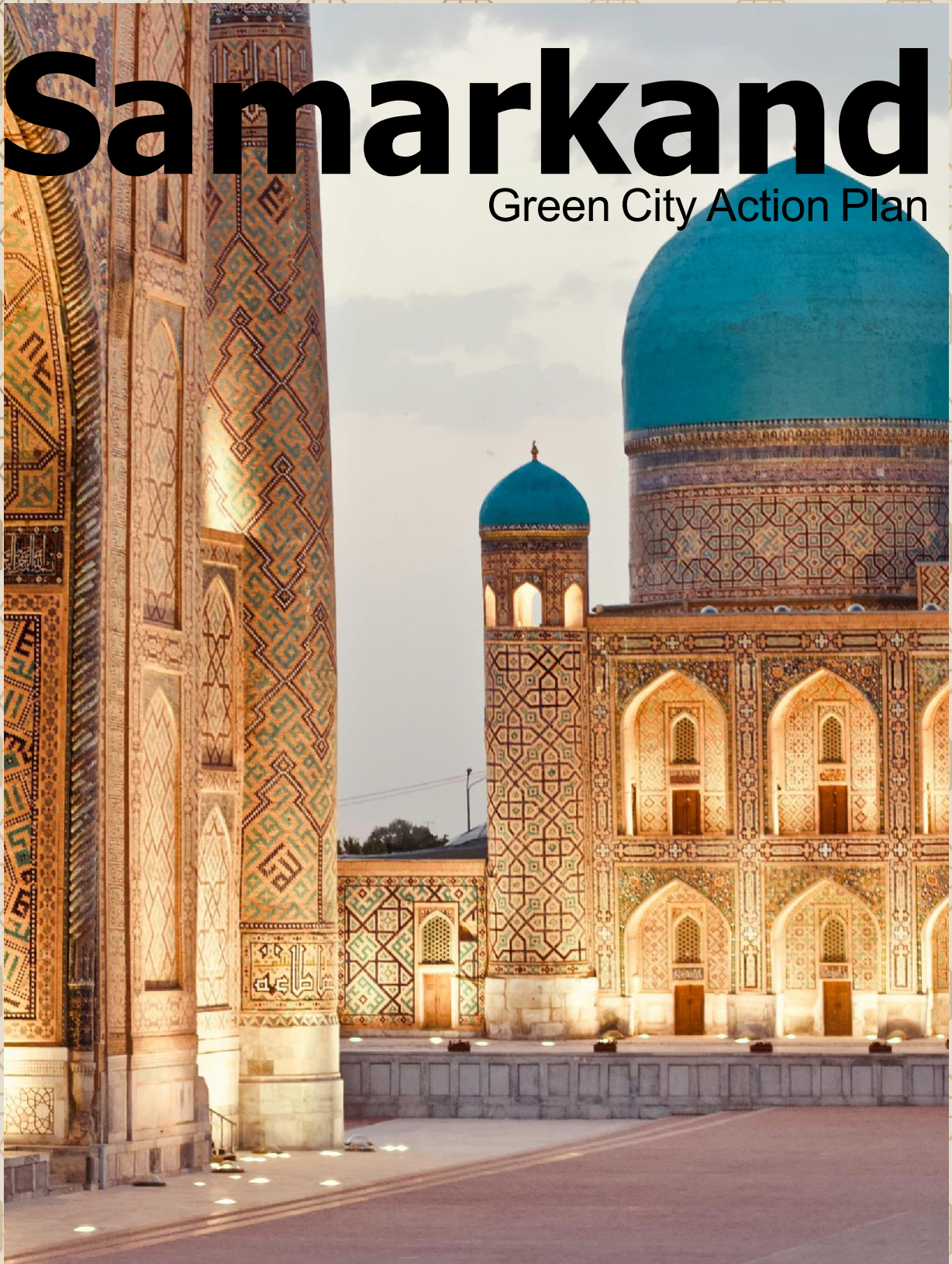


# Samarkand

Green City Action Plan



**EBRD GREEN CITIES**

  
European Bank  
for Reconstruction and Development

**IKS**  
GROUP OF COMPANIES

**AECOM**

Prepared by AECOM for:  
Samarkand Regional Government  
European Bank for Reconstruction and Development (EBRD)

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# Foreword



Samarkand is globally famous as the Crossroad of the Silk Road, where traders from Europe and Asia met. Our UNESCO World Heritage site attracts thousands of visitors each year. Now, Samarkand needs to grow and develop to meet the needs of the 21<sup>st</sup> century while preserving the unique and beautiful architecture and heritage for which we are famous.

It was for this reason that in 2021, Samarkand joined the European Bank for Reconstruction and Development's (EBRD's) Green Cities programme- the first city in Uzbekistan to do so. A critical step in the Green Cities

programme is the development of a Green City Action Plan (GCAP), with the generous support of EBRD.

This report is the final GCAP report for Samarkand. It enables us to identify, prioritise and address the most pressing environmental challenges faced by the city. The GCAP presents 31 Actions across sectors including buildings, climate change and resilience, energy, industries, solid waste, urban development and water. These Actions will not only result in environmental benefit, but they will also promote Samarkand's resilience to climate and disaster risks, improve its smart maturity, promote gender and social inclusion and protect and enhance Samarkand's beautiful heritage assets.

The Actions have been designed to be ambitious and challenging but feasible in terms of implementation, monitoring and evaluation. They comprise a mixture of infrastructure investments and policy, behavioural and institutional measures.

Because it is designed to be a holistic document to maximise environmental benefit, the GCAP also contains crosscutting actions. This integrated approach will facilitate its implementation by governments at Regional, city and national level, ably assisted by key partners across academia and the public and private sectors, as well as by non-governmental organisations and civil society.

I fully endorse the GCAP Vision of a historic, green, safe and comfortable city, with clean air, beautiful heritage and modern infrastructure. A city where fair governance and smart technology improves environmental sustainability and the quality of residents' lives. The Vision and the GCAP as a whole builds on and is aligned with important strategies at a nation level that are helping Uzbekistan grow economically while protecting the country's fragile environment. These include the New Uzbekistan Development Strategy 2022-26 and the Action Plan on the Transition to a Green Economy and Ensuring Green Growth in Uzbekistan until 2030.

The GCAP comes at a crucial time for Samarkand and Uzbekistan, as both seek to balance economic and social development with the need to decarbonise infrastructure, transport and buildings. This provides opportunities, both in terms of green jobs and green financing- for example, Uzbekistan launched its first ever green bonds in late 2023, as the GCAP report was being progressed. Instruments such as these will prove important in turning the GCAP Actions into tangible investments and infrastructure.

Multiple people and organisations have worked together to develop this GCAP over several months. I would like to thank in particular my staff from Samarkand Regional Government, the City government and their partner State Unitary Enterprises and Joint Stock Companies. I would also like to thank the representatives of non-governmental organisations, academia and civil society who participated in the GCAP stakeholder engagement workshops and technical meetings; Mr Andi Aranitasi, head of the EBRD Uzbekistan office; Ms. Mariné Baghdasaryan, EBRD Manager for Samarkand GCAP; Mr Anvar Nasritdinov, EBRD Operation Lead for Samarkand GCAP; the EBRD Green Cities team and Sector Specialists; and the consulting team led by AECOM.

**Boboiev Adiz Muzafarovich**  
**Governor, Samarkand Region**

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# List of Acronyms

Acronym	Meaning	Acronym	Meaning
ADB	Asian Development Bank	MSW	Municipal Solid Waste
AFD	Agence Française de Développement	NCV	Natural Capital Valuation
AFOLU	Agriculture, Forestry and Other Urban Development and Green Spaces	NDC	Nationally-Determined Contribution
AI	Artificial Intelligence	NGL	Natural Gas Liquids
AIP	Annual Investment Plan	NGO	Non-governmental organisation
AQAP	Air Quality Action Plan	NO	Nitrous Oxide
BOD	Biochemical Oxygen Demand	NO <sub>2</sub>	Nitrogen Dioxide
BREEAM	Building Research Establishment Environmental Assessment Method	NOx	Oxides of Nitrogen
CAPEX	Capital Expenditure	OPEX	Operating Expenditure
CAREC	Central Asia Regional Economic Cooperation Program	PIA	Priority Investment Area
CBD	Convention on Biological Diversity	PM	Particulate Matter
CO <sub>2</sub>	Carbon dioxide	PMP	Progress Monitoring Plan
CO <sub>2e</sub>	Carbon dioxide equivalent	PPP	Public-Private Partnership
DRR	Disaster Risk Reduction	PSR	Pressure-State-Response
EBRD	European Bank for Reconstruction and Development	PV	Photovoltaic
EPC	Energy Performance Certificate	RFP	Request for Proposal
ESP	Electrostatic Precipitator	RTO	Regenerative Thermal Oxidiser
EU	European Union	RVA	Risk and vulnerability assessment
EUR	Euro	SCADA	Supervisory Control and Data Acquisition
GCAP	Green City Action Plan	SCO	Shanghai Co-Operation Organisation
GDP	Gross Domestic Product	SEP	Stakeholder Engagement Plan
GEF	Global Environment Facility	SIZ	Small Industrial Zone
GHG	Greenhouse gas	SMA	Smart Maturity Assessment
GIS	Geographic Information Systems	SME(s)	Small and Medium-Sized Enterprise(s)
GWh	Gigawatt hour	SO <sub>2</sub>	Sulphur Dioxide
HAP	Hazardous Air Pollutant	SOE	State-Owned Enterprise
ICT	Information and Communications Technology	SRG	Samarkand Regional Government
IDA	International Development Association	STEM	Science, Technology, Engineering and Mathematics
IFI	International Financial Institution	STS	Smart Traffic System
IKS	Islohotkonsaltsevis (Local Partner to AECOM)	SuDS	Sustainable Urban Drainage System(s)
ILO	International Labour Organisation	SUE	State Unitary Enterprise
IMP	Impact Monitoring Plan	TBR	Technical Baseline Report

IPPU	Industrial Processes and Product Use	UNDP	United Nations Development Programme
ISO	International Standards Organization	UNDRR	United Nations Office for Disaster Risk Reduction
ITS	Intelligent Transport System	UNECE	United Nations Economic Commission for Europe
IUCN	International Union for the Conservation of Nature	UNESCO	United Nations Educational, Scientific and Cultural Organisation
IWMP	Integrated Water Management Plan	UNICEF	United Nations Children’s Fund
JSC	Joint Stock Company	USD	United States Dollar
kTpa	Kilotons per Annum	Uzhydromet	Centre of Hydrometeorological Services under the Ministry of Emergency Situations, Uzbekistan
KWh	Kilowatt hour	UZS	Uzbek soum
LEED	Leadership in Energy and Environmental Design	Uzstat	Agency of Statistics Under the President of the Republic of Uzbekistan
MBT	Mechanical Biological Treatment Plant	VOC	Volatile Organic Compound
MEPCC	Ministry of Environmental Protection and Climate Change	WCP	Waste Collection Point
MO	Maroqand Obod (Samarkand municipal solid waste)	WHS	World Heritage Site
MRF	Materials Recovery Facility	WWTP	Wastewater Treatment Plant

# Executive Summary

## EBRD's Green Cities Programme

Urban areas are crucial to human development and growth, serving as **drivers of social, economic, and technological advancement**. With approximately half of the global population residing in cities, urban centres require substantial resources to cater to a **wide range of infrastructure and service demands**.

However, these demands can have significant environmental consequences. To respond to and address such challenges, the **European Bank for Reconstruction and Development (EBRD) has established the Green Cities Programme**, to work towards a more sustainable and inclusive future for urban areas and their inhabitants across Europe, Africa, the Middle East and Asia.

## About Samarkand

**Samarkand Regional Government joined the Green Cities Programme in 2022**, building on its prior successful collaboration with EBRD, which resulted in the successful deployment of e-buses, to cut traffic emissions across the city. Now, as the next stage of collaboration with EBRD, a **Green City Action Plan (GCAP)** has been developed. GCAPs are comprehensive action plans aimed at achieving a **sustainable and resilient urban future**. The GCAP process was launched by former **Regional Governor Erkinjon Turdimov** in March 2023 and its final report was completed in August 2024.

Samarkand is the **second-largest urban area in Uzbekistan and is globally famous for its UNESCO World Heritage Sites**, designated for preservation under the highly appropriate name of Crossroad of the Silk Road. However, like other cities in Uzbekistan as the nation develops quickly, Samarkand faces **multiple urban challenges including rapid population growth, climate impacts, and environmental pollution**. The GCAP for Samarkand combines infrastructure investments and policy interventions to guide urban development in a sustainable and inclusive direction. **Further information about Samarkand can be found in Chapter 2 of this report.**

## Development of the GCAP

GCAPs, including that of Samarkand, focus on key sectors that shape the urban environment. These sectors are **Biodiversity and Environment, Climate and Resilience, Energy, Water, Solid Waste, Transport, Urban Development and Green Space, Buildings, and Industries**. Of these sectors, the latter seven are referred to as 'infrastructure sectors'- Biodiversity and Environment and Climate and Resilience do not relate specifically to infrastructure but are nevertheless of strategic importance for GCAP purposes.

At the same time, the **GCAP considers how cross-cutting themes such as climate and disaster risk, smart maturity, gender and social inclusion, and heritage and tourism affect (and are affected by) each sector**. Using this detailed action plan and ongoing support from EBRD, Samarkand aims to transform its urban fabric and improve its citizens' quality of life, reflecting a visionary commitment to sustainable urbanisation.

This GCAP document was developed in line with EBRD's GCAP methodology<sup>1</sup>, which systematically assesses environmental challenges through a **Pressure-State-Response framework**. The methodology strongly emphasises stakeholder engagement, with input from a wide range of governmental and non-governmental stakeholders from Samarkand and beyond over the 19 months of GCAP development. Preparatory activities for GCAP development included the **identification of key stakeholders grouped by roles and responsibilities**. This information, captured in a Stakeholder Engagement Plan, informed the preparation of three Stakeholder Engagement Workshops and associated technical meetings. **The Technical Baseline Report, informed by these workshops and meetings, identified specific challenges (Table 0- and 0-2) and intervention opportunities. Further detail about the development process of the GCAP can be found in Chapter 1 of this report.**

## Environmental Challenges







The GCAP methodology requires every Green City Action Plan to research, identify and define the Priority Environmental Challenges (PECs) faced by the city. The PECs for Samarkand were identified through the baseline evidence gathering stage, with input from local stakeholders. Through the analysis, there was an appreciation that some challenges cut across sectors and relate to data availability and roles and responsibilities for implementation.

