument</th><th>Source</th><th>Amount € / Share %</th></tr>
<tr><td>Grant</td><td>International development partner (e.g., bilateral donor or United Nations)</td><td>200,000 (Advisory Costs) / 100%</td></tr>
<tr><td>Own-Source</td><td>Municipal Government</td><td>100,000 (CapEx) 44%</td></tr>
<tr><td>Equity</td><td>State Unitary Enterprise</td><td>125,000 (CapEx) 56%</td></tr>
</table>
</td></tr>
<tr><td>Revenue Opportunities</td><td>☒ No</td><td>☐ Yes →</td><td>N/A</td></tr>
<tr><td>Impact Measures (Quantitative and Qualitative)</td><td>State Indicators</td><td colspan="2">• Concentration of PM2.5, PM10, SO2, NOx in air compared to EU targets or health indicators
• Concentration of mercury, cadmium, zinc, and mineral oil in soil</td></tr>
</table>

		• Number of contaminated sites • Open green space area ratio per 100 000 inhabitants • Share of green space areas within urban limits • Abundance of bird species all species
	Pressure Indicators	• Population density on urban land • Percentage of urban development that occurs on existing urban land rather than on greenfield land
	Estimated Carbon Emissions Reduction	• Due to the nature of this action, no direct carbon emissions reductions are expected. However, the action will help in understanding environmental performance and, thus, tailor and target future interventions to achieve low-carbon development objectives.
	Physical Annual Savings	• See above pressure indicators. No direct savings would be achieved from the platform, but decision-making can result in more efficient use of natural resources (e.g. land and water).
	Climate Resilience Benefits	• Better monitoring of climate resilience data. • Indirectly reduced damages from climate impacts due to proactive planning and management.
	Reductions in Operating Expenditures	• Digital solutions may increase efficiency in city government planning processes.
	Other Indicators / Social and Economic Benefits	• Monitoring and publicising ecological footprints can lead to positive behaviour and consumption pattern changes and help non-public actors to take better decisions • The action may create 3 new jobs linked to the platform, data, and monitoring services and activities.
Potential Project Risks	**Area**	**Risks**
	Social	• Without digital literacy skills programme, some municipal staff may not be able to use the new platform and related technology – same may apply to parts of the population
	Environmental	• N/A
	Economic	• Operating expenditures for system requires continuous funding to ensure dedicated team to update database, which otherwise loses its functionality if it becomes too outdated
	Other	• Data is collected but not made available across departments or for public information • Data is made available, but platform is not used • Platform may provide an entry way for cyber attacks against city government / state unitary enterprise if not properly secured

4.9. GCAP Smart City Action

Recognising the importance for increasing digital literacy in Dushanbe and promoting the instrumental role that the state-owned enterprise Dushanbe Smart City (DSC) is planned to play in the implementation of the GCAP, a dedicated stand-alone smart city action has been developed. Although not leading to direct carbon emission reductions, the action has the potential for job creation at an estimated 2% share in the overall GCAP actions' job creation. Its investment cost share is an equivalent 2% among all actions.

27 Develop a citywide digital twin for Dushanbe

Sector	☒ Smart City
Action Type	☒ Investment ('Hard')
GCAP Action Classification	☒ Capital Investment
Priority Environmental Challenges Addressed	• High rates of non-revenue water and unsustainable water consumption • Emissions from growing and ageing vehicle fleet • Lack of building-level data • Air, water, and soil polluting industries within urban boundaries
Strategic Objective Supported	Improve the conservation, enhancement, and efficient use of land resources to reduce greenhouse gas emissions and strengthen resilience to climate change and disaster risks alongside stronger development control and enhanced stakeholder engagement
Linkage to Existing Policies/Plans	• Tajikistan's Digital Economy 2040 Concept • Digital CASA Tajikistan Project • Smart cities initiative through the Central Asia Policy Innovation Facility (PIF) Programme • EDB Digital Initiative Fund
Description	This action aims to put into practice smart city opportunities by developing a Citywide Digital Twin (CDT) of Dushanbe. Such a CDT can provide a virtual representation of the city context to simulate possible interventions in the city prior to implementing them in order to inform the testing of different solutions and to better understand their respective impacts. Accordingly, the CDT presents a digital image of the physical urban world based on real-time data monitoring which can be used for scenario modelling. If designed properly, the CDT can enable policymakers to take data-driven decisions, enhancing a more integrated approach to urban planning. It can also support live management of urban infrastructure systems and services, such as in the energy, transport, and water sectors. The CDT can provide several benefits to the city administration, the private sector and citizens. Some of these benefits include improving urban planning and project visualisation, improving mobility and safety on roads and public spaces, supporting the development of resilient infrastructure, facilitating open data initiatives, and enabling easy reporting of problems from users to operators (e.g. water pipe leakages or potholes in roads). The CDT should be developed in a modular fashion over time. The following modules could be implemented: (i) Environmental conditions remote sensing and display (to assist GCAP actions around indicators data collection and environmental pollution control); (ii) Digital land-use and building permitting (to support a Geographic Information System (GIS) based approach to land use planning); (iii) Real-time public transit and multimodal passenger information (to increase the efficiency of Dushanbe's transport system and accompanying GCAP actions) and traffic and public transport management and optimisation of related investments; (iv) A model of Dushanbe's transport system to understand how to deploy smart parking and smart charging (to support increased revenues to DCA); (v) Water leakage and quality monitoring and supply/consumption tracking (to address the high non-revenue water problem in the city); (vi) Digital flood monitoring and watercourse pollution control (to accompany corresponding GCAP actions linked to Dushanbe's two main rivers); and/or (vii) Building heat loss and energy efficiency modelling (to form part of the GCAP energy and buildings actions). Modules need to continue being upgraded or updated according to the different sectoral needs of Dushanbe.

<table>
<tr><td></td><td colspan="3">The CDT can support the definition, implementation, and monitoring of several other GCAP actions and, reversely, several GCAP actions can provide data that would feed into the CDT. The CDT also creates a potential for private sector development (further business development / entrepreneurship, development of the digital economy and a greener industry). Dushanbe can use the idea of developing a CDT as a guiding star to step-by-step improve the smart maturity of the city and its institutions based on the requirements needed to run the CDT effectively.</td></tr>
<tr><td>Rationale and Linkage to Other GCAP Actions / Existing Projects/Work</td><td colspan="3">Dushanbe Smart City (DSC) is the state unitary enterprise established in 2019 to support the Dushanbe Social and Economic Development Programme until 2025. DSC was established in order to increase the presence of effective services using city information to meet the needs of citizens, ensuring the safety of citizens and the protection of public order. Its main mission is the transformation of Dushanbe into a “smart city”. Having a dedicated smart city action in the GCAP can provide thrust to DSC’s efforts and function as an enabling action for other investments proposed in the GCAP.
DSC has already addressed several sectors (e.g., education, health, and transport) in stand-alone projects. The information systems built for these projects are currently working as ‘data silos’.
Dushanbe City Administration (DCA) and DSC could benefit from having a unified information system that can express better the interconnections between sectors. The CDT allows interconnecting urban data sources and modelling algorithms gradually for potentially all sectors. This means that the CDT can be constantly enriched to better reflect the complex reality of its physical urban counterpart. This will ultimately improve the smart maturity of the city and directly contribute to improving the environmental performance of key infrastructure services across Dushanbe.
Action 26 has lots of linkages with this action and the two actions should complement each other in terms of sharing data captured, best practices and lessons learnt. This action also has linkages and synergies with: Energy Sector Action 1. Water Sector Action 5 and 7, Transport Sector Actions 9, 10, 11, Buildings Sector Action 14, Industries Action 19, Land Use Sector Action 24, 25.</td></tr>
<tr><td rowspan="2">Cross-Cutting Themes / Co-benefits</td><td>Climate Action</td><td>Gender and Social Inclusion</td><td>Smart Maturity</td></tr>
<tr><td>☐ Directly targeted
☒ Some elements
<u>Reason</u>:
The CDT can be used to monitor climate change-related indicators and can be used to test different resilience measures.</td><td>☐ Directly targeted
☒ Some elements
<u>Reason</u>:
The CDT can be used to monitor gender and social inclusion-related indicators and can be used to test different measures that promote inclusion in Dushanbe.</td><td>☒ Directly targeted
☐ Some elements
<u>Reason</u>:
The creation and implementation of a CDT requires several developments in DCA and DSC that will increase the smart maturity of Dushanbe.</td></tr>
<tr><td>Status of Preparation</td><td colspan="3">☒ Project idea</td></tr>
<tr><td>Implementation Process and Timeline</td><td colspan="3"><table>
<tr><th>Step</th><th>Duration</th><th>Task Owner / Support Required</th></tr>
<tr><td>Conduct a field visit with engagement of relevant stakeholders to further define the most effective intervention areas for the CDT.</td><td>1 month</td><td>SUE Dushanbe “Smart City” (DSC) with international development partner / donor</td></tr>
<tr><td>Set up the CDT rollout programme (incl. setting up implementation unit, defining the scope of the digital twin, continue working on data governance and management policies and initiatives)</td><td>16 months</td><td>SUE Dushanbe “Smart City” (DSC) / Support is required from DCA and the Ministry of Industry and New Technologies and likely the inputs of a specialist consultant</td></tr>
<tr><td>Scope out and find potential research / technology partner for design and implementation of CDT</td><td>6 months</td><td>SUE Dushanbe “Smart City” (DSC) with international development partner / donor</td></tr>
</table></td></tr>
</table>

	Develop a 3D model as representation of the city	Ongoing (after previous step)	SUE Dushanbe "Smart City" (DSC) / Support from Department of Architecture and Urban Planning
	Set up a pilot to test the CDT (the most recommended modules to pilot would be (i) Water leakage and quality monitoring and supply/consumption tracking, and (ii) Real-time public transit and optimisation function for public transport routes/investments)	16 Months	SUE Dushanbe "Smart City" (DSC) / Support from Department of Architecture and Urban Planning and applicable sector department or state-owned enterprise; likely inputs of a specialist consultant required
	Develop modules for the CDT	Ongoing (after previous step)	SUE Dushanbe "Smart City" (DSC) / Support from other SUEs and other Departments from DCA

Next Steps	Conduct field visit, scope intervention, and set up the CDT rollout programme.
Action Owner(s)	SUE Dushanbe "Smart City" (DSC)

Stakeholders

Stakeholder Group	Engagement (Inform, Consult, Involve, Collaborate, Empower)
SUE Dushanbe "Smart City" (DSC)	Empower
Telecom companies (e.g., ZET Mobile, Tcell, Babilon Mobile, MegaFon and TK Mobile)	Collaborate
Ministry for Economic Trade and Development	Consult
Ministry of Industry and New Technologies	Involve
Department of Architecture and Urban Planning	Collaborate
Dushanbe City Administration	Collaborate
Universities and research institutes – departments for business/commerce, management, and industry/manufacturing	Involve
Vulnerable population representatives (e.g., NGOs, civil society groups)	Consult

Indicative Project Costs

CapEx [€]	OpEx over 5 years [€]	Development / Advisory Costs [€]
2,000,000 (3D model) 2,500,000 (pilot test) **Total: 4,500,000**	Est. at 2-3% of CapEx per annum: **562,500**	**250,000**

Potential Financing Instruments and Sources

Instrument	Source	Amount € / Share %
Grant	International development partner (e.g., multilateral development bank like EBRD, bilateral donor, or private-sector oriented organisation such as IFC)	250,000 (Advisory Costs) / 100% 900,000 (CapEx) / 20%
Loan	International development partner (e.g., multilateral development bank like EBRD, bilateral donor, or private-sector oriented organisation such as IFC)	2,700,000 (CapEx) / 60%
Own-Source	National government	225,000 (CapEx) / 5%
Own-Source	City Government	450,000 (CapEx) / 10%
Own-Source or equity investment	State unitary enterprise (DSC)	225,000 (CapEx) / 5%

Revenue Opportunities	☒ No	☐ Yes →

Impact Measures (Quantitative and Qualitative)	State Indicators	Several depending on CDT rollout, e.g.: • Average annual concentration of PM2.5 • Average annual concentration of PM10 • Average annual concentration of PM SO2 • Average annual concentration of PM NOX • Biochemical Oxygen Demand in rivers and lakes