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

<sup>1</sup> EBRD, 2022. Available in English at: <https://www.ebrdgreencities.com/assets/Uploads/PDF/Green-City-Action-Plan-Methodology.pdf> and in Russian at: [https://ebrdgreencities.com/assets/Uploads/PDF/GCAP\\_2-1\\_Methodology-rus.pdf](https://ebrdgreencities.com/assets/Uploads/PDF/GCAP_2-1_Methodology-rus.pdf)

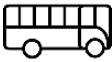



Table 0-1 below highlights the PECs identified for each environmental topic assessed (full details appear in Chapter 3). Table 0-2 then continues the identification of PECs for each of the GCAP infrastructure sectors.

**Table 0-1 Samarkand’s Priority Environmental Challenges by Environmental Topic**

<p><b>Air Quality</b></p> 	<ul style="list-style-type: none"> <li>• <b>Lack of clear, consistent data</b></li> <li>• <b>Elevated values of PM2.5 and PM10</b></li> </ul>
<p><b>Water Resources and Quality</b></p> 	<ul style="list-style-type: none"> <li>• <b>Pollution of important surface water sources</b></li> <li>• <b>Overall high level of water stress</b></li> </ul>
<p><b>Land and Soil Quality</b></p> 	<ul style="list-style-type: none"> <li>• <b>Lack of consistent monitoring and data collection</b></li> <li>• <b>Excessive use of fertilisers</b></li> </ul>
<p><b>Biodiversity and Open Space</b></p> 	<ul style="list-style-type: none"> <li>• <b>Tensions between urban growth and biodiversity conservation</b></li> <li>• <b>Inadequate provision of open/green spaces across the urban area</b></li> </ul>
<p><b>Climate Mitigation</b></p> 	<ul style="list-style-type: none"> <li>• <b>Greenhouse gas emissions</b></li> <li>• <b>Lack of clarity on local government role</b></li> </ul>
<p><b>Climate Change and Disaster Resilience</b></p> 	<ul style="list-style-type: none"> <li>• <b>Too little focus on climate change-related hazards</b></li> <li>• <b>Lack of clarity on DRR role for Regional and/or city government</b></li> </ul>

**Table 0-2 Samarkand’s Priority Environmental Challenges by Infrastructure Sector**

<p><b>Water</b></p> 	<ul style="list-style-type: none"> <li>• <b>Poor maintenance of drainage infrastructure</b></li> <li>• <b>Drought/water shortage</b></li> <li>• <b>High household water consumption</b></li> <li>• <b>Inadequate wastewater treatment</b></li> <li>• <b>Ageing/poor quality drinking water supply</b></li> </ul>
<p><b>Energy</b></p> 	<ul style="list-style-type: none"> <li>• <b>Ageing and inefficient network infrastructure</b></li> <li>• <b>Increasing energy demand</b></li> </ul>
<p><b>Solid Waste</b></p> 	<ul style="list-style-type: none"> <li>• <b>Lack of source separation of recyclables</b></li> <li>• <b>Lack of adequate recycling facilities</b></li> <li>• <b>Water, air and soil pollution from landfills</b></li> <li>• <b>Illegal waste dumping</b></li> <li>• <b>Lack of proper industrial/construction waste disposal</b></li> <li>• <b>Lack of proper hazardous waste disposal</b></li> </ul>

<p><b>Transport</b></p> 	<ul style="list-style-type: none"> <li>• Traffic congestion</li> <li>• Poor air quality from vehicle emissions</li> <li>• Inadequate walking and cycling infrastructure</li> <li>• Inadequate public transport</li> </ul>
<p><b>Urban Development and Green Space</b></p> 	<ul style="list-style-type: none"> <li>• Heritage risks</li> <li>• Lack of green/open spaces</li> <li>• Illegal or poorly planned development</li> </ul>
<p><b>Buildings</b></p> 	<ul style="list-style-type: none"> <li>• Old, poor quality public building stock</li> <li>• Poor enforcement of building safety and energy efficiency regulations</li> <li>• Poor energy efficiency in residential and commercial buildings</li> </ul>
<p><b>Industries</b></p> 	<ul style="list-style-type: none"> <li>• High levels of energy consumption and energy inefficiency</li> <li>• Potentially hazardous industrial wastewater is discharged</li> <li>• Sector generates high level of GHG and dust emissions</li> </ul>

Source: AECOM, 2023. GCAP Samarkand Technical Baseline Report

### Strategic Goals and Vision

Stakeholder input further refined draft Strategic Goals (Table 0-33) and informed the **Green City Vision Statement**, now endorsed by the GCAP Steering Committee:




**Samarkand’s Green City Vision Statement:**





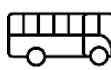

A historic, green, safe and comfortable city, with clean air, beautiful heritage and modern infrastructure. A city where fair governance and smart technology improves environmental sustainability and the quality of residents’ lives.

Source: AECOM. 2023. GCAP Samarkand: Vision and Strategic Goals.

Further detail on the GCAP Vision and Strategic Goals can be found in Chapter 4 of this report.

**Table 0-3. Samarkand’s Strategic Goals**

Sector	Strategic Goal(s)
<p><b>Environment and Biodiversity</b></p> 	<ul style="list-style-type: none"> <li>• Improve air and water quality in Samarkand</li> <li>• Protect and enhance biodiversity in Samarkand</li> </ul>
<p><b>Climate Change and Resilience</b></p> 	<ul style="list-style-type: none"> <li>• Improve Samarkand’s resilience to climate and natural disasters</li> <li>• Continue transition to renewable energy</li> </ul>
<p><b>Buildings</b></p> 	<ul style="list-style-type: none"> <li>• Promote energy efficiency within buildings in Samarkand</li> </ul>

Sector	Strategic Goal(s)
<b>Energy</b> 	<ul style="list-style-type: none"> <li>Use smart and renewable technologies to reduce energy consumption in Samarkand</li> <li>Modernise Samarkand's energy infrastructure</li> </ul>
<b>Industries</b> 	<ul style="list-style-type: none"> <li>Reduce the environmental impact of industries</li> </ul>
<b>Urban Development and Green Space</b> 	<ul style="list-style-type: none"> <li>Develop land use plans for Samarkand, incorporating heritage management</li> <li>Increase extent of Samarkand's green and open space</li> </ul>
<b>Solid Waste</b> 	<ul style="list-style-type: none"> <li>Introduce comprehensive system of waste recycling in Samarkand</li> </ul>
<b>Transport</b> 	<ul style="list-style-type: none"> <li>Decarbonise Samarkand's transport sector through low-emission vehicles</li> <li>Improve pedestrian and cycling infrastructure in Samarkand</li> </ul>
<b>Water</b> 	<ul style="list-style-type: none"> <li>Increase reuse/recycling of water in Samarkand</li> <li>Improve Samarkand's water supply and drainage infrastructure</li> </ul>

Source: AECOM, 2023. GCAP Samarkand: Vision and Strategic Goals.

## GCAP Actions

Green City Action Plans culminate in a list of **Actions which EBRD, the Regional Government and AECOM have collectively agreed are the most effective and realistic steps to take in order to transform the city's environmental challenges and impacts**. Each of the actions is also an opportunity for financial investment.

The **31 actions** presented in Table 0-4 were narrowed down from an initial 60 potential actions. Consultation with the city and stakeholders and evaluation by experts and the EBRD measured actions on their likelihood to tackle the challenges identified for each sector as well as their contribution to socio-economic alongside environmental outcomes. Their performance was also tested against the four cross-cutting themes (climate and disaster risk, smart maturity, gender and social inclusion and heritage and tourism).

The GCAP Steering Committee approved the **31 Green City Actions to take forward for detailed assessment and presentation within this final GCAP document, thus collectively forming an Action Plan for green development. All Actions are presented in Chapter 5 of this report.**

It is estimated that **EUR 1.18bn<sup>2</sup> is required for development and advisory support (both CAPEX and OPEX)** for Samarkand's GCAP Actions. Capital expenditures are estimated at a total of 1.08bn EUR and operational expenditures over the first 5 years at EUR 96.04m. All cost estimates are high-level assumptions based on the data available at the time of assessment, with the limitations this entails. Further, more detailed cost modelling work will be needed to inform the implementation of each Action, whether by the Regional Government or by other investors.

Although based on only limited local data and assumptions informed by international best practice, the carbon emissions reductions for the GCAP actions are estimated to be **223,342 tCO<sub>2e</sub> per annum** – making a direct contribution to Uzbekistan's Nationally Determined Contribution (NDC).

<sup>2</sup> Note at the time of writing the exchange rate was EUR 1 – UZS 14,234 (30 September 2024), so this figure in UZS is 16.824tn.

In addition to those environmental benefits, it is estimated that several of the GCAP actions have the potential for job creation, with an **estimated 20,727 new jobs** being created through construction, operation and maintenance works, as well as green economy services linked to several of the GCAP actions.

## Implementation and Monitoring



The GCAP report concludes with an **Implementation and Monitoring Plan** that will be used to track progress on the implementation of the thirty-one Green City Actions. The GCAP Coordinator at Samarkand Regional Government will have overall responsibility for progressing this implementation plan, providing bi-annual updates, with the Green Champions responsible for updating their respective actions; and it will be reviewed regularly at the Regional Government GCAP Coordination Unit meeting. The Progress Monitoring Plan and Impact Monitoring Plan has been designed to concisely facilitate the tracking of GCAP action implementation and outcomes, involving stakeholders from the public sector, private sector, and civil society. **For more detail, please refer to Chapter 6 of this report.**



## Stakeholder Engagement



**Stakeholder engagement has been critical to the development of the Samarkand GCAP** and included both in person and online outreach. In- person events took place over the course of four missions to Samarkand attended by EBRD and the Consultant Team, in March, June and November 2023 and April 2024 respectively. Each mission was designed with an overarching purpose for stakeholder engagement in mind. Efforts were made to allow for the participation of a diverse set of stakeholders to create a GCAP that reflects the range of issues affecting people living in Samarkand.


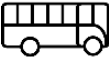
**Over the course of the project, the Consultant Team arranged and attended a Kick Off Meeting, a Launch Event, twelve Technical Meetings, three Stakeholder Engagement Workshops, and three Capacity Building Sessions. Collectively, 212 different individuals were engaged across the in person stakeholder engagement events, with a total of 294 in-person interactions. Including the online survey, the project has had benefitted from 491 different inputs from stakeholders. For more detail on stakeholder engagement within the Samarkand GCAP, please refer to Chapter 1 of this report.**



Table 0-4 GCAP Samarkand Actions - Summary Table

Sector	Action ID	Action Title	GCAP Action Classification	Cross-Cutting Themes / Co-Benefits				Estimated Costs			Estimated Carbon Emissions Reduction (Annual tCO <sub>2e</sub> )
				Climate and Disaster Risk	Gender and Social Inclusion	Smart Maturity	Heritage and Tourism	CapEx (EUR)	OpEx (EUR)	Feasibility / Advisory (EUR)	
Crosscutting 	C1	Establish a team for environmental data collection to gather and monitor data on buildings, industry, energy, and DRR	Other- Organisational measure, and monitoring, data collection, analysis and studies	Directly targeted	Some elements	Some elements	Some elements	0	208,000	5,382	1,035
	C2	Build capacity of city to collect and share data (using GIS systems) to map and plan for climate and disaster risks	Other- Awareness, demonstration, training and capacity building, and monitoring, data collection, analysis and studies	Directly targeted	Directly targeted	Some elements	Some elements	267,000	250,000	100,000	5,060
	C3	Develop a digital reporting platform to engage citizens on environmental and climate issues and policy	Other- Awareness, demonstration, training and capacity building, and monitoring, data collection, analysis and studies	Directly targeted	Directly targeted	Some elements	Some elements	38,000	28,000	0	0
Buildings 	B1	Invest in energy efficiency in buildings through thermal performance retrofit and building design standards	Capital	Directly targeted	Some elements	Some elements	No direct links	60,000,000	10,800,000	575,000	0
	B2	Invest in decarbonisation of district heating systems	Capital	Directly targeted	Some elements	No direct links	No direct links	102,369,000	10,237,000	210,000	0
	B3	Pilot review of seismic resilience of existing critical infrastructure to inform investment in retrofit measures	Capital	Directly targeted	Some elements	Some elements	Some elements	21,767,000	0	210,000	0

Sector	Action ID	Action Title	GCAP Action Classification	Cross-Cutting Themes / Co-Benefits				Estimated Costs			Estimated Carbon Emissions Reduction (Annual tCO <sub>2e</sub> )
				Climate and Disaster Risk	Gender and Social Inclusion	Smart Maturity	Heritage and Tourism	CapEx (EUR)	OpEx (EUR)	Feasibility / Advisory (EUR)	
Climate Change and Resilience 	CR1	Establish a scenario-based approach to disaster risk management (DRM) and response across all sectors	Other- Strategies, plans, and programmes, awareness, demonstration, training, and capacity building, organisational measure and behavioural measure	Directly targeted	Some elements	Directly targeted	Some elements	0	44,000	0	0
	CR2	Undertake a regional/city level GHG inventory to determine local climate mitigation opportunities	Other- Strategies, plans, and programmes, and monitoring, data collection, analysis and studies	Directly targeted	Some elements	No direct links	No direct links	0	0	230,000	0
	CR3	Identify/map hazards and vulnerabilities to climate risk in participatory way using GIS to improve urban resilience	Other- monitoring, data collection, analysis and studies	Directly targeted	Directly targeted	Directly targeted	Some elements	0	88,000	0	0
Energy 	E1	Invest in electricity network infrastructure upgrades for performance improvement	Capital	Directly targeted	Some elements	No direct links	Some elements	101,578,000	Savings	2,587,500	480
	E2	Introduce fiscal incentives for households and businesses to adopt renewable energy technology	Other- investment-related feasibility study, awareness, demonstration, training, and capacity building, behavioural measure and monitoring, data collection, analysis, and studies	Directly targeted	Some elements	Some elements	No direct links	169,070,000	1,691,000	115,000	30
	E3	Invest in energy efficient street lighting	Capital	Directly targeted	Directly targeted	Some elements	No direct links	21,385,000	1,069,000	0	10