		• Ammonium concentration in rivers and lakes • Share of green space areas within urban limits
	Pressure Indicators	Several depending on CDT rollout, e.g.: • Heating cooling consumption in buildings fossil fuels residential buildings fossil fuels • Non-revenue water • Annual average of daily number of hours of continuous water supply per household • Transport modal share in commuting vehicles • Travel speed of bus service on major thoroughfares • Average annual growth rate of built-up areas
	Estimated Carbon Emissions Reduction	• The CDT does not produce directly any carbon emissions reductions; however, the CDT can help the city indirectly reduce its carbon emissions by supporting the efforts to increase the optimisation of infrastructure investments and municipal services through the implementation of other GCAP actions.
	Physical Annual Savings	• The development of a CDT will not result in any direct physical savings, but it can inform planning, investment decision-making, and operation in several sectors for an improved use of resources and reduced carbon intensity in Dushanbe, allowing e.g., for reduced fuel use in the transport and energy sector, as well as lower water losses.
	Climate Resilience Benefits	• The CDT could be used to stress test different climate resilience measures or policies before implementing them in the real world, thus helping to find the most efficient measures and reduce risks. The CDT also has the potential to function as a monitoring and early warning system in case of extreme weather events and disasters.
	Reductions in Operating Expenditures	• The development of a CDT will not result in any direct reductions in operating expenditures. The information produced by modelling in the CDT could, however, produce potential reductions in operating expenditures for sectors such as transport, water, and energy.
	Other Indicators / Social and Economic Benefits	• The activities and investments around a CDT can provide an impetus into the digital economy market of Dushanbe and Tajikistan as a whole and support possible job creation through additional staff positions within DSC (estimated at 2 GIS and data-related roles) and within the private sector (estimated at a possible 15 new ICT jobs in the first 3 years)
Potential Project Risks	**Area**	**Risks**
	Social	The needs of vulnerable populations (women, children, the elderly, people with disabilities) are not effectively captured and attended by the CDT. A key concern is the current low digital literacy in Dushanbe/Tajikistan.
	Environmental	New technologies and innovations may have unexpected or unknown effects to the environment. The computing needs of a CDT could increase the carbon footprint of the city. Monitoring and modelling functions needs to be checked for producing accurate information to inform appropriate decision-making.
	Economic	The city may not find a sustainable source of funding for the creation and running of the CDT. If initial fund capitalisation is based on donor grant financing, the CDT's medium-term sustainability of operation may be at risk. The current market of ICT service providers in Tajikistan may require procurement of foreign service providers which may come at a higher cost.
	Other	The low internet speed in Dushanbe may pose an infrastructural challenge to the full functionality of the CDT. The use of digital technologies comes with cyber risks, e.g., linked to hacking of government computer systems. Some stakeholders might not want to rely on data-driven decision-making or go against the findings. Other stakeholders might rely too much on the CDT, seeing its results as "hard truths", and do not fully understand its limitations.

5. GCAP Implementation and Monitoring

5.1. Implementation and Monitoring Objectives

This chapter outlines the key roles and responsibilities that have been put in place to implement the GCAP Dushanbe and track its progress for both delivery and impact. The key roles include the Green City Coordinator, the GCAP Coordination Board and Green Champions. These roles will maintain accountability for the progress of the GCAP over the timelines set out in this document.

A transparent process has been established for monitoring, evaluating and reporting on the implementation of the GCAP. Supported by two excel-based tools, the objectives of this approach are to:

- Track implementation progress of GCAP actions through a Progress Monitoring Plan (PMP);
- Identify whether each implemented action is having the desired results and impacts, linking back to state and pressure indicators through the Impact Monitoring Plan (IMP);
- Facilitate learning about what is and what is not working, both in terms of the actions and the management and delivery structures in place within DCA; and
- Determine what adjustments need to be made during the GCAP implementation to maximise the potential positive impacts.

The results of GCAP monitoring can be complementary to other planning agendas and activities in DCA. Aligning the GCAP monitoring with other planned activities within DCA will help to streamline data collection with other stakeholder engagement initiatives, reducing duplication and improving efficiency.

5.2. Governance Structure for GCAP Implementation

The monitoring and evaluation roles for the GCAP Dushanbe are further detailed in Table 5.1, while Figure 5.1 provides an overview of the key organisation structure for the related processes.

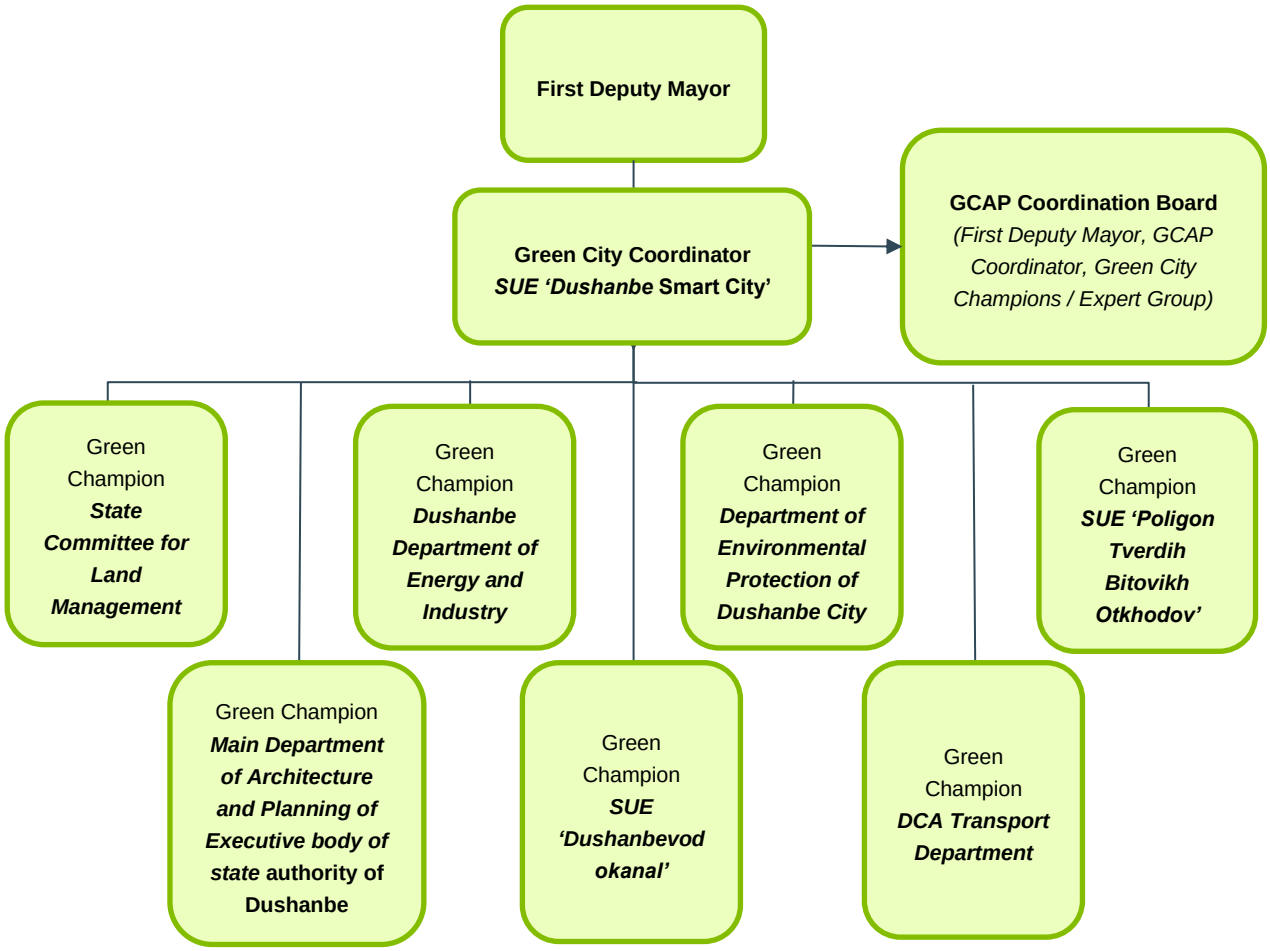
Table 5.1. GCAP Dushanbe Monitoring and Evaluation Roles

Role	Role Details
Green City Coordinator	The Green City Coordinator will be appointed by an internal DCA order and will sit within the SUE 'Dushanbe Smart City'. This role will: • Oversee implementation, liaising with relevant municipal departments; • Coordinate the monitoring and reporting of the GCAP across departments, ensuring that the Progress Monitoring Plan (PMP) and Impact Monitoring Plan (IMP) are updated accordingly; • Collaborate with action leads to ensure the proper progress monitoring of actions; • Help identify and establish Green Champions; • Set standards for data collection and storage; • Collaborate with the GCAP Coordination Board, seeking high-level technical input from the GCAP Coordination Board as and when required; and • Develop an Annual Action Progress Report.
Departmental Green Champion	Each municipal department that has taken responsibility for the GCAP actions included in this document will appoint one Departmental Green Champion (DGC). The DGCs will be responsible for: • Monitoring the progress of the relevant actions within their department;

	• Determine and liaise with appropriate stakeholders for data collection and action implementation; • Responsible for completing relevant sections of the PMP and IMP Tool; and • Work collaboratively with other DGCs, especially on cross-cutting issues.
GCAP Coordination Board	The Coordination Board will be responsible for implementing and monitoring actions as well as decision making during the implementation period. The composition of the Coordination Board will be confirmed before the GCAP implementation and could include a range of stakeholders, including members from GCAP process Expert Group, DGCs, and the Green City Coordinator. They will: • Meet at least twice a year to make decisions regarding the actions; • Provide technical advice to DGCs and Green City Coordinator; and • Provide insight into departmental priorities and opportunities for new green city actions.

Source: AECOM, 2022.

Figure 5.1. GCAP Dushanbe Monitoring and Evaluation Organisational Structure



Source: AECOM, 2022.

5.3. Monitoring of Actions Implementation and Environmental Performance

Progress Monitoring Plan (PMP)

The PMP sets out all the GCAP actions broken down by strategic objective and target, including the body responsible for implementation and key milestones. The PMP also provides the sequence of action milestones over the life of the action. A screenshot of the PMP is provided in Figure 5.2 at the end of this chapter.

The Green City Coordinator will ultimately be responsible for overseeing the PMP, while the Departmental Green Champions will be responsible for updating the PMP for their respective actions, feeding this back to the Green City Coordinator, who in turn will report to the Green City Coordination Board on a bi-annual basis. The results of the monitoring will inform the planning of subsequent stages of each action as well as any required amendments to timeframes, resources and budgets.

Impact Monitoring Plan (IMP)

It is also critical to measure the extent to which GCAP actions are having the desired impact, along with any possible unintended consequences. The IMP is based on the Indicators Database used to inform the Technical Assessment that was a key basis for this GCAP report. It establishes a quantitative baseline for the state of environmental assets, as well as sectors that exert pressure on Dushanbe's environment. The IMP sets out the baseline condition for each indicator against which an annual evaluation will be undertaken. A screenshot of the IMP is provided in Figure 5.3 at the end of this chapter.

The indicators included in the IMP were selected from the original Indicators Database, narrowed down to those indicators that directly link to actions, are already available in Dushanbe, or should be collected to allow for effective impact monitoring of certain actions.

This will enable the consistent assessment of the impact the various actions will have on the environmental state, and sectoral pressures, over the short to medium-term. The aim is to identify whether each implemented action is having the desired results and impacts, and if not, identify what interventions may be required to adjust or adapt the action.

The Green City Coordinator will be responsible for overseeing the IMP, while each Departmental Green Champion will be responsible for monitoring the set of indicators that are linked to that department's actions. The Departmental Green Champions will update the IMP for their respective indicators on an annual basis and feed this back to the Green City Coordinator. As many actions will be impacting indicators across the objectives of several departments, Departmental Green Champions across all departments will need to work collaboratively to monitor annual impacts. Subsequently, the Green City Coordinator will provide an update to the Green City Coordination Board. This feedback can be provided through the GCAP Coordination Board Meeting, for review.

Sharing Lessons Learned

The Green City Coordinator will provide concise bi-annual updates to the Green City Coordination Board on the PMP and annual updates on the IMP. It is suggested that an Annual Progress Report is produced and presented following the annual Coordination Board Meeting, including a summary of:

- Action implementation status and any issues encountered;
- Recommendations for revisions to any GCAP actions;
- Change in a 'dashboard' of key state and pressure indicators;
- Potential new GCAP actions for consideration; and
- A public fact sheet on implementation progress to be published on the DCA website. Press releases and case studies may also be produced to highlight specific success stories. Further information can be shared through DCA's and DSC's social media channels.

Improving Baseline Data

Successful monitoring and evaluation processes are grounded in good quality data. During the data collection for the development of this GCAP several limitations were encountered, including:

- **Pressure Indicators**: Regarding indicators outlining the pressure on the environment, substantial areas of data collection have proved either challenging to obtain or unavailable. According to various sources, municipal data with relation to solid waste typically only covers total volumes of such waste generation, and do not cover data on recycling performance. There is also little information on industrial waste, as regular reporting is not carried out[39]. Regarding energy consumption, there was little disaggregated data available that monitored specific heat, or electricity. Whilst basic data on transport was available for recent years, there was limited information available in previous years that was applicable to pressure on the environment or from which trends could be identified. Given that there are several areas that are missing, the database provides only a basic overview of many of the sectors and therefore qualitative data and information was needed to support the technical assessment.
- **State Indicators**: For indicators representing aspects of state of the environment, particular challenges were noted across several sectors. It was noted both by the project team as well as other sources[40] that in 2010 the Agency of Statistics suspended the collection data regarding water and the majority of available information on biological diversity, ecosystems and forests is outdated.[41] Additionally, it was reported that there have been no soil quality measurements taken in last 10 years. As there is no central database, numerous meetings were required with various departments and stakeholder such as the *SUE "Dushanbevodakanal"* and the *DCA Ecology Department*. In general, however, there was enough data to be able to provide a fairly reliable cross-sectoral overview of the state of environment in Dushanbe.
- As certain areas of data are not collected in Dushanbe, proxy indicators or qualitative information were gathered from local expert discussions with focal points or from third party studies to help ensure a comprehensive understanding overview of the environmental context in the city. An overview of the specific data challenges relating to the PSR framework are summarised in Table 5.2.