Sector	Action ID	Action Title	GCAP Action Classification	Cross-Cutting Themes / Co-Benefits				Estimated Costs			Estimated Carbon Emissions Reduction (Annual tCO <sub>2e</sub> )
				Climate and Disaster Risk	Gender and Social Inclusion	Smart Maturity	Heritage and Tourism	CapEx (EUR)	OpEx (EUR)	Feasibility / Advisory (EUR)	
Environment and Biodiversity 	EB1	Invest in air quality monitoring stations to track and improve air quality and enable the development of an Air Quality Action Plan	Other- monitoring, data collection, analysis and studies	No direct links	Directly targeted	No direct links	Directly targeted	211,000	211,000	0	0
	EB2	Develop financial, legal and other incentives for polluters to minimise pollution and improve city liveability and resilience	Other- Standards, guides and regulations, behavioural measure and monitoring, data collection, analysis and studies	No direct links	Some elements	Some elements	Some elements	0	0	460,000	0
	EB3	Develop biodiversity metrics to drive habitat improvement for species over time	Other- monitoring, data collection, analysis and studies	No direct links	Some elements	No direct links	Some elements	0	0	105,000	0
Industries 	I1	Invest in energy efficiency in industrial enterprises in Samarkand	Capital	Directly targeted	Some elements	Some elements	Some elements	95,000,000	Savings	172,500	184,770
	I2	Invest in emissions reduction technologies to drive reductions in industrial emissions and air pollution	Capital	Directly targeted	Some elements	Some elements	Some elements	17,660,000	353,000	115,000	0
	I3	Mitigate industrial water pollution by strengthening enforcement of regulations on industrial wastewater discharge	Other- Standards, guides and regulations, awareness, demonstration, training, and capacity building, and monitoring, data collection, analysis and studies	No direct links	Some elements	Some elements	Some elements	0	0	105,000	0

Sector	Action ID	Action Title	GCAP Action Classification	Cross-Cutting Themes / Co-Benefits				Estimated Costs			Estimated Carbon Emissions Reduction (Annual tCO <sub>2e</sub> )
				Climate and Disaster Risk	Gender and Social Inclusion	Smart Maturity	Heritage and Tourism	CapEx (EUR)	OpEx (EUR)	Feasibility / Advisory (EUR)	
Solid Waste 	SW1	Invest in a waste-sorting facility and supporting infrastructure to improve recycling and reduce landfill	Capital	Directly targeted	Some elements	Some elements	No direct links	17,872,000	13,404,000	345,000	1,000
	SW2	Investment in landfill biogas and digestion facilities to generate renewable energy and reduce landfill	Other- investment-related feasibility study	Directly targeted	Some elements	No direct links	No direct links	0	10,000	412,850	0
	SW3	Monitor and mitigate illegal waste dumping to improve city liveability and public health	Other- Strategies, plans, and programmes, behavioural measure and monitoring, data collection, analysis and studies	Some elements	Directly targeted	Some elements	Some elements	1,104,000	276,000	29,000	0
Transport 	T1	Extend and integrate public transport network, including trams and e-buses, to reduce reliance on cars and cut air pollution	Capital	Directly targeted	Directly targeted	Some elements	Some elements	93,055,556	25,125,000	0	10,000
	T2	Design and implement interventions to reduce congestion on existing roads	Capital	Some elements	Directly targeted	Directly targeted	Directly targeted	47,377,778	4,264,000	28,750	0
	T3	Invest in and promote cycling and walking infrastructure	Capital	Some elements	No direct links	Directly targeted	Directly targeted	57,705,000	15,580,000	57,500	0
	T4	Support the transition to electric vehicles by investing in charging infrastructure	Capital	Directly targeted	Directly targeted	Some elements	Some elements	1,527,000	229,000	0	2,590

Sector	Action ID	Action Title	GCAP Action Classification	Cross-Cutting Themes / Co-Benefits				Estimated Costs			Estimated Carbon Emissions Reduction (Annual tCO <sub>2e</sub> )
				Climate and Disaster Risk	Gender and Social Inclusion	Smart Maturity	Heritage and Tourism	CapEx (EUR)	OpEx (EUR)	Feasibility / Advisory (EUR)	
Urban Development and Green Space 	UD1	Expand existing programme of street tree planting with native, drought-tolerant species	Capital	Directly targeted	Some elements	Directly targeted	Some elements	18,586,000	1,859,000	115,000	8,307
	UD2	Plan for and invest in new urban green space in Samarkand	Capital	Directly targeted	No direct links	Some elements	Some elements	52,613,333	2,368,000	0	3,830
	UD3	Develop and adopt a strategic land use plan and heritage framework to guide spatial decision-making	Other- strategies, plans and programmes	Directly targeted	Some elements	Some elements	Directly targeted	1,786,000	446,000	0	0
Water 	W1	Invest in wastewater, sewerage and drainage infrastructure to deliver range of environmental benefits	Capital	Some elements	Some elements	Some elements	Some elements	139,158,333	6,262,000	115,000	6,230
	W2	Develop Integrated Water Resource Management Plan, including drought management actions	Other- strategies, plans and programmes	Some elements	Some elements	Some elements	Some elements	0	50,000	201,000	0
	W3	Invest in resilience of potable water storage to increase quality and availability of supply	Capital	Directly targeted	Some elements	Some elements	Some elements	59,556,000	1,191,000	0	0

**Notes/ comments:**

- In most cases, a conservative approach was used to estimate the carbon emissions for these actions, in order to avoid overestimating the emissions.
- It is anticipated where feasibility studies are being undertaken as part of the action, that the capital costs will be refined (where they may already exist) or determined (where they do not) on the basis of the feasibility study.

# 1. Introduction

## Background

Samarkand is the **second-largest city in Uzbekistan** after the capital, Tashkent. It is the **administrative centre of Samarkand Region**. Samarkand is **globally important in terms of its built heritage**. Its mosques, madrassas and other ancient buildings, testament to a rich history of Islamic worship, learning and trade, were designated a **World Heritage Site (WHS)** by UNESCO in 2001.<sup>3</sup> The city's cultural heritage reflects Samarkand's important position on the Silk Road, reflected in the official name of the WHS: '**Samarkand- Crossroad of Cultures**'. The property protected by the WHS designation totals 1,123 hectares, with a further buffer zone (with appropriate restrictions on development within it) of 1,369 hectares.

**Long-term trends and recent events have underscored the need for mainstreaming climate action into Samarkand's urban development.** The city's location in a semi-arid region with unusually scarce water resources makes Samarkand particularly **exposed to the impacts of climate change**. Climate change is expected to produce **increases in monthly maximum temperatures** across Samarkand Region and result in a decline in precipitation between 50-100mm in the Region. Increased heat and precipitation variability will lead to increased evapotranspiration in summer months, resulting in a **decrease in river flow**. Future projections suggest **that increased glacier melting is expected to impact water availability** and river flow in the short to long term.<sup>45</sup>

To help address these and other environmental challenges, **Samarkand Regional Government** joined the **European Bank of Reconstruction and Development's (EBRD) flagship Green Cities Programme** in 2022. The Green Cities Programme is an urban sustainability initiative providing **over €5 billion in support to more than 60 cities across EBRD's countries of operation**. Samarkand is the first city in Uzbekistan to join the programme, although five other cities in the Central Asia region (in Kazakhstan, Tajikistan and Kyrgyzstan) are already members. The programme supports cities to address their key environmental challenges by **supporting investments in sustainable infrastructure and development of suitable policy and capacity-building measures**. Samarkand's membership in the Green Cities Programme builds on prior successful collaboration with EBRD, illustrated through the development of the **city's e-buses project**.

As part of the Green Cities Programme, the EBRD has supported Samarkand Regional Government **with the development of this Green City Action Plan (GCAP)**. The GCAP includes **detailed actions, both infrastructure investments and policy interventions, which will support the Regional Government in guiding urban development and strengthening sustainability in response to its key environmental challenges**. Actions in the GCAP are designed to be **implemented by the Regional Government and entities within its administrative remit, with support from the EBRD and other local and national partners**.

The development of the GCAP follows a **comprehensive, evidence-led, and consultative assessment of environmental performance and identification of priority challenges** carried out using the EBRD's Pressure-State-Response (PSR) assessment framework. It covers the **nine sectors** that shape Samarkand's past and future development: **Environment and Biodiversity, Climate and Resilience, Energy, Water, Solid Waste, Transport, Urban Development and Green Space, Buildings, and Industries**. The assessment also covered performance (and impacts) on the cross-cutting themes of **climate and disaster risk, gender and social inclusion, smart maturity, and heritage and tourism**.

The GCAP is structured as follows:

- **Introduction** (this section), summarising the process leading to the development of this GCAP.
- **City Baseline**, highlighting the geographic, climatic, governance, demographic and economic context that shape Samarkand's urban development, and the key environmental and sectoral challenges that have informed the development of actions within this GCAP.
- **Green City Vision and Strategic Goals**, capturing Samarkand's ambitions for the future of the city, and areas of focus for each of the GCAP sectors in response to the Green City Challenges and Vision.

<sup>3</sup> UNESCO (2023), Samarkand- Crossroad of Cultures, available at <https://whc.unesco.org/en/list/603/>.

<sup>4</sup> World Bank, (2023). Climate Change Knowledge Portal. Available at <https://climateknowledgeportal.worldbank.org/country/uzbekistan/climate-data-historical>

<sup>5</sup> UNDP, (2023). Approach to Assessing the Vulnerability of the Water and Agricultural Sectors in Uzbekistan to Climate Change Impacts, available at <https://www.undp.org/uzbekistan/publications/approach-assessing-vulnerability-water-and-agriculture-sectors-uzbekistan-climate-change-impacts>

- **Green City Actions**, consisting of detailed descriptions of 30 infrastructure investments and policy interventions that Samarkand can begin implementing within 5 years, to help achieve its vision for 2050.
- **Implementation and Monitoring**, outlining key roles and responsibilities for implementation of Green City Actions and approaches to monitor and evaluate progress and impact.

## GCAP Development Process

The development process for Samarkand's GCAP followed EBRD's Green City Action Plan Methodology, which uses the 'Pressure-State-Response' (PSR) framework to systematically assess the **causal linkages between the baseline environmental performance in a city ('state'), the key drivers within urban built environmental sectors that contribute to this performance ('pressure') and infrastructure or policy interventions in these sectors that mitigate the negative impacts ('response')**. In line with the goal of an **evidence-led and consultative approach** to developing the GCAP, the process looked at **optimising engagement with key stakeholders in Samarkand at strategic points of the process** as summarised below.

### Stage 1 – Inception and Preparation

The GCAP development process was officially **launched on 28 March 2023 at an event co-organised by Samarkand Regional Government and EBRD**. A GCAP Co-Ordinator<sup>6</sup> was nominated to begin working with the consultant team on early activities, such as **identifying key strategies, plans and technical documents to inform the Technical Baseline Report, gaining a clearer understanding of Samarkand's urban development context, and identifying key stakeholders** with whom to engage at appropriate points of the GCAP development process.

The **first set of six Technical Meetings** were attended by nineteen key technical leads from the Regional Government and its partner agencies and served both to raise awareness of the GCAP process, and gather insights, data and information on sectoral performance and key environmental challenges in the city.

### Stage 2 – Identification and Prioritisation of Green City Challenges

Using the available data, **international and local sectoral experts drafted the Technical Baseline Report** which includes an evaluation of the policy landscape, an assessment of the performance of the city against its environmental indicators, and the status and impacts of key cross-cutting themes (climate and disaster risk, gender and social inclusion, smart maturity and heritage and tourism).

The project's first **Stakeholder Engagement Workshop** was held in Samarkand on 13<sup>th</sup> June and brought together sixty-nine attendees, including non-Governmental organisations and academics alongside representatives from various government entities and utilities. The Stakeholder Engagement Workshop, along with additional **Technical Meetings**, and an online stakeholder survey collectively enabled the consultant team to identify the most relevant and pressing **Green City Challenges for each sector**. Key findings from the baseline assessment, including identification of key environmental and sectoral challenges, are included in Chapter **Error! Reference source not found**. of this document. Key findings from the Technical Baseline Report were validated with Regional Government stakeholders in November 2024.

### Stage 3 – Development of Green City Vision and Strategic Goals

Following the validation of the Green City Challenges and the drafting of the Technical Baseline Report, a second **Stakeholder Engagement Workshop** was held on 3 November 2024, attended by 40 participants. Workshop participants **provided inputs into a draft Vision and Strategic Goals for the GCAP**. The final Vision and Strategic Goals was **approved by the GCAP Steering Committee**.

The agreed Green City Vision and Strategic Goals are included in Chapter 4 of this Report.

### Stage 4 – Development of Green City Actions

After the completion of the Green City Vision and Strategic Goals, the Consultant Team compiled **an extensive list of over 60 potential Actions** for consideration. Each Action was designed to align with the Green City Vision and Strategic Goals while at the same time aiming to tackle the challenges identified for each sector. A thorough evaluation of these actions was undertaken, including a review of their potential to improve socio-economic as well as environmental outcomes, and their performance against the **four cross-cutting themes (climate and disaster risk, smart maturity, gender and social inclusion and heritage and tourism)**.

<sup>6</sup> Timur Fozilov for the first weeks of the GCAP, with Nurmukhammad Khashimov subsequently taking over from Timur. Both Timur and Nurmukhammad work in Samarkand Regional Government's Department of Investment and Foreign Trade.

This initial list of actions was consolidated into a **longlist of 40 potential Actions** which were presented to Samarkand Regional Government in February 2024, with instructions for the GCAP Steering Committee to select a final list of **30 Green City Actions to take forward for detailed assessment and presentation within this final GCAP document, thus collectively forming an Action Plan for green development.**

Eventually, 31 actions were selected by the Steering Committee in consultation with EBRD. These 31 are outlined in Table 0-4 and discussed in detail in Chapter 5. Almost every action, in addition to the direct environmental benefits it offers, also indirectly or directly targets the GCAP cross-cutting themes discussed above.

From 2024 onwards, Samarkand Regional Government will begin implementing this Green City Action Plan. To support effective and efficient implementation of actions, **an Implementation and Monitoring Plan was developed in consultation with the Regional Government and EBRD**, drawing on lessons learnt from previous GCAPs **and the specific governance context for delivery of Green City Actions in Samarkand.** The Implementation and Monitoring Plan is included in Chapter 6 of this document. To assist in developing institutional capacity for delivery of the GCAP, the Consultant Team **supported the Regional Government with a three capacity building sessions on Action Plan monitoring, Climate and Disaster Resilience and Public and Stakeholder Engagement** to support effective implementation of the GCAP.

### Stage 5- Capacity Building Sessions

EBRD's GCAP process also allows for the delivery of three capacity building sessions to the GCAP Steering Committee and other key stakeholders and partners. For these sessions, the Regional Government selected the topics of Climate and Disaster Resilience, Monitoring and Evaluation, and Public and Stakeholder Engagement.

### Key Milestones

- **Jun 2021** – Samarkand Joins the Green Cities Programme
- **Mar 2023** – GCAP Launch Event
- **Mar 2023** – First round of Technical Meetings with government and partner stakeholders in Samarkand
- **Apr – May 2023** – Inception and Preparation Activities
- **Jun 2023** – First Stakeholder Engagement Workshop (Prioritising Environmental Challenges)
- **Jun 2023** – Second round of Technical Meetings with government and partner stakeholders in Samarkand
- **Jun – Oct 2023** – Technical Baseline Assessment (including Priority Environmental Challenges)
- **Nov 2023** – Second Stakeholder Engagement Workshop (Vision and Strategic Goals)
- **Nov 2023** – Presentation of Technical Baseline Assessment to GCAP Steering Committee
- **Nov 2023** – First GCAP Capacity Building session (Climate Change and Disaster Resilience in Planning)
- **Nov 2023 – Jan 2024** – Finalisation of Green City Vision and Strategic Goals, and Development of Longlist of Actions
- **Feb 2024** – Presentation of Shortlist of Actions to GCAP Steering Committee
- **Feb 2024** – Virtual Engagement for Shortlisting of Green City Actions
- **Feb – May 2024** – Development of Green City Actions and Green City Action Plan
- **Apr 2024** – Third Stakeholder Engagement Workshop (Validation of Actions)
- **Apr 2024** – Second and Third Capacity Building sessions- (Monitoring and Evaluation of Green City Action Plan and Public and Stakeholder Engagement)
- **Late 2024** – Regional Government Approval of Green City Action Plan

## Stakeholder Engagement

Stakeholder engagement is an important – and differentiating – feature of the GCAP. As described above, the GCAP process involves significant participation from the regional and national government- but also efforts have been made to engage a wide cross-section of experts, academics, and community members. This has included both in-person events as well as the use of an online survey to enable a wider outreach.

A Stakeholder Engagement Plan (SEP) was developed and updated throughout the development of the GCAP- and has guided the approach to outreach. Where possible, efforts have been made to increase participation and amplify the voices of women and marginalized groups.

### In-Person Events

Table 1-1 summarises all elements of stakeholder engagement that took place to inform the final GCAP. Over the course of the project, the Consultant Team arranged and attended the following events, all in Samarkand, some of which are illustrated in Figures 1-1 to 1-6 below: a Kick Off Meeting, a Launch Event, twelve Technical Meetings, three Stakeholder Engagement Workshops, and three Capacity Building Sessions. Throughout the process, 212 different individuals were engaged across the in person stakeholder engagement events, with a total of 294 in-person interactions. Including the online survey, the project has had benefitted from 491 different inputs from stakeholders.

**Figures 1-1, 1-2, 1-3, 1-4, 1-5, 1-6, (top left to bottom right): GCAP Launch Event, March 2023; First Stakeholder Engagement Workshop, June 2023; Second Stakeholder Engagement Workshop, November 2023; Third Stakeholder Engagement Workshop, April 2024; first Capacity Building Session, November 2023; second Capacity Building Session, April 2024.**



Table 1-1. All Stakeholder Engagement Activities for GCAP Samarkand

GCAP Task	Date/ duration	Details	Communication	No. of attendees/ participants
<b>1a) Kick Off Meeting</b>	27 March 2023	In-person meeting between Regional Government, EBRD and Consultant team	1) Activity announcement: <ul style="list-style-type: none"> <li>• Invitation via SRG official letters</li> </ul>	11
<b>1b) Launch Event Organisation and Presentation</b>	28 March 2023	In-person event attended by Regional Government key contacts and decision-makers (including Governor of Samarkand Region), EBRD and Consultant Team	1) Activity announcement: <ul style="list-style-type: none"> <li>• Invitation via SRG official letters</li> <li>• EBRD social media</li> </ul> 2) Outputs/Results after activity: Regional Government and EBRD websites	32
<b>1c) Technical Meetings</b>	29-30 March 2023	Six Technical Meetings (1 per GCAP sector, including cross-cutting themes) with Regional Government and relevant partners to develop detailed understanding of challenges and priorities and data sources. Attended by Consultant Team, EBRD and Regional Government.	Communications with Regional Government and partner organisation stakeholders only	25
<b>1d) Online survey</b>	May – June 2023	Online questionnaire (in both Uzbek and Russian versions) developed by the Consultant Team, approved by EBRD and distributed by the Regional Government to gather early inputs from stakeholders on key challenges and concerns to inform GCAP technical baseline and the first stakeholder engagement workshop.	Activity announcement: Regional Government and EBRD websites, Regional Government social media	197
<b>2a) First Stakeholder Engagement Workshop (Prioritisation of Environmental Challenges)</b>	13 June 2023	In-person interactive workshop hosted by the Consultant Team and EBRD with participants from the Regional Government, partner organisations, academia, private sector and non-governmental organisations (NGOs), comprising presentations and interactive exercises (with all written feedback captured by the Consultant Team) to develop understanding of key environmental challenges and opportunities in Samarkand.	1) Activity announcement: Invitation via SRG official letters and EBRD website 2) Outputs/Results after activity: Regional Government and EBRD websites and social media	69
<b>2b) Technical Meetings</b>	14-15 June 2023	Six Technical Meetings (1 per GCAP sector and key cross-cutting themes) with Regional Government and relevant partners to explore in more depth baseline understanding of challenges and priorities, key documents, and data sources	Communications with Regional Government and partner organisation stakeholders only	12
<b>3a) Presentation to GCAP Steering Committee</b>	1 November 2023	Presentation of Executive Summary of Baseline Report to GCAP Steering Committee, with opportunity for feedback, questions and answers	Communication with Regional Government only	17

GCAP Task	Date/ duration	Details	Communication	No. of attendees/ participants
<b>3b) GCAP Capacity Building Session 1</b>	2 November 2023	First GCAP Capacity Building session for members of GCAP Steering Committee, other relevant Regional Government and partner organisation stakeholders on the topic of Climate and Disaster Resilience	Communication with Regional Government and partner organisation stakeholders only	13
<b>3c) Second Stakeholder Engagement Workshop: Vision and Objectives</b>	3 November 2023	In-person interactive workshop hosted by the Consultant Team and EBRD with participants from the Regional Government, partner organisations, academia, private sector and non-governmental organisations (NGOs), comprising presentations and interactive exercises (with all written feedback captured by the Consultant Team) to develop a vision and sector-specific objectives for the Samarkand GCAP.	1) Activity announcement: Invitation via SRG official letters and EBRD website 2) Outputs/Results after activity: Regional Government and EBRD websites and social media	40
<b>4a) GCAP Capacity Building Session 2</b>	17 April 2024	Second GCAP Capacity Building session for members of GCAP Steering Committee, other relevant Regional Government and partner organisation stakeholders on the topic of GCAP Monitoring and Evaluation	Communication with Regional Government and partner organisation stakeholders only	20
<b>4b) GCAP Capacity Building Session 3</b>	18 April 2024	Third GCAP Capacity Building session for members of GCAP Steering Committee, other relevant Regional Government and partner organisation stakeholders on the topic of Public and Stakeholder Engagement	Communication with Regional Government and partner organisation stakeholders only	19
<b>4c) Third Stakeholder Engagement Workshop: Validation and Verification of Green City Actions</b>	19 April 2024	In-person interactive workshop hosted by the Consultant Team and EBRD with participants from the Regional Government, partner organisations, academia, private sector and non-governmental organisations (NGOs), comprising presentations and interactive exercises (with all written feedback captured by the Consultant Team) to validate and verify the Actions set out in the Samarkand GCAP.	1) Activity announcement: Invitation via SRG official letters and EBRD website 2) Outputs/Results after activity: Regional Government and EBRD websites and social media	36

## Online Survey

To encourage wider participation, an online survey was delivered during the process of identifying challenges. The **Online Survey** invited consultees to select the three most important challenges by GCAP sector, asked for challenges to be identified/prioritised by the cross-cutting sector of climate change/disaster resilience, and consultees to rank which of the seven sectors were considered most important for the Samarkand GCAP to address.

### Results of Online Survey

The survey was provided in both Uzbek and Russian to maximise accessibility and response rate. **There were 197 responses, of whom 75% were male and 25% female, reflecting an unfortunately skewed gender representation.** 64% of consultees were aged 30-49, 23% 18-29, 11% 50-59 and 3% over 60 (note that totals may not sum due to rounding). By occupation, consultees were 31% public sector, 27% private sector, 10% academics and researchers, 8% NGO or civil society, 5% retired and 19% other.

**The findings from the online survey** were used to directly inform the key challenges and opportunity areas for each GCAP sector, which in turn **informed development of the final GCAP Actions.**

## Alignment of GCAP with National Policy

### Samarkand Environmental Masterplan

In April 2024, while the GCAP was being progressed, the Ministry of Ecology, Environmental Protection and Climate Change of Uzbekistan informed EBRD and the consultant team of the parallel development of a national government-led **Samarkand Environmental Masterplan**. The Samarkand Environment Masterplan is being **developed to guide the city of Samarkand toward stronger environmental governance, healthier urban environments and a co-ordinated focus on environmental stewardship.**

The Samarkand Environmental Masterplan will form binding policy. It will cross-reference the GCAP within it, and itself relies on data gathered over 2023 to inform the GCAP's Technical Baseline Report (TBR). It notes that **the Ministry of Ecology, Environmental Protection and Climate Change will be progressing further Environmental Masterplans for major cities in Uzbekistan** and that the Samarkand GCAP presents an excellent learning opportunity for other such cities as they implement their own Environmental Masterplans.

In this context, the Samarkand GCAP- with its stakeholder-driven approach- should be used as an advisory document to assist the national and regional governments in their important goal of creating a greener and more sustainable Samarkand.

## 2. City Baseline

Samarkand, like many other cities in Uzbekistan, is growing quickly. This growth is driving an increase in greenhouse gas emissions from a number of sources. The city's location in an arid region means it is highly vulnerable to the impacts of climate change, particularly in terms of long-term water insecurity; additionally, like much of Uzbekistan, the city lies in a significant seismic risk zone. The city's urban infrastructure needs improvement across a number of sectors to make the city more resilient to environmental and natural hazards. The GCAP provides an opportunity to address these challenges while augmenting the capacity and quality of Samarkand's urban infrastructure, including its globally significant heritage assets.

### Geography

Samarkand is the **second-largest city in Uzbekistan** after the capital, Tashkent. It is the **administrative centre of Samarkand Region**. **Due to its dense population, Samarkand Region is relatively small** compared to other regions across the country. It lies in the central east of the country and a short section of its eastern border (well away from the city itself) is shared with Tajikistan. The region is landlocked and the nearest major body of water is Aydar Lake, around 150 kilometres in length and lying about 40 kilometres north of the region.

The metropolitan (urban) area of Samarkand has a **population of approximately 614,000**<sup>7</sup>; that of the region as a whole is 4.1 million<sup>8</sup>. The city is at an altitude of 720 metres<sup>9</sup>, and lies in the **valley of the Zarafshan River**, like most towns and cities across the region. However, away from the river valley running through its centre from east to west, both the far north and the far south of the region are mountainous; its highest point is Gord Kyrk-Tau on the southern boundary, at 2,512 metres<sup>10</sup>. The region measures 16,773 square kilometres in area<sup>11</sup>.

The urban boundary of Samarkand City itself comprises 93 square kilometres. Green space within it tends to be limited - only 13% of land. With population growth and economic development, the urban area is expanding by almost 2% each year on average.

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<sup>7</sup> Macrotrends, (2023). Samarkand, Uzbekistan Metro Area Population 1950-2023, available at <https://www.macrotrends.net/cities/23208/samarkand/population>

<sup>8</sup> Uzstat, (2023). Residents of Samarkand region as of April 1, available at <https://stat.uz/en/press-center/news-of-committee/37914-samarqand-viloyatida-1-aprel-holatiga-doimiy-aholi-soni-3>

<sup>9</sup> Climatedps, (2023). Map of Samarkand, Uzbekistan Latitude, Longitude, Altitude/ Elevation, available at <http://www.samarkand.climatedps.com/map.php>

<sup>10</sup> PeakVisor. (2023). Gord Kyrk-Tau, available at <https://peakvisor.com/peak/gord-kyrk-tau.html>

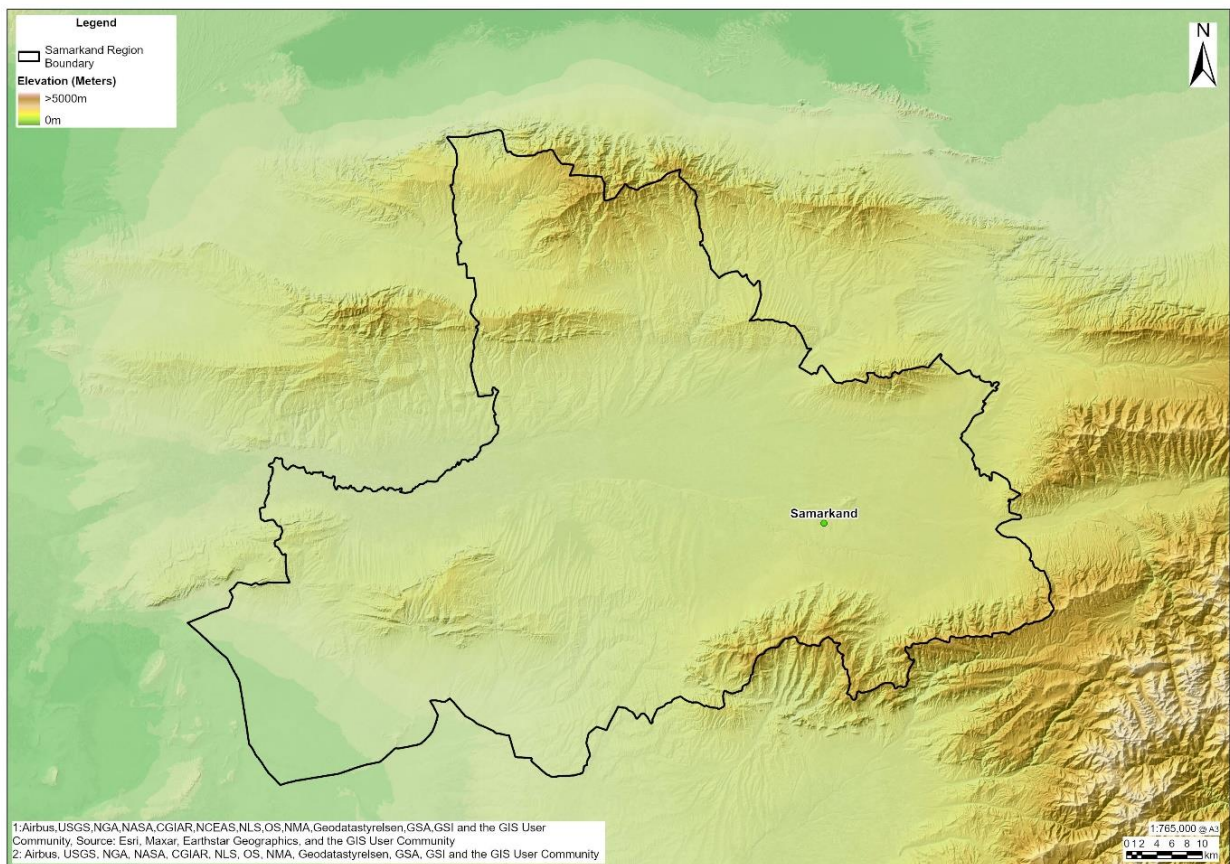
<sup>11</sup> Hays, J., (2023). Sights and Museums in Samarkand, available at [https://factsanddetails.com/central-asia/Uzbekistan/sub8\\_3h/entry-6867.html](https://factsanddetails.com/central-asia/Uzbekistan/sub8_3h/entry-6867.html)

Figure 2-1. Uzbekistan, including location of Samarkand (green circle)



Source: Wikimedia Commons

Figure 2-2. Topographical map of Samarkand Region, with location of Samarkand city



Source: AECOM

# Climate and Disaster Risk

## Climate

Samarkand, like the rest of the Zarafshan River valley, has a **semi-arid climate with warm, dry summers and cold winters**. The average annual precipitation is 339.3 mm. **Most of the precipitation (70–90%) occurs in the winter and spring- with rainfall rarely observed in summer**. The average air temperature (between 1991–2021) is 14.7°C, with the coldest month being January (average air temperature 0°C) and the warmest being July (average air temperature 27.63°C). **Absolute minimal air temperatures reach -20°C and maximal air temperatures reach upwards of 41°C.**<sup>12</sup> Recent summers have seen an **increasing frequency of drought**, which has put pressure on the Region’s water supply, as well as exacerbating pressure on local biodiversity and green space, already under pressure from a rapid rate of urban expansion (2% per year).