DCA can address these limitations in the following ways:

- Using the existing Indicator Database as a starting point, the Green City Coordinator and Departmental Green Champions will map out data sources. This will include addressing the gaps noted above and any others that the Green City Coordinator and Departmental Green Champions think are critical to ensure effective monitoring and evaluation.
- The Green City Coordinator and Departmental Green Champions will establish clear lines of communication around data collection and the data owners. This includes creating clear data collection schedules. Additionally, they will work with the data owners to identify ways in which the data gaps can be addressed.
- As part of the monitoring and evaluation process, the Green City Coordinator and Departmental Green Champions will iterate on the IMP, identifying additional indicators that are relevant to better assess the impact of the respective actions.

Table 5.2. Summary of Data Availability for PSR Indicators

	Core	Optional	Additional	Total
Overall	79%	33%	100%	64%
State	78%	46%	NA	59%
Pressure	50%	29%	100%	49%
Response	100%	NA	NA	100%

Source: AECOM & Urbanlogic & ARPA. 2021. GCAP Dushanbe Indicators Database. Excel File. London.

[39] https://unece.org/DAM/env/epr/epr_studies/ECE.CEP.180.Eng.pdf, pg xxvii
[40] https://unece.org/DAM/env/epr/epr_studies/ECE.CEP.180.Eng.pdf, pg xxvii
[41] https://unece.org/DAM/env/epr/epr_studies/ECE.CEP.180.Eng.pdf, pg 78

Figure 5.2. GCAP Dushanbe Progress Monitoring Plan (PMP) Excel Tool

City	Country	Sector	GCAP Action Smart potential	Action Code	GCAP Actions	Investment / Policy	GCAP Action Classification	Implementing Body	Source of Funding [Potential] (Municipal budget, national budget, PPP, Private sector, IFIs, Donors)	Potential Support (Any IFIs involved) (EBRD support for investment and/or TC)	Status Implementation	Description Note	Date	Entered by	CAPEX (€) estimate	OPEX (over 5 years) (€) estimate	Devt & Advisor costs	Funding source	PPP potential (y/n)
Dushanbe	Tajikistan	Energy	Directly targeted	**1**	**Modernise and expand energy-efficient city-wide street lighting**	Investment ('Hard')	Capital Investment	SUE "Dushanbe for City Lighting" supported by the city's Department of Energy and Industry	Grant, Municipal budget, Concessional Loan						2,422,500	800,000	100,000		y
Dushanbe	Tajikistan	Energy	N/A	**2**	**Carry out study on cleaner fuel options for combined heat and power plants**	Policy ('Soft')	Investment-related feasibility study	City of Dushanbe's Department of Energy and Industry and JSC "Dushanbe CHPP"	Grant						N/A	N/A	75,000		n
Dushanbe	Tajikistan	Energy	Directly targeted	**3**	**Phase out coal in more than 20 coal-fired boiler houses**	Investment ('Hard')	Capital Investment	Dushanbe City Authority, Department of Energy and Industry and Dushanbe Teploset JSC	Grant, Equity, Concessional Loan						25,000,000	1,250,000	800,000		n
Dushanbe	Tajikistan	Energy	Directly targeted	**4**	**Modernise, climate-prove, and expand district heating network and infrastructure**	Investment ('Hard')	Capital Investment	City of Dushanbe's Department of Energy and Industry and JSC "Dushanbe CHPP"	Sovereign-guaranteed loan, Grant	EBRD					9,346,000	1,409,000	N/A		n
Dushanbe	Tajikistan	Water	Some elements	**5**	**Rehabilitate and extend drinking water supply network in key areas of the city**	Investment ('Hard')	Capital Investment	State Unitary Enterprise Dushanbevodokanal (SUE DVK)	Grant, Municipal Budget	World Bank, ADB					47,100,000	950,000	N/A		n
Dushanbe	Tajikistan	Water	N/A	**6**	**Rehabilitate and extend sewerage network and upgrade wastewater treatment**	Investment ('Hard')	Capital Investment	State Unitary Enterprise Dushanbevodokanal (SUE DVK)	Grant, Municipal Budget	World Bank, ADB					17,300,000	350,000	N/A		n
Dushanbe	Tajikistan	Water	Some elements	**7**	**Devise an institutional and capacity development programme for more sustainable water supply and wastewater services**	Policy ('Soft')	Awareness, demonstration, training, and capacity building. Organisational measure	State Unitary Enterprise Dushanbevodokanal (SUE DVK)	Grant, Municipal Budget	World Bank, ADB					N/A	N/A	5,900,000		n
Dushanbe	Tajikistan	Water	N/A	**8**	**Invest in green-grey infrastructure in flood risk zones**	Investment ('Hard')	Capital Investment	Dushanbe City Department of Architecture and Planning and Dushanbe City Department for Irrigation and Drainage	Grant, Equity, Concessional Loan, National Budget, Municipal Budget						12,500,000	500,000	350,000		n
Dushanbe	Tajikistan	Transport	Some elements	**9**	**Develop a Sustainable Urban Mobility Plan for Dushanbe**	Policy ('Soft')	Strategies, plans, and programmes	Transport Department (Dushanbe City Administration) Transport-related State Unitary Enterprises (SUEs) (4 Units – "Bus-1", "Bus-2", "Bus-3" and "Trolleybus") Department of Architecture and Urban Planning SUE "Dushanbe hadamot nakliyotrason"	Grant						N/A	N/A	800,000		n
Dushanbe	Tajikistan	Transport	Some elements	**10**	**Develop pilot transport projects focused on sustainable urban mobility**	Investment ('Hard')	Capital Investment	Transport Department (Dushanbe City Administration) Transport-related State Communal Unitary Enterprises (SUEs) (4 Units – "Bus-1", "Bus-2", "Bus-3" and "Trolleybus") Department of Construction and Utilities Department of Architecture and Urban Planning SUE "Dushanbe hadamot nakliyotrason"	Grant, Equity, Concessional Loan, Municipal Budget						10,450,000	1,306,250	650,000		y
Dushanbe	Tajikistan	Transport	Some elements	**11**	**Prepare a local sustainable mobility and e-mobility plan for the city centre**	Policy ('Soft')	Strategies, plans, and programmes	Transport Department (Dushanbe City Administration) Transport-related State Communal Unitary Enterprises (SUEs) (4 Units – "Bus-1", "Bus-2", "Bus-3" and "Trolleybus") SUE "Dushanbe hadamot nakliyotrason"	Municipal Budget, Grant						N/A	N/A	400,000		n
Dushanbe	Tajikistan	Transport	Some elements	**12**	**Implement a fleet renewal and EV charging infrastructure programme for urban transport and e-mobility**	Investment ('Hard')	Capital Investment	Transport Department (Dushanbe City Administration) Transport-related State Communal Unitary Enterprises (SUEs) (4 Units – "Bus-1", "Bus-2", "Bus-3" and "Trolleybus") Department of Energy and Industry SUE "Dushanbe hadamot nakliyotrason"	Grant, Equity, Concessional Loan, Municipal Budget						20,800,000	1,975,000	750,000		y

City	Country	Sector	GCAP Action Smart potential	Action Code	GCAP Actions	Investment / Policy	GCAP Action Classification	Implementing Body	Source of Funding [Potential] (Municipal budget, national budget, PPP, Private sector, IFIs, Donors)	Potential Support (Any IFIs involved) (EBRD support for investment and/or TC)	Status Implementation	Description Note	Date	Entered by	CAPEX (€) estimate	OPEX (over 5 years) (€) estimate	Devt & Advisor costs	Funding source	PPP potential (y/n)
Dushanbe	Tajikistan	Buildings	Directly targeted	**13**	**Develop and adopt a comprehensive programme for increased energy-efficient affordable housing**	Investment ('Hard')	Capital Investment	DCA/Main Department of Architecture and Planning. DCA/Land Management Committee for Investments and State Property Management.	Grant, Equity, Concessional Loan, National Budget						4,000,000	600,000	650,000		y
Dushanbe	Tajikistan	Buildings	Some elements	**14**	**Carry out area-based infrastructure upgrading and energy-efficient retrofitting pilot programme for older multi-storey apartment block neighbourhoods**	Investment ('Hard')	Capital Investment	DCA/Department of Construction and Utilities DCA/Land Management Committee	Grant, Equity, Concessional Loan, Municipal Budget, Loan						4,000,000	600,000	550,000		y
Dushanbe	Tajikistan	Buildings	Some elements	**15**	**Update permission process and provide incentives to scale up and strengthen compliance with energy-efficient (EE) building construction and retrofitting in accordance with local EE codes**	Policy ('Soft')	Standards, guidelines, and regulations	Main Department of Architecture and Planning/Local Authority for Architecture and Urban Planning	Grant, Municipal Budget						7,500,000	N/A	150,000		n
Dushanbe	Tajikistan	Buildings	Some elements	**16**	**Incentivise and invest in energy-efficient upgrading and retrofitting of public and private buildings**	Investment ('Hard')	Capital Investment	Main Department of Architecture and Planning/Local Authority for Architecture and Urban Planning.	Grant, Equity, Concessional Loan, National Budget, Municipal Budget						10,580,000	1,322,500	980,000		n
Dushanbe	Tajikistan	Industries	Directly targeted	**17**	**Devise strategy and set up fund and innovation platform to increase green-oriented entrepreneurship and industrial development**	Investment ('Hard')	Strategies, plans, and programmes Awareness, demonstration, training, and capacity building	Department of Energy and Industry	Grant, Concessional Loan, Municipal Budget						3,000,000	150,000	250,000		n
Dushanbe	Tajikistan	Industries	Some elements	**18**	**Develop green procurement processes for improved environmental performance in public and private sector**	Policy ('Soft')	Standards, guidelines, and regulations	DCA Planning and Public Procurement Sector / Agency for Public Procurement of Goods, Works and Services	Grant, National Budget, Municipal Budget						N/A	N/A	250,000		n
Dushanbe	Tajikistan	Industries	Some elements	**19**	**Improve separation of sensitive land uses from significant polluting users**	Policy ('Soft')	Strategies, plans, and programmes	Department of Energy and Industry	Grant, Municipal Budget						N/A	N/A	250,000		n
Dushanbe	Tajikistan	Solid Waste	Some elements	**20**	**Develop and implement a system for diverting waste from landfill including sorting, recycling and recovery**	Policy ('Soft')	Capital Investment, Investment-related feasibility study	State Unitary Enterprise (SUE) "Svalka Tverdobitovikh Otkhodov"	Grant, Equity, Concessional Loan, Municipal Budget, Loan	EBRD					27,250,000	4,125,000	1,500,000		y
Dushanbe	Tajikistan	Solid Waste	Directly targeted	**21**	**Launch construction and demolition waste recycling and reuse across the city**	Investment ('Hard')	Capital Investment, Investment-related feasibility study	State Unitary Enterprise (SUE) "Svalka Tverdobitovikh Otkhodov"	Grant, Equity, Concessional Loan, Municipal Budget, Loan						5,000,000	750,000	450,000		y
Dushanbe	Tajikistan	Solid Waste	Some elements	**22**	**Construct new sanitary landfill site and close and remediate existing landfill site**	Investment ('Hard')	Capital Investment, Investment-related feasibility study	State Unitary Enterprise (SUE) "Svalka Tverdobitovikh Otkhodov"	Grant, Equity, Concessional Loan, National Budget, Municipal Budget, Loan	EBRD					42,750,000	2,125,000	750,000		y
Dushanbe	Tajikistan	Land Use and Biodiversity	Some elements	**23**	**Devise municipal staff capacity development programme on sustainable urban development**	Policy ('Soft')	Awareness, demonstration, training, and capacity building Organisational measure	Dushanbe City Authority & Dushanbe City Land Management Committee	Grant, National Budget						N/A	N/A	250,000		n
Dushanbe	Tajikistan	Land Use and Biodiversity	Some elements	**24**	**Devise community green space conservation and biodiversity upgrading programme for targeted local area investments utilising nature-based solutions**	Investment ('Hard')	Strategies, plans, and programmes	Dushanbe City Department for Landscape Improvement and Department of the Committee for Environmental Protection	Grant, National Budget, Municipal Budget						1,500,000	250,000	250,000		n
Dushanbe	Tajikistan	Land Use and Biodiversity	Some elements	**25**	**Strengthen development control and land management towards ecologically-rich and climate-resilient neighbourhood-scale planning**	Policy ('Soft')	Capital Investment, Strategies, plans, and programmes	State unitary enterprise Smart City and Dushanbe City Department of Architecture and Planning	Grant, National Budget, Municipal Budget						50,000	500,000	150,000		n
Dushanbe	Tajikistan	Land Use and Biodiversity	Directly targeted	**26**	**Improve environmental practices through systematic environmental data collection, monitoring, and online platform**	Investment ('Hard')	Capital Investment, Awareness, demonstration, training, and capacity building, Monitoring, data collection, analysis, and studies	SUE Smart City and Dushanbe City Committee for Environmental Protection	Grant, Municipal Budget, Loan						225,000	30,000	200,000		y
Dushanbe	Tajikistan	Smart City	Directly targeted	**27**	**Develop a citywide digital twin for Dushanbe**	Investment ('Hard')	Capital Investment	SUE Dushanbe "Smart City" (DSC)	Grant, National Budget, Municipal Budget	EBRD					4,500,000	562,500	250,000		y