Climate change is expected to produce **increases in monthly maximum temperatures** across Uzbekistan. It is expected that precipitation will decline between 50-100mm in central and eastern districts, which includes Samarkand. Increased heat and precipitation variability will lead to increased evapotranspiration in summer months, resulting in a **decrease in river flow**. Moreover, future projections suggest **that increased glacier melting is expected to impact water availability** and river flow in the short to long term.<sup>13,14</sup>

## Risk and Vulnerability Assessment

As part of the GCAP’s Technical Baseline stage, a Risk and Vulnerability Assessment (RVA) was carried out for Samarkand. **It provides an overview and ranking of key identified hazards for Samarkand, namely earthquakes, droughts, extreme temperatures, flooding, epidemics, landslides and air pollution**. For each hazard, the RVA **summarises key vulnerabilities, analyses and prioritises risks**. The conclusions of the RVA inform relevant Actions among those set out in Chapter 5.

## Governance

Samarkand Region is **divided into fourteen districts**, known as ‘tumans’ in Uzbek: Bulung’ur, Ishtixon, Jomboy, Kattakurgan, Qo’shrabot, Narpay, Nurobod, Oqdaryo, Paxtachi, Payariq, Pastdarg’om, Samarkand, Toyloq and Urgut. Samarkand City is an administrative division within Samarkand District. For certain administrative and technical purposes, neighbouring tumans have been designated as forming part of the **larger Samarkand metropolitan area**; these are (from west to east) Pastdarg’om, Oqdaryo, Jomboy and Toyloq. Samarkand District itself is 430 square kilometres in area and has its administrative centre at Gulabad to the south of Samarkand City but still on the edge of the wider urban area.

**Figure 2-3** below shows the districts within Samarkand Region, and **Figure 2-4** the entire urban area of Samarkand, which extends across administrative boundaries. Meanwhile, **Figure 2-5** shows the (current) administrative boundary of Samarkand City itself, demonstrating how tightly drawn it is around the centre of the urban area- in fact, most of the extensive suburbs of the city lie outside its extent. For this reason, there are plans for it to be expanded so that **more of the urban area can be controlled by the city government**.

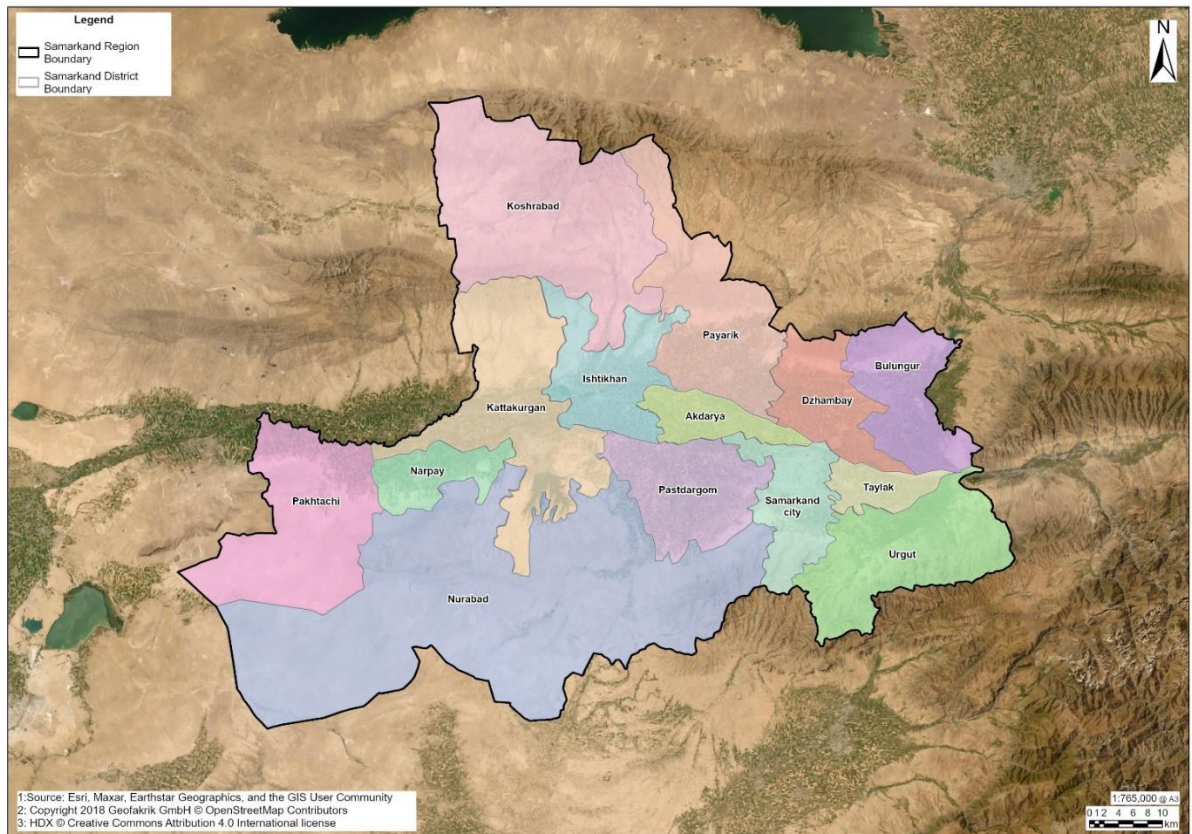
<sup>12</sup> Samarkand Solar PV Project, (2023), available at <https://www.eib.org/attachments/registers/166631998.pdf>

<sup>13</sup> World Bank, (2023). Climate Change Knowledge Portal. Available at <https://climateknowledgeportal.worldbank.org/country/uzbekistan/climate-data-historical>

<sup>14</sup> UNDP, (2023). Approach to Assessing the Vulnerability of the Water and Agricultural Sectors in Uzbekistan to Climate Change Impacts, available at <https://www.undp.org/uzbekistan/publications/approach-assessing-vulnerability-water-and-agriculture-sectors-uzbekistan-climate-change-impacts>

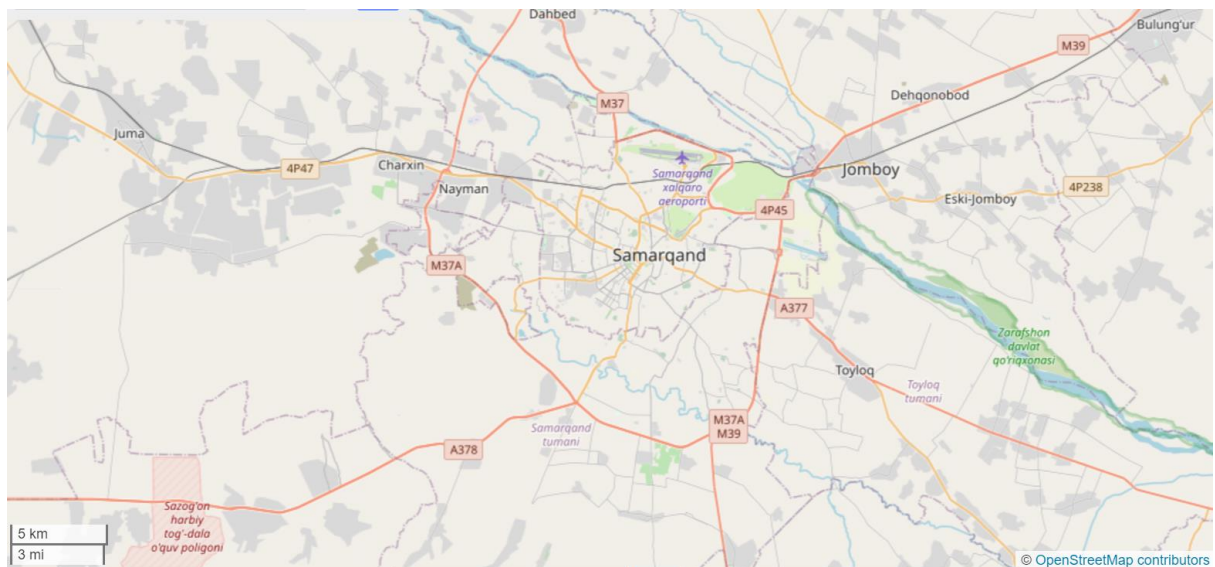
**Figure 2-3 Map of Samarkand Region and its Districts**

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Source: AECOM

**Figure 2-4. Map of Samarkand Urban/Metropolitan Area**



Source: Openstreetmap,2023.

Figure 2-5. Map of Samarkand City Boundary



Source: AECOM, Google Earth

Samarkand Region is **controlled by a Regional Governor appointed by the President of the Republic**. The Governor's administration executive is supported by an **elected council** (which is a legislative body, known as the *kengash*, elected every five years). Below the level of the region are Districts or Cities. **Regional Governors appoint District governors and City mayors.**<sup>15</sup>

Because **political power in Uzbekistan is highly centralised**, it is central government, specifically individual Ministries working in partnership with the Presidential Administration, and the Cabinet of Ministers, that sets the vision and policies for all sectors covered by this GCAP. **The role of Regional and city governments is normally limited to enforcing and implementing** that vision and those policies. Centralised power is maintained and ensured by the fact that **Ministries have branch offices in each region, including Samarkand**, to help ensure that local governments effectively implement the national government's vision and policies.

The **tasks and service delivery responsibilities of the Regions, Districts and Cities are similar in terms of topic and sector**, differing only by geographical coverage and by strategic versus local issues. They comprise environmental protection, prevention of natural and man-made disasters, fire protection, sanitation, public order and security, local economic and social development, culture, tourism, sports, leisure facilities, water, gas, electricity, heat, waste management, sewerage, utility infrastructure maintenance and development, construction, roads and their maintenance, public transport, employment and job creation, and the development of small and medium-sized enterprises (SMEs).

**Some district/city and regional services are delivered in partnership with central government.** For example, healthcare services are managed and financed by central government and its branch offices, but the Region and/or District are responsible for maintenance and renovation of healthcare infrastructure.

An alternative way in which local government services and utilities are delivered is through **State-Owned Enterprises (SOEs)**. SOEs are publicly controlled sector-specific management and delivery organisations **owned by and reporting to Regional and city/District governments** with the aim of ensuring policy and implementation

<sup>15</sup> Urinboyev, R. (2018). Local Government in Uzbekistan, available at [https://doi.org/10.1007/978-3-319-31816-5\\_3665-1](https://doi.org/10.1007/978-3-319-31816-5_3665-1)

objectives are achieved. Similar to SOEs, but differing because they do not directly own the assets they use<sup>16</sup>, are State Unitary Enterprises- SUEs. Examples of important SOEs and SUEs in Samarkand include Maroqand Obod (Clean Samarkand), which collects and processes the city’s solid waste, and Samarkand Electric Company Joint Stock Company (JSC) which maintains the local electricity supply network. **As Uzbekistan takes steps towards economic privatisation, the number and power of SOEs and SUEs is likely to reduce in future.**

Below the level of the District or the City is the **mahalla, or neighbourhood, the most local level of government in Uzbekistan**. Mahalla committees assist Districts in implementing local development projects, collecting taxes, administering social welfare programs, maintaining and repairing roads, disposing of waste, ensuring security and order, removing rubbish, maintaining playgrounds and sports fields, and many other tasks that are of local importance. Mahallas also are responsible for administering many **state social welfare benefits**, including assistance to low-income families (also known as the ‘Iron List’, which is shared with the city government).<sup>17</sup> The chairpersons and secretaries of the mahalla committees are salaried state officials, effectively meaning that mahallas serve as sub-district extensions of higher levels of government.<sup>18</sup> As of 2023, there were 219 mahallas in Samarkand City.<sup>19</sup>

**Table 2-1 below summarises the findings of the GCAP Samarkand assessment of SRG/city government powers and responsibilities across all sectors.** While local governments are limited in their autonomy- particularly in vision setting, there are some sectors (specifically, urban development and green space, industries and transport) where requirements are locally specific enough for local government to have some ability to influence the sectoral vision.

**In terms of setting and enforcing policies, in most cases, the local government has almost no powers to set policies, but has powers to enforce them, in line with the centralised model described above. Likewise, in most cases local government has limited powers in terms of budget and revenue,** reflecting the fact that budgets tend to be centrally set and the role of local government is limited to revenue collection (for example, of taxes due).

Finally, **in terms of owning and operating sectoral infrastructure, resources and assets, again in most cases, Regional and city governments have limited powers.** The only sector where powers are strong is Buildings because more public buildings in Samarkand (mainly public housing) are owned by local rather than central government entities.

**Table 2-1. Assessment of powers of Samarkand Regional Government by GCAP Sector**

**Legend**

Weak / no powers	Limited powers	Strong powers
------------------	----------------	---------------

Sector	Vision Setting	Set & Enforce Policies	Budget & Revenue	Own & Operate
Urban Development and Green Space				
Buildings				
Industries				
Transport				
Energy				
Water				
Solid Waste				

<sup>16</sup> ADB, (2020). State-Owned Enterprises in Uzbekistan: Taking Stock and Some Reform Priorities. Available at <https://www.adb.org/sites/default/files/publication/560601/adb-wp1068.pdf>

<sup>17</sup> Information provided by Samarkand Regional Government in technical meetings with AECOM, March 2023. The term ‘Iron List’ refers to the fact that assistance is guaranteed for as long as the recipient meets relevant criteria of need.