Source: AECOM. 2022. GCAP Dushanbe PMP IMP Tool. Excel File. London.

Figure 5.3. GCAP Dushanbe Impact Monitoring Plan (IMP) Excel Tool

Indicators	Indicator Code	Sector	PSR	Trend	Colour code	Unit	Figure (In Indicator Database of GCAP)	Data Source / Contact Detail	Related Actions (Major Impact)	Related Actions (Medium Impact)	Related Actions (Minor Impact)	Figure (3 years after GCAP finalisation)	Colour code	Figure (5 years after GCAP finalisation)	Colour code
Average_annual_concentration_of_PM2.5	1	Air	State	Fluctuating	Red	µg/m3	21	Collected from the monitoring reports of the Committee for Environmental Protection. Hasan Sherov Monitoring station in East of Dushanbe –'84 Microrayon'	Transport	Energy	Industry				
Average_annual_concentration_of_PM10	1.1	Air	State	Upwards	Red	µg/m3	252	Collected from the monitoring reports of the Committee for Environmental Protection. Hasan Sherov Monitoring station in East of Dushanbe –'84 Microrayon'	Transport	Energy	Industry				
Average_daily_concentration_of_SO2	1.2	Air	State	Fluctuating	Red	µg/m3	65	Collected from the monitoring reports of the Committee for Environmental Protection. Hasan Sherov Monitoring station in East of Dushanbe –'84 Microrayon'	Transport	Energy	Industry				
Average_daily_concentration_of_NOx	1.3	Air	State	Upwards	Green	µg/m3	23	Collected from the monitoring reports of the Committee for Environmental Protection. Hasan Sherov Monitoring station in East of Dushanbe –'84 Microrayon'	Transport	Energy	Industry				
Biochemical Oxygen Demand in rivers and lakes (Varzob River)	2	Water	State	Fluctuating	Green	µg/m3	1.4	Collected from the monitoring reports of the Committee for Environmental Protection Jamshed Ismoilzod	Water	Solid Waste	Land-Use & Biodiversity				
Ammonium concentration in rivers and lakes (Varzob River)	2.1	Water	State	Upwards	Red	mg/L	2.3	Collected from the monitoring reports of the Committee for Environmental Protection Jamshed Ismoilzod	Water	Solid Waste	Land-Use & Biodiversity				
Ammonium concentration in rivers and lakes (Kafirnigan River)	2.2	Water	State	Fluctuating	Red	mg/L	2.25	Collected from the monitoring reports of the Committee for Environmental Protection Jamshed Ismoilzod	Water	Solid Waste	Land-Use & Biodiversity				
Water Exploitation Index	5	Water	State	Downwards	Red	%	49%	Provided by DVK on 9 March 2021, after several meetings with stakeholders at DVK (Mr. Kabirov N, DVK planning department)	Water	Solid Waste	Land-Use & Biodiversity				
Number of contaminated sites	4	Land	State	N/A	N/A	CSs / 1000 inh (or km²)	No Data		Industries	Solid Waste	Land-Use & Biodiversity				
Concentration of mercury in soil	4.1.a	Land	State	N/A	N/A	mg/kg	No Data		Industries	Solid Waste	Land-Use & Biodiversity				
Concentration of cadmium in soil	4.1.b	Land	State	N/A	N/A	mg/kg	No Data		Industries	Solid Waste	Land-Use & Biodiversity				
Concentration of zinc in soil	4.1.c	Land	State	N/A	N/A	mg/kg	No Data		Industries	Solid Waste	Land-Use & Biodiversity				
Open green space area ratio per 100,000 inhabitants	6	Land	State	N/A	Red	m2/capita	3.59%	Copernicus 2019 Land Use Dataset put the green space at 1.9%, but likely misses out on smaller pervious surfaces. This is also at odds with the UNECE Environmental Performance Review document, which calculated green space in 2009 at 19%	Land-Use & Biodiversity	Industries	Buildings				
Share of green space areas within urban limits	6.1	Land	State	N/A	N/A	%	No Data		Land-Use & Biodiversity	Industries	Buildings				
Share of population with an authorised connection to electricity	21	Energy	Presssure	N/A	Green	%	100%	Third Environmental Performance Review UNECE, 2017, page 242, Republic of Tajikistan, Population and Housing Census 2010, Agency of Statistics 2013	Energy	Buildings	Industries				
Share of population with access to heating cooling	22	Energy	Presssure	N/A	Green	%	91%	EBRD District Heating Study. 2020. Page 40.	Energy	Buildings	Industries				
Proportion of total energy derived from RES as a share of total electricity consumption in Dushanbe	23	Energy	Presssure	Stable	Green	%	85%	OJSC "Barki Torjik." Current department information 2020.	Energy	Buildings	Industries				
Water consumption per capita	25	Water	Presssure	Upwards	Yellow	L/ day/ capita	229	The available data were provided by SUE Dushanbevodokanal's, planning department, data based on registered water consumption to the DVK's customers Mr. Kabirov N, DVK planning department	Water	Buildings	Energy				
Water consumption per unit of city GDP	25.1	Water	Presssure	Fluctuating	Yellow	L/ day/ USD	0.036	The available data were provided by SUE Dushanbevodokanal's, planning department, based on registered water consumption to the DVK's customers	Water	Buildings	Energy				
Unit of water consumed in power plants, per unit of primary energy generated	25.2	Water	Presssure	N/A	N/A	l/MW/h	No Data	Data not available, data was requested on 26 January 2021 Mr. Kabirov N, DVK planning department	Water	Energy	Industries				
Industrial water consumption as percent of total urban water consumption	25.3	Water	Presssure	N/A	N/A	%	No Data	Data not available, data was requested on 26 January 2021 Mr. Kabirov N, DVK planning department	Water	Industries	Energy				
Non-revenue water	26	Water	Presssure	Downwards	Red	%	49%	DVK is delaying to provide this data, was used information from feasibility study report for sewerage system of Dushanbe developed on 2020 by JSC Korezloiha-design Institution. The water expert will cross check and recalculate when DVK will provide its data Mr. Kabirov N, DVK planning department	Water	Buildings	Industries				
Annual average of daily number of hours of continuous water supply per household	26.1	Water	Presssure	Upwards	Yellow	h/day	19.2	Mr. Kabirov N, DVK planning department	Water	Buildings	Energy				
Percentage of residential and commercial wastewater that is treated according to applicable national standards	27	Water	Presssure	Upwards	Red	%	19%	Mr. Kabirov N, DVK planning department	Water	Industries	Energy				
Average age of car fleet total and by type	10	Transport	Presssure	N/A	Red	Years	16	Third Environmental Performance Review UNECE, 2017, page 34	Transport	Energy	Industries				
Percentage of diesel cars in total vehicle fleet	10.1	Transport	Presssure	N/A	Yellow	%	20.10%	Transport Unit of the Dushanbe city Chairman's office; Abduahadov Huseyn - Main Specialist	Transport	Energy	Industries				
CO2 emissions from mobile (transport) sources	10.4	Transport	Presssure	Upwards	N/A	Thousand Tons	330	Development Asia (ADB). 2019. How Electric Vehicles Can Make Tajikistan Emissions-Free.	Transport	Energy	Industries				
Transport modal share in commuting vehicles (cars, motorbike, taxi, bus metro, tram, bicycle, pedestrian)	11	Transport	Presssure	N/A	Yellow	Private Transport %	34%	Stat.tj - website of the state statistical committee	Transport	Energy	Industries				
Motorisation rate	11.2	Transport	Presssure	Upwards	Green	Number of vehicles per capita	0.07%	Agency on Statistics under the President of the Republic of Tajikistan. Provision of population with individual automobiles, 1998-2016 http://oldstat.ww.tj/en/database/real-sector/	Transport	Energy	Industries				
Kilometres of road dedicate exclusively to public transport per 100,000 population	11.4	Transport	Presssure	N/A	Green	Km	12.6	Transport Unit of the Dushanbe city Chairman's office; Abduahadov Huseyn - Main Specialist	Transport	Land-Use & Biodiversity	Industries				
Travel speed of bus service on major thoroughfares	12.1	Transport	Presssure	N/A	Yellow	Km/h	20	Transport Unit of the Dushanbe city Chairman's office; Abduahadov Huseyn - Main Specialist	Transport	Energy	Industries				
Electricity consumption in buildings	14.3	Buildings	Presssure	Downwards	N/A	Million kWh	3603.8	Third Environmental Performance Review UNECE, 2017, page 241, Environmental Protection in the Republic of Tajikistan, Agency of Statistics 2014 and 2015	Energy	Buildings	Industries				
Residential buildings affected by natural hazards	14.4	Buildings	Presssure	Downwards	N/A	Units	283	Third Environmental Performance Review UNECE, 2017, page 241, Environmental Protection in the Republic of Tajikistan, Agency of Statistics 2014 and 2015	Buildings	Energy	Water				
Heating cooling consumption in buildings fossil fuels residential buildings fossil fuels	15.5	Buildings	Presssure	Upwards	N/A	kWh / year	1351.4	Joint-stock company (JSC) "Dushanbe CHP" (MBG highway Dushanbe) Production and technical department beginning. department Ratiani Tatiana Ionasovna. Current department information 2020	Energy	Buildings	Industries				
Gas Heating cooling consumption in buildings fossil fuels residential buildings fossil fuels	15.6	Buildings	Presssure	Upwards	N/A	Million m3 / year	193105	Joint-stock company (JSC) "Dushanbe CHP" (MBG highway Dushanbe) Production and technical department beginning. department Ratiani Tatiana Ionasovna. Current department information 2020	Energy	Buildings	Industries				
Oil Heating cooling consumption in buildings fossil fuels residential buildings fossil fuels	15.7	Buildings	Presssure	Downwards	N/A	Thousand tons	0.476	Joint-stock company (JSC) "Dushanbe CHP" (MBG highway Dushanbe) Production and technical department beginning. department Ratiani Tatiana Ionasovna. Current department information 2020	Energy	Buildings	Industries				
Coal Heating cooling consumption in buildings fossil fuels residential buildings fossil fuels	15.8	Buildings	Presssure	Upwards	N/A	Thousand tons	1026961	Joint-stock company (JSC) "Dushanbe CHP" (MBG highway Dushanbe) Production and technical department beginning. department Ratiani Tatiana Ionasovna. Current department information 2020	Energy	Buildings	Industries				
Electricity consumption in buildings	21	Buildings	Presssure	Downwards	N/A	Million kWh	3603.8	Data of OJSC "Barki Tochik" in https://unece.org/fileadmin/DAM/energy/se/pdfs/gee21/projects/others/Tajikistan.pdf	Energy	Buildings	Industries				
Share of population with access to heating or cooling	22	Buildings	Presssure	Upwards	N/A	Difference between planned and actual connections to district heating	120	OJSC "Dushanbe Heating Network". Production and technical department. Head of Department Muhabbat Sattorov. Current department information 2020	Energy	Buildings	Industries				
Total Solid Waste Generation Per Capita	29	Solid Waste	Presssure	Upwards	Yellow	Kg/year/capita	386.28	Logbook of SUE "SOLID WASTE POLYGON, Mavjuda Hakimova	Solid Waste	Buildings	Industries				
Proportion of MSW that is sorted and recycled	31	Solid Waste	Presssure	N/A	N/A	%	No Data		Solid Waste	Buildings	Industries				
Population density on urban land	33	Land-Use	Presssure	Upwards	Green	Residents/km2	8464	Asmatbekzoda F. responsible for the preparation of materials for the construction part Agency on Statistics under the President of the Republic of Tajikistan.	Land-Use & Biodiversity	Buildings	Industries				
Average annual growth rate of built-up areas	34	Land-Use	Presssure	Flucuating	Red	%	5%	Asmatbekzoda F. responsible for the preparation of materials for the construction part Agency on Statistics under the President of the Republic of Tajikistan.	Land-Use & Biodiversity	Buildings	Industries				

Source: AECOM. 2022. GCAP Dushanbe PMP IMP Tool. Excel File. London.

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