<sup>18</sup> Urinboyev, R. (2018). Local Government in Uzbekistan, available at [https://doi.org/10.1007/978-3-319-31816-5\\_3665-1](https://doi.org/10.1007/978-3-319-31816-5_3665-1)

<sup>19</sup> Egjs (2023), Samarkand E-bus Project: Draft Environmental and Social Assessment Report, not available online.

# People and Culture

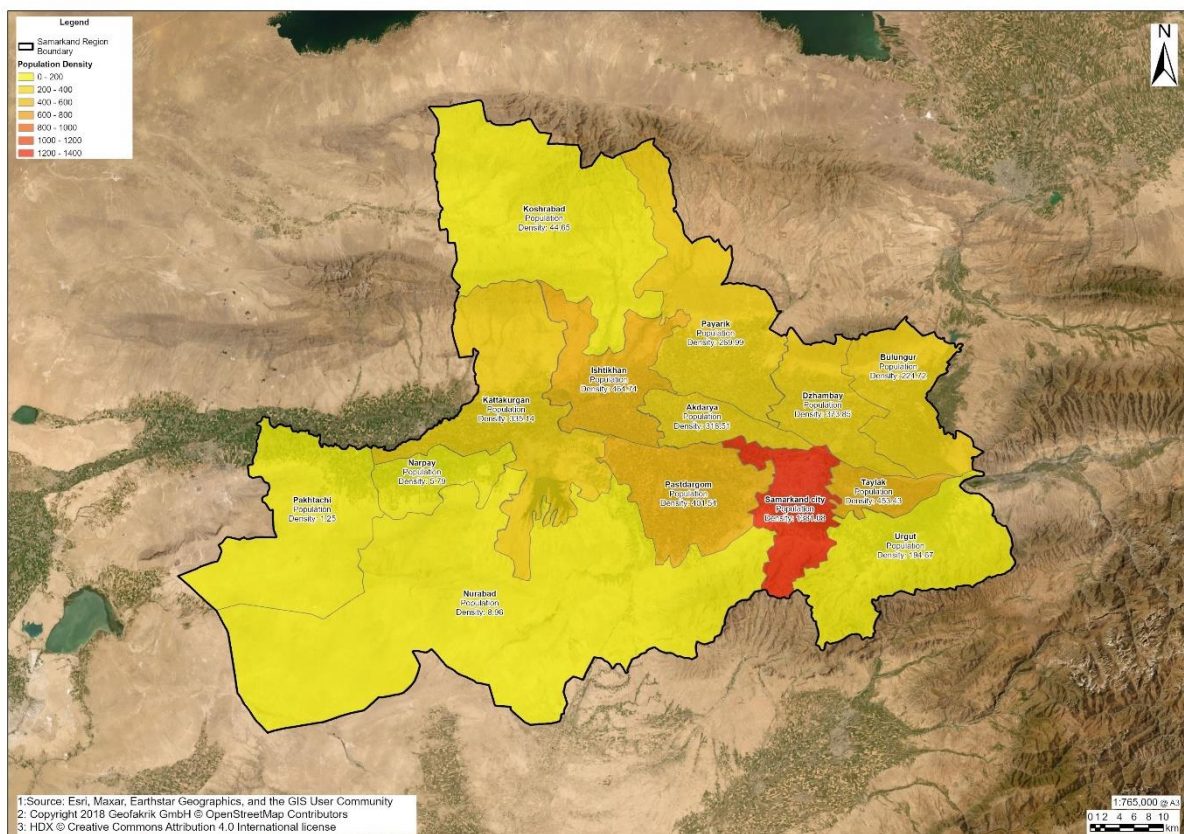
## Demographics

As a result of Samarkand Region's geography, the **population is unevenly distributed**. The north and south of the Region, consisting largely of deserts and mountains, are very sparsely populated, but the central river valley, including Samarkand City, is far denser. While the **average density of the region as a whole is 246 persons per square kilometre**<sup>20</sup>, the individual tumans vary widely. The least dense is the rural Paxtachi Tuman, at only 1.25 persons per km<sup>2</sup> and the densest is Samarkand tuman, at 1,381 persons per km<sup>2</sup>. The tumans neighbouring Samarkand itself are also more densely populated than the Region average: Pastdarg'om has 402 persons per km<sup>2</sup>, Oqdaryo 319, Jomboy 374 and Toyloq 453<sup>21</sup>.

The population of the Region has **grown rapidly over the last fifty years**. Based on data from the European Commission's Joint Research Centre, it rose from 1.16 million in 1975 to 2.9 million in 2015.<sup>22</sup> The latest figures from UZSTAT indicate even higher growth in the period to 2023, with **4.14 million** as of April that year.<sup>23</sup> The Regional Government has an ambition to grow Samarkand's population from around 600,000 to **over one million people in the near future**.<sup>24</sup> This will be accomplished in part by extending the city boundaries to encompass a wider proportion of the urban area.

**Specific data is not available to determine the spatial distribution of lower-income or poorer, more excluded city residents.** However, available evidence reviewed for this report suggests that the poorest and most marginalised residents are **more likely to live in the outlying, more poorly connected parts of the urban area as they have the cheapest land**- such areas are also more likely to suffer from 'bad-neighbour' uses, such as industrial and waste sites, than more central residential neighbourhoods.

**Figure 2-6. Map of Samarkand Region and its Districts by population density**



Source: AECOM

<sup>20</sup> Uzstat, (2023). Statistika, available at [https://t.me/statistika\\_rasmiy/3334](https://t.me/statistika_rasmiy/3334)

<sup>21</sup> City Facts, (2023), available at <https://www.city-facts.com/samarkand/population>

<sup>22</sup> Ibid.

<sup>23</sup> Uzstat, (2023). Resident population of Samarkand region as of April 1, available at <https://stat.uz/en/press-center/news-of-committee/37914-samarqand-viloyatida-1-aprel-holatiga-doimiy-aholi-soni-3>

<sup>24</sup> Kun.uz, (2023). Population of Samarkand to reach 1 million, 5 districts to be created, available at <https://kun.uz/en/news/2021/04/02/population-of-samarkand-to-reach-1-million-5-districts-to-be-created>

## Gender and Social Inclusion

In the last decade, **Uzbekistan has made significant progress in improving gender equality**, supported by newly adopted policies and regulations (including an April 2023 law protecting women and children from domestic violence<sup>25</sup>), but **significant challenges remain**. Critically, **the vast majority of policymakers in both Uzbekistan and Samarkand are male**. This limits women’s decision-making power and influence over the GCAP action areas. Gender-related stereotypes and harmful social norms further challenge the government’s efforts to achieve gender parity.

The Government of Uzbekistan’s Open Data Portal estimates the ethnic makeup of the Region’s population in 2023 as follows: **Uzbek 88.5%, Tajik 7.1%, Russian 1.2%** and others (including citizens of other former Soviet countries) at 3.2%. However, according to multiple sources, Samarkand city is **likely to have a higher Tajik population than recorded in official statistics**.<sup>26</sup>

## Heritage and Tourism

Samarkand is **globally important in terms of its built heritage**. Its mosques, madrassas and other ancient buildings, testament to a rich history of Islamic worship, learning and trade, were designated a **World Heritage Site (WHS)** by UNESCO in 2001.<sup>27</sup> The city’s cultural heritage reflects Samarkand’s important position on the Silk Road, reflected in the official name of the WHS: **‘Samarkand- Crossroad of Cultures’**. The property protected by the WHS designation totals 1,123 hectares, with a further buffer zone (with appropriate restrictions on development within it) of 1,369 hectares.

The overall responsibility for **preserving the integrity of the WHS** lies with the **Ministry of Cultural and Sport Affairs** and **Samarkand Regional Government**. The Principal Scientific Board for Preservation and Utilization of Cultural Monuments plays an advisory role, as does the Samarkand Region State Inspection on Protection and Utilization of Cultural Heritage Objects. Decisions on construction or rebuilding projects within the WHS buffer zone are taken in consultation with the Samarkand Regional State Inspection on Protection and Utilization of Monuments, or by the Scientific Board on Protection and Utilization of Monuments in Samarkand. If the building project is major, national-level approval is needed.

Samarkand’s outstanding cultural heritage offering **makes tourism a major economic driver for the city**. Samarkand airport offers direct flights to a range of Middle Eastern and Russian cities. As Uzbekistan has opened to the outside world under President Shavkat Mirziyoyev, **tourist numbers have increased rapidly**. Between 2016 and 2019, tourists visiting the country increased by 13% per year until the COVID-19 outbreak in 2020 caused a major drop in visitor numbers, with the country now steadily recovering from its impact on tourism.

Across Samarkand Region, it was reported in 2022 that about half of the investment projects underway or planned are **private projects for hotel construction**, with most of them domestically funded. Many of the newly planned hotels are located within the new **Silk Road Complex** on the eastern edge of the city. The **largest purpose-built tourism facility in Central Asia**, the Silk Road Complex opened for business in 2022 when it hosted the Shanghai Co-Operation Organisation annual summit.<sup>28</sup> Samarkand International Airport also benefitted from significant investment in 2021.<sup>29</sup>

## Economy

Samarkand Region’s **GDP has grown rapidly in recent years**.<sup>30</sup> By 2022, it had reached approximately 50.4 trillion UZS annually (**4.34 billion USD**),<sup>31</sup> and by 2023 was 30 million UZS (2,590 USD) per capita.<sup>32</sup> For the

<sup>25</sup> Kun.uz, (2023). President Signs a Law on Protection of Women and Children from Violence, available at <https://kun.uz/en/news/2023/04/11/president-signs-a-law-on-protection-of-women-and-children-from-violence>

<sup>26</sup> The Diplomat, (2023). The Tajik Tragedy of Uzbekistan, available at <https://thediplomat.com/2016/09/the-tajik-tragedy-of-uzbekistan/>

<sup>27</sup> UNESCO (2023), Samarkand- Crossroad of Cultures, available at <https://whc.unesco.org/en/list/603/>.

<sup>28</sup> Ibbotson, S. (2022). Uzbekistan: Samarkand Reborn with the largest complex for tourists in Central Asia, available at <https://www.thetravelmagazine.net/samarkand/>

<sup>29</sup> International Trade Administration, (2023). Uzbekistan- Country Commercial Guide, Travel and Tourism, available at <https://www.trade.gov/country-commercial-guides/uzbekistan-travel-and-tourism>

<sup>30</sup> CEIC, (2018). Uzbekistan GDP: Samarkand, available at <https://www.ceicdata.com/en/uzbekistan/sna-2008-gdp-by-region/gdp-samarkand>

<sup>31</sup> Extrapolated for figure for first nine months of the year. Kun.uz, (2021). Provinces with Highest GDP Announced, available at <https://kun.uz/en/news/2021/11/26/provinces-with-highest-gdp-announced>

<sup>32</sup> Uzstat, (2023). Available at <https://stat.uz/en/press-center/news-of-committee/39741-samarqand-viloyati-bo-yicha-aholi-jon-boshiga-hisoblangan-yalpi-hududiy-mahsulot-qanchaga-o-sdi-3>

purposes of international benchmarking, the per capita figure is higher than India's national figure for 2022, but lower than Morocco's.<sup>33</sup>

In 2022, **industry and construction amounted to 22% of regional GDP, agriculture 40.5% and services 37.4%**. The overall contribution of the region to Uzbekistan's national GDP is 7%. Notably, the trend is for **industrial and services GDP to increase, while agricultural GDP is decreasing year-on-year**. Of the total GDP, 71.4% was contributed by smaller businesses, representing a decrease from 2021 due to an increase in output from larger businesses.<sup>34</sup>

In recent years, **overall business growth has been strong**. New infrastructure, including gas pipelines, water pipes and highways, have been provided. At the same time, many new apartment blocks are being built in urban areas, with supporting services including schools and hospitals being constructed or expanded. **Plans to expand Samarkand's boundaries to encompass five new urban districts** are part of a vision to support Samarkand in being a centre of heritage tourism as well as a leading centre for conferences, exhibitions and other business meetings<sup>35</sup>.

## Greenhouse Gas Emissions

As **no Greenhouse Gas (GHG) inventory exists at Samarkand Region or Samarkand city level**, Samarkand GCAP's assessment of greenhouse gas emissions relies initially on national-level data, which can then be extrapolated as appropriate to Samarkand itself.

Nationally Determined Contributions (NDCs) are commitments made by UN member states to reduce their GHG emissions. In 2021, the government of Uzbekistan strengthened its 2017 commitments as part of its **updated NDC in accordance with the Paris Agreement**, pledging to **reduce specific GHG emissions per unit of GDP by 35%** from their 2010 baseline by 2030. However, Uzbekistan's NDC is not clear on what, if any, role should be played by Regional or city governments.<sup>36</sup>

**Uzbekistan's GDP has increased substantially in the context of a slight fall in emissions**- this signifies a fall in emissions intensity per unit of GDP.

**The largest share of emissions in 2017 was from the energy sector** (76.3%), followed by the agriculture, forestry, and other land-use (AFOLU) sector (17.8%), industrial processes and product use (IPPU) sector (4.5%) and the waste sector (1.4%). In the context of such a high share of emissions, the country's current national strategy to achieve NDC targets focuses firmly on the energy sector, seeking to **improve energy efficiency, reduce the energy intensity of GDP, and increase the share of renewable energy sources**. Other targets include conserving terrestrial ecosystems, modernisation of infrastructure, creating sustainable industry through resource efficiency, and improving solid waste processing<sup>36</sup>.

**Emissions growth in Uzbekistan from 2010 to 2017 has been greatly reduced across all sectors, compared to historic trends**. The greatest change is from the energy sector, where emissions have reduced by 19 million tCO<sub>2e</sub>, or 12% since the baseline year.

The NDC data indicates that **the scale of mitigation that can be adopted for the energy sector is reliant on the scale of financial support available**, which in many cases will need to come from IFIs, foreign investment and/or the private sector. Specifically, investment will be needed to achieve a **greater diversification of fuel consumption, reduction of natural gas consumption, and an increase in renewable energy as a fuel source**. The NDC also envisages the **development of a green economy, increasing energy efficiency**, and realising the maximum potential for **reducing greenhouse gas emissions in the production, distribution, and consumption of energy**.

<sup>33</sup> World Bank,(2023). GDP per capita (current US\$), at

[https://data.worldbank.org/indicator/NY.GDP.PCAP.CD?most\\_recent\\_value\\_desc=false](https://data.worldbank.org/indicator/NY.GDP.PCAP.CD?most_recent_value_desc=false)

<sup>34</sup> Review.uz, (2023). Infographics: Analysis of macroeconomic indicators of the Samarkand Region for 2022, available at <https://review.uz/en/post/samarkand-viloyatining-2022-yil-yanvar-dekabr-oylaridagi-makroiqtisodiy-korsatkichlari>

<sup>35</sup> Review.uz, (2021). Infographics: Social and Economic Development of Samarkand Region over Five Years, available at <https://review.uz/en/post/infografika-socialno-ekonomicheskoe-razvitie-samarkandskoy-oblasti-za-pyat-let>

<sup>36</sup> Uzhydromet, (2021). First Biennial Update Report of the Republic of Uzbekistan, available at <https://unfccc.int/sites/default/files/resource/FBURUZeng.pdf>

**Between 2010 and 2017, the urban population of Samarkand made up approximately 1.6-1.7% of the entire population of Uzbekistan**<sup>37</sup> The Samarkand Regional GDP accounts for 8-9% of Uzbekistan’s GDP for the same period. Figure 2-7 sets out the results of estimating the share of GHG emissions attributable to the Samarkand Region using its contribution to national GDP, and the GHG emissions attributable to the urban population of Samarkand relative to total Uzbekistan population. While this provides a visual indication of how population growth and GDP growth in the Region influences emissions, it is not a definitive indicator of actual GHG emissions within Samarkand nor can the estimate be broken down by local sector. Instead, **it is recommended that efforts to reduce emissions in Samarkand Region and urban area should align with the national-level strategy previously described**, including a particular focus on mitigating emissions from the energy sector.

Figure 2-7: Samarkand – Estimated GHG emissions

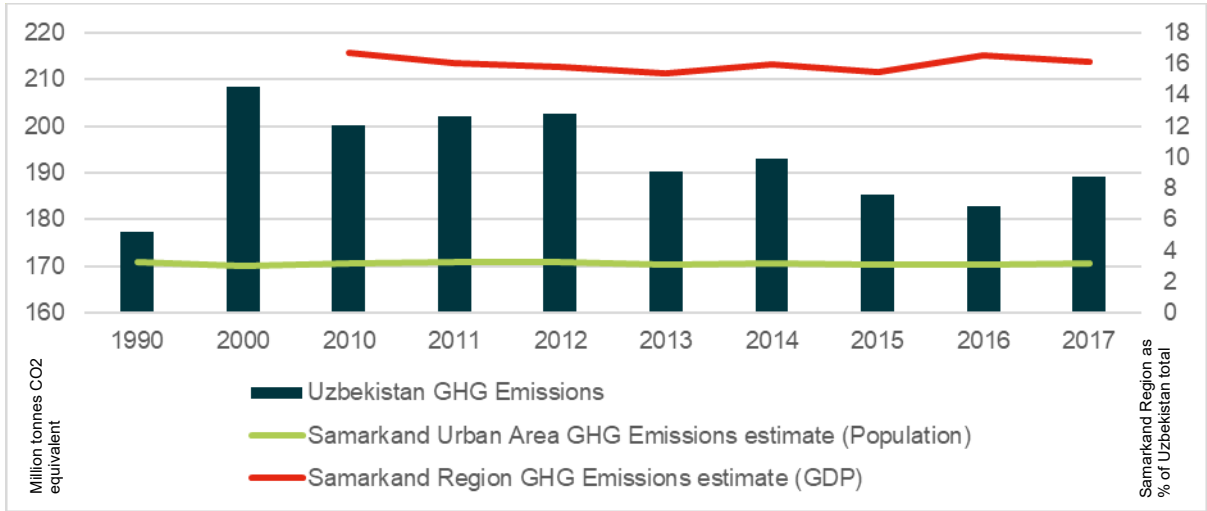
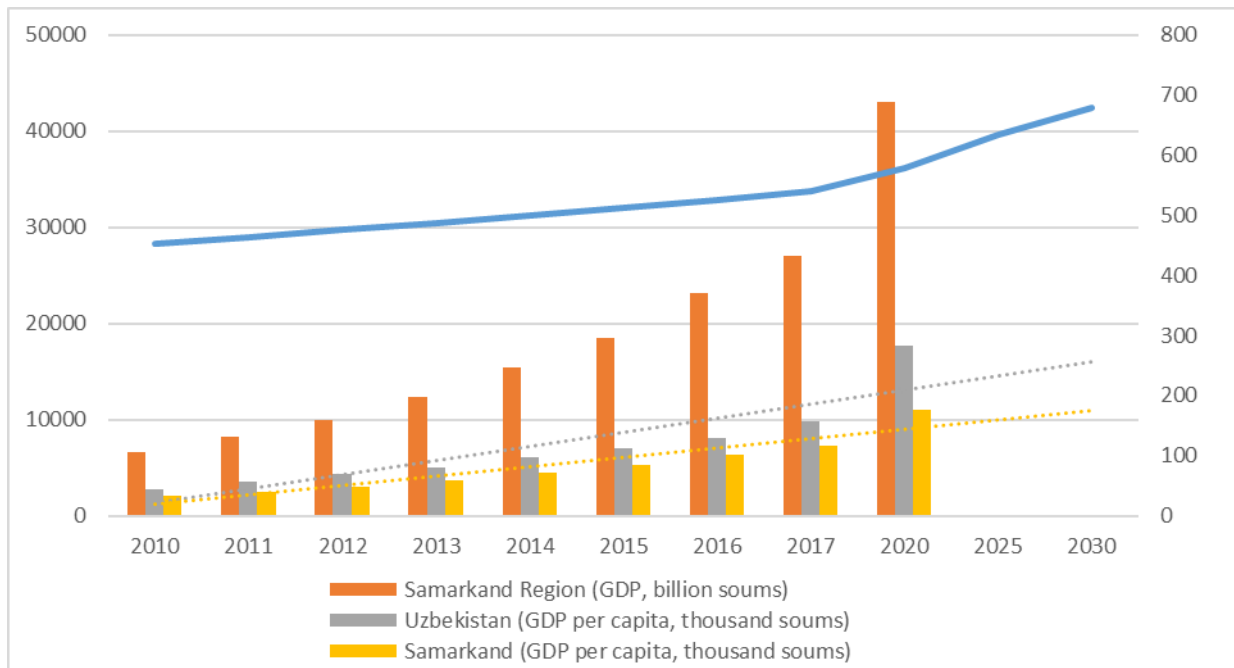


Figure 2-8 shows the GDP per capita growth trend for Samarkand and Uzbekistan. The **rate of national GDP growth is likely to outstrip that of the Region**. Given current trends in Samarkand’s population and economic growth, this indicates that GHG emission per unit of GDP is likely to be reduced faster at national level than it will be at the Regional level, provided GHG emission trends remain constant. This suggests that **Samarkand will have to adopt more ambitious mitigation measures to reduce GHG emissions in order to match the emissions per unit of GDP reduction target at national level**.

<sup>37</sup> United Nations, (2018). World Urbanization Prospects- Urban Agglomerations, available at <https://population.un.org/wup/Download/>

Figure 2-8. Samarkand –GDP Growth Trends



## Local Government Finance and Investment Planning

### Public Finance Context

In Uzbekistan, local governments (at both Regional and city level) have a range of financial responsibilities.<sup>38</sup> Areas funded include **environmental protection, prevention of natural and human-caused disasters, fire safety, public health, public order and security, economic development, culture, tourism, sports and leisure, utilities, construction, maintenance and public transport.**<sup>39</sup>

Uzbek cities and Regions, including Samarkand, have **little independence in managing public finance. Open-market borrowing is prohibited, and there also appears to be no powers for local government to raise funds through issuing bonds or directly engaging with private investors.** Rather, **transfers/allocations from central government are the most important source of income;** central government ministries decide the revenue streams local governments can generate and set budgetary requirements for services. This is achieved through close engagement in local government activities by regional branches of central government ministries, and by requiring city governments to report regularly to the regional branches on their activities.

Local governments must also follow centrally mandated tax rates and tax base parameters, having no ability to set their own. This precludes fund-raising mechanisms such as local sales taxes or tax increment financing tools. **Cities may, however, be able to raise funds from disposal of assets, including buildings, to third parties.**

### Local Government Revenue and Expenditure

**The budget of Samarkand between 2018 and 2022 shows significant revenue growth,** which can partially be explained by **high inflation rates,** which have averaged 14% per year. However, after accounting for inflation, revenue growth between 2018 and 2022 is estimated at 163% (nominal growth of 313%)- this may be because of an increasing tax base due to population growth. In 2022, the last year of the assessment period, Samarkand had a high budget deficit, though much reduced from the 2018 deficit. **It is unclear how the deficit has narrowed so quickly, why it was so high in the first place, and how revenues have increased much faster than spend since 2018,** although based on the analysis above, it seems reasonable to assume that **central government allocations may have grown over this time.**

Overall, the data suggests an **improving picture in terms of the City's finances, but it is difficult to determine the significance or regularity of the high financial shortfall in recent years.** It may be that the shortfall can be explained by the reliability of central government in meeting the costs of financing the local government deficit and

<sup>38</sup> UNDP, (2021). Local Government Performance Measurement in Uzbekistan. Available at <https://ipsd.uz/document/BOUKMnXEg4.pdf>

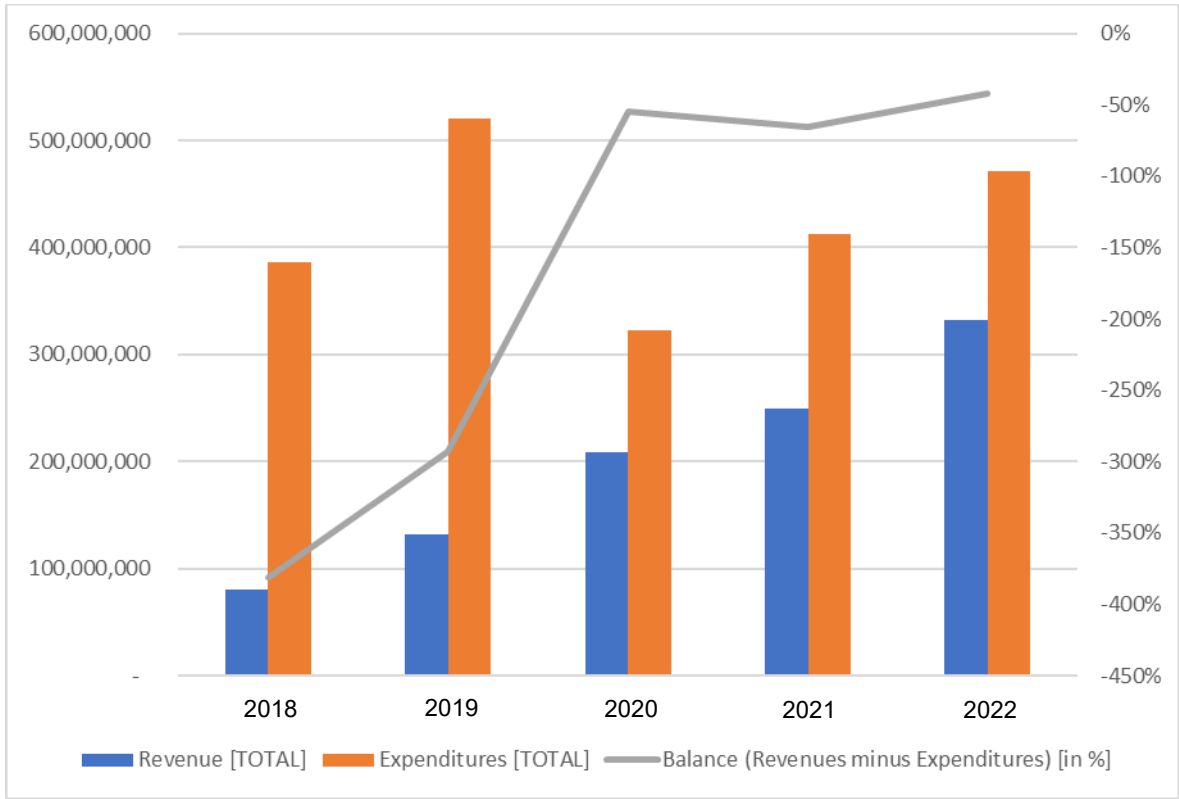
<sup>39</sup> Urinboyav, R., (2018). Local Government in Uzbekistan. Available at [https://portal.research.lu.se/files/51006205/Proof\\_Local\\_Government\\_in\\_Uzbekistan.pdf](https://portal.research.lu.se/files/51006205/Proof_Local_Government_in_Uzbekistan.pdf)

debt obligations. However, from a balance sheet perspective, **consistently negative cash flow is a strategic risk, and a budget surplus is preferable**. No information has been provided on the City’s balance sheet and/or its assets net liabilities position. It should be noted, however, that **part of the reason a budget surplus would be desirable is because, in Uzbekistan, local governments have the powers to spend such funds**.

A further possible factor impacting local government finances over the assessment period is the **cost of preparations for the 2022 international SCO Summit in Samarkand**. However, **the extent to which such expenditure is reflected in the city accounts in the period is not clear**; it may be that all expenditure was managed at central government level.

Figure 2-9 below shows **total city revenues, expenditures and the balance between them for the assessment period 2018 to 2022 (in UZS, 000s)**. The balance (revenues minus expenditures) as a percentage of total revenues was **negative throughout the five years, ranging from -381% in 2018 to -42% in 2022**.

**Figure 2-9. Samarkand City Budget (2018-2022, in total yearly revenue, UZS, 000s)**



Source: Samarkand City Government

### Local Government Investment Planning and Finance

The constraints governing local government finance in Samarkand mean that **strategic investment plans at the level of the city or Region do not appear to be publicly available, if produced. No major Public-Private Partnerships (PPPs) currently exist in the city<sup>40</sup>**; if they did, it is possible that more information on local and/or central government investment planning for Samarkand might be available.

However, over recent years, **IFIs and international development funds have invested significantly in Samarkand**. EBRD, ADB, AFD, Masdar and the World Bank all have a presence in Uzbekistan. **Samarkand has attracted particularly significant investment in solar energy due to a combination of insolation potential and available, inexpensive land and labour costs**. Abu Dhabi Development Fund (Masdar) has invested in not only solar PV but also transport and water sector improvements. ADB has invested nationally in the electricity grid, including infrastructure within Samarkand Region. EBRD has invested in solar projects in and around Samarkand, most notably in the significant Tutly Plant with partners EIB and PROPARGO. It has also financed the existing rollout of electric buses in the city. More investment is anticipated as EBRD extends its impact in Uzbekistan, including through the Green Cities programme. **Selected recent large-scale IFI and other international**

<sup>40</sup> AFD, (2023). Consultancy Services on Analysing Possibilities of Improvement of Solid Waste Management in Samarkand City and Region through the Involvement of Private Actors, not available online. The involvement of private sector waste collection companies is given as an example of a small-scale PPP in Samarkand.

development fund investments specifically within Samarkand Region and city are set out in Table 2-2 below, which provides a helpful baseline of the scale of investment in Samarkand even before the GCAP is adopted.

**Table 2-2. Selection of Recent International Development Projects in Samarkand**

Project (Donor)	Type	Period / Status	Approximate value (EUR) <sup>41</sup>	Sector(s)
<b>Bukhara Samarkand Solid Waste Management Project (World Bank)</b>	Grant	Approved 2009 / closed	26 million	Solid Waste
<b>Uzbekistan: Samarkand Solar Power Project (Asian Development Bank)</b>	Loan	Approved 2013 / closed	285 million to date	Energy
<b>Modernisation of Solid Waste Management in the City of Samarkand (Agence Française de Développement)</b>	Loan	Approved 2015 / active	23.5 million	Solid Waste
<b>Samarkand Solar Power Plant (Asian Development Bank and Masdar)</b>	Loan	Approved 2020 / active	21.8 million	Energy
<b>Total Eren – Tutly Solar Power Plant (EBRD, EIB, PROPARCO)</b>	Loan	Approved 2021 / active	43.7 million (EIB), 21.8 million (EBRD,) 21.8 million (PROPARCO)	Energy
<b>Modernisation of Samarkand’s road and water supply network (Abu Dhabi Development Fund)</b>	Loan	Approved 2022 / active	276.3 million	Transport, Water
<b>Scaling Solar 2 Project for Uzbekistan (World Bank)</b>	Grant	Approved 2023 / active	11 million	Energy
<b>Samarkand Solar (EBRD)</b>	Loan	Approved 2023 / active	31.6 million	Energy
<b>Samarkand Solar Revolving Facility (EBRD)</b>	Revolving facility	Approved 2023 / active	18 million	Energy
<b>Samarkand E-Bus Project (EBRD)</b>	Loan	Approved 2023 / active	45 million	Transport

Sources: World Bank, ADB, AFD, Abu Dhabi Development Fund, EBRD

Based on the assessment of the public finance context, as well as projects in Samarkand to date, **the GCAP implementation budget is likely to be met by a combination of private and public sector entities**. In terms of the private sector, this is likely to be a combination of IFIs and/or state-backed international development entities as has been the case in the past, but also likely an **increasing number of multinational corporations as the government becomes more supportive of major PPP opportunities**. Central government has set up a PPP Development Agency that reports to the Ministry of Finance. As such, **major PPP projects in Samarkand seem likely to be launched in the foreseeable future, particularly once the GCAP is adopted** and acts as a clear guide to strategic investment opportunities. Already in early 2023, AFD began discussions with Maroqand Obod to explore the potential for large-scale PPPs in Samarkand’s solid waste sector.

In terms of **public sector investment**, the public finance context analysis above indicates that this is likely to be either directly from central government or by the Regional or city governments on the basis of increased allocations from central government. Given the existing local government budget deficit, particularly significant expenditure required to finance GCAP actions (whether as part of a PPP or through local government investment alone) seem very likely to require a transfer of funds from central government, which in turn requires **central government support for the relevant GCAP actions and understanding of their cost**.

<sup>41</sup> All figures inflation-adjusted and converted from USD where necessary using August 2023 exchange rate.

## Smart Maturity

As part of the GCAP methodology, a Smart Maturity Assessment (SMA) for Samarkand was developed. The SMA concluded that the recent adoption of a framework for the implementation of smart city technologies in Uzbekistan has set a **national legal basis for digital transformation and smart integration processes**. However, that **institutional basis appears to be underdeveloped at Regional (and city) level**, as the political power of local government in Uzbekistan tends to be limited to enforcement and implementation of national-level visions and policies.

While Samarkand Regional Government has a **Department of Information and Communications, and also a Department of Innovation**, there **does not yet appear to be a dedicated office or institution specifically tasked with leading on the digital transformation of the city**. Likewise, it is not clear if there is a specific budget dedicated to coordination or development of smart city initiatives.

The **main local challenges** that were uncovered by the SMA are considered to be the following:

- **Constrained ability for Regional and/or city governments to drive the process of digitalisation** or to pioneer the adoption of smart technologies due to centralisation of powers at national government level.
- **No dedicated Region or city-level policies, strategies or other locally specific information** relating to implementing important national digital initiatives
- **The institutional structure of Regional and city government limits the ability to progress towards smart maturity**- there is no digital department, and no evidence of a digital development budget.
- **The Regional and city governments do not appear to have significant or sustained levels of engagement or partnerships** with stakeholders who could help drive smart or digital investments.
- There is **little evidence at Regional or city government level of an understanding or awareness of the value of open data efforts**; data (digital or otherwise) is not regularly shared.
- While there is evidence that digital data is used in governmental day-to-day operations and management in GCAP sectors, there is **little indication that such data is integrated across sectoral boundaries**.
- The Regional and city government's **approach to data protection and cybersecurity, and/or awareness of their importance, is unknown**.
- The strong performance at national level in e-government, whereby **citizens can access services, download forms, and even submit petitions and proposals**, is **not replicated at local level**.
- There is evidence of **limited digital literacy, and a lack of digital skills and capacity**, at Regional and city government level. This appears to include a lack of GIS capacity.

**The findings of the SMA were taken fully into account** in the development of the Actions in Chapter 5 below.

# 3. Environmental Challenges and Impacts

## Environmental Challenges

The GCAP methodology requires every Green City Action Plan to research, identify and define the Priority Environmental Challenges (PECs) faced by the city. The PECs for Samarkand were identified through the baseline evidence gathering stage, with input from local stakeholders. Through the analysis, there was an appreciation that some challenges cut across sectors and relate to data availability and roles and responsibilities for implementation.

### Air Quality

- **Lack of clear, consistent data:** Without quality data that demonstrates trends over time it is challenging to implement effective monitoring of air quality that would allow for the development of targeted policy and the monitoring of its impact.
- **Elevated values of PM2.5 and PM10:** Available data suggests that pollution can be attributed to older vehicles and outdated industrial and construction processes.

### Water Resources and Quality

- **Pollution of important surface water sources:** Pollution levels in the Zarafshan river is of significant concern, but also relevant to other collectors (irrigation channels).
- **Overall high level of water stress:** High water stress that is constraining existing sources can be attributed to increased usage as a result of economic development across Uzbekistan and Samarkand Region.

### Land and Soil Quality

- **Lack of consistent monitoring and data collection:** Poor data makes it challenging to develop evidence-based policy responses to tackle soil pollution, including mitigation of key pressure sectors (agriculture, industries)
- **Excessive use of fertilisers:** While fertilisers are used to increase agricultural outputs and economic growth, in the long-term they can impact on soil fertility and quality.

### Biodiversity and Open Space

- **Tensions between urban growth and biodiversity conservation:** Precise figures for biodiversity loss are difficult to establish due to data gaps and apparent limited policy focus on the importance of balancing the conservation of biodiversity outside nature reserves with economic and urban growth.
- **Inadequate provision of open/green spaces across the urban area:** There are insufficient open and/or green spaces across the city- which have negative impacts on quality of life and biodiversity.

### Climate Mitigation

- **Greenhouse gas emissions:** The sectors that contribute the most are residential heating, transport, and agriculture. Economic growth has potential to increase absolute emissions unless mitigation measures are planned in the immediate future and applied without delay.
- **Lack of clarity on local government role:** Limited guidance on responsibilities and timeline for a regional/city level GHG inventory, mitigation strategy, and a Climate Action Plan tailored to local circumstances makes it challenging for strong local policy and action.

### Climate Change and Disaster Resilience

- **Too little focus on climate change-related hazards:** With the possible exception of drought, there is limited strategic policy focus on hazards arising from climate change, such as heatwaves and flash flooding events (as opposed to natural hazards, such as earthquakes)
- **Lack of clarity on DRR role for Regional and/or city government:** Official government policy, legislation and other technical data do not set out the precise roles and responsibilities for DRR at local government level- which may result in delayed and/or inefficient disaster responses.

## Sectoral Impacts on Environment

**This section summarises the impacts on the environment for each GCAP sector.** As is clear from Table 3-1, most sectors have a negative or a moderate impact on the environment. This is to be expected and is not unique to Samarkand, given that each is identified within the EBRD GCAP Pressure-State-Response approach as generating environmental pressures. In the table text, pressures specific to Samarkand (or, where local information is not available, specific to Uzbekistan) are identified.

**Table 3-1. GCAP Sectoral Impacts on the Environment at Samarkand**

**Legend**

Negative impact on Environmental State topic	Moderate or limited impact on Environmental State topic	Positive or no detected impact on Environmental State topic
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Sector	Air Quality and Carbon Emissions	Water resources and quality	Land and Soil Quality	Biodiversity and Open Space	Climate and Disaster Risk
<b>Urban Development and Green Space</b>	There is little focus on air quality and carbon emissions from city authorities at present, either in general or relating specifically to the impacts of urban development.	Increased development and population put pressure on surface and groundwater; use of cesspools and septic tanks by development not connected to mains sewerage contaminates groundwater; impermeable surfaces increase flooding	The lack of development control is causing urban growth to spread outwards into floodplains and productive agricultural regions, without regard for the loss of valuable agricultural land and negative impact on soil resources	Limited focus on biodiversity and open space in urban development decisions. Samarkand lacks accessible open space and/or parkland, and that which is remaining is fast being developed because it does not appear to have official protection.	Development taking place in proximity to watercourses exposes residents to the risk of flash flooding. High rate of urban development in arid climate increases water use and results in more severe droughts in drier years.
<b>Buildings</b>	High reliance on fossil fuels (mainly natural gas) for space heating in buildings. Electricity used for cooling. Poorer families still use coal or wood burning stoves.	As wastewater treatment is not mandatory for new buildings, cesspools and septic tanks are used, causing groundwater contamination. No recycling or reuse of greywater within buildings.	Burial of asbestos on construction sites where existing buildings are demolished. Rapid construction of new buildings increases volume and intensity of storm water run-off, which can lead to soil erosion.	Rapid pace of construction of new buildings poses significant obstacles to the preservation and expansion of green spaces (and their associated biodiversity). However, minimum design requirements exist to provide open space as part of new developments.	Building regulations identify limitations for high rise construction to mitigate disaster risk. Building codes do not yet appear to manage or mitigate the effects of floods or landslides. The extent of conformity with building codes for earthquake resilience is not clear.

Sector	Air Quality and Carbon Emissions	Water resources and quality	Land and Soil Quality	Biodiversity and Open Space	Climate and Disaster Risk
<b>Industries</b>	Some heavy industries still operate within the urban area and are likely significant contributors to poor air quality. Industrial emissions nationally often exceed the maximum permissible amount.	Industrial water consumption is low in relative terms; however, industrial wastewater can be discharged to municipal sewerage and industrial contaminants are found in rivers locally	Extractive industries contribute to soil degradation. Industrial heavy metals contaminate soil to an unknown extent. Industrial waste disposal contaminates soil and groundwater.	Industrial activities and expansion have negative impacts on both biodiversity and open space. While some environmental inspections take place, the true extent of harm is unknown. Biodiversity offsetting is not applied.	Industry contributes directly to climate change through GHG emissions; in turn, climate change exacerbates the risk of disasters such as droughts. The seismic safety of industrial premises is unknown.
<b>Transport</b>	Vehicle emissions standards are outdated. Uptake of low emission vehicles is limited, and infrastructure is poor. Many public buses are still powered by fossil fuels.	New multi-lane highways increase the extent of impermeable cover. This can lower groundwater recharge rate and increase surface water runoff, exacerbating flooding.	Addressing congestion through building new roads leads to low density suburbs consuming productive agricultural land.	Public transport helps to avoid sprawl and helps residents to access existing and new open spaces throughout the urban area. High levels of overall vehicle emissions will have a negative impact on biodiversity	There are measures in place to prepare the transport sector for disaster risk, but it is not clear if these consider seismicity as well as climate hazards.
<b>Energy</b>	The combustion of fossil fuels has negative impacts on air quality; it is a key source of carbon emissions as well as carbon monoxide.	Hydroelectric power plants alter the landscape, biodiversity and ecosystems of the water bodies they are built on. However, hydropower production has only limited effect on water quality.	Oil pipelines in the Region have potential to contaminate soils in cases of spillage. drilling and extraction of gas from wells also contaminates land and soil. However, the extent of the problem is not clear.	Renewable energy production facilities potentially impact land used for local open space. Solar power is relatively biodiversity-friendly, but hydropower can have negative impacts on aquatic ecosystems. Air pollution from carbon-intensive energy sources has a particularly negative impact on biodiversity.	There appears to be a lack of sectoral resilience planning, including for the energy sector; for example, the number or frequency of power outages caused by extreme weather events is unclear, and overground gas pipelines along streets are a fire risk in case of earthquakes.

Sector	Air Quality and Carbon Emissions	Water resources and quality	Land and Soil Quality	Biodiversity and Open Space	Climate and Disaster Risk
<b>Water</b>	Recent droughts mean more power is required to pump groundwater, presumably increasing associated GHG emissions; however, there have been energy efficiency improvements in pumping.	Unsustainable large-scale abstraction of ground and surface water resources, particularly by agriculture for irrigation, directly impacts the water stress levels of the city. Recent droughts have lowered the water table and exacerbated the problem.	High levels of reported contamination in the Zarafshan from WWTPs. Use of cesspools and septic tanks for wastewater collection, with associated ground seepage and pollution.	The reported high levels of contamination in the Zarafshan and Siab Collector from sewage treatment plants as well as inadequately managed drainage systems can negatively affect aquatic biodiversity.	Higher water demand and increasing frequency of droughts. Channelising streams and rivers with concrete exacerbates the risk of flooding. Lack of resilience in the water supply network, with a storage capacity of 4.4 hours.
<b>Solid Waste</b>	Current landfill emits gases directly into the atmosphere. The AFD-funded new landfill will better manage gas emissions. Truck movements also impact air quality but plans for biogas as fuel will help mitigate this.	Leachate is not collected at the existing landfill, resulting in groundwater contamination. Planned new landfill will improve this, but groundwater contamination from unauthorised waste dumping remains a problem.	Current landfill negatively impacts local land and soil quality. Planned new landfill will improve this significantly. Burial of hazardous construction waste has significant negative impact.	Landfill sites use land that could otherwise be used for open space or nature conservation. Unregulated waste disposal sites also impact biodiversity.	Existing landfill site has direct and significant contribution to climate risk through gas emissions. However, new landfill site will have its emissions better managed. Investment in new waste collection trucks also likely to have some positive impact in terms of vehicle emissions.

# Interconnections between Environmental Challenges

Figure 3-1. Interconnections between environmental challenges at Samarkand based on the GCAP Pressure-State-Response framework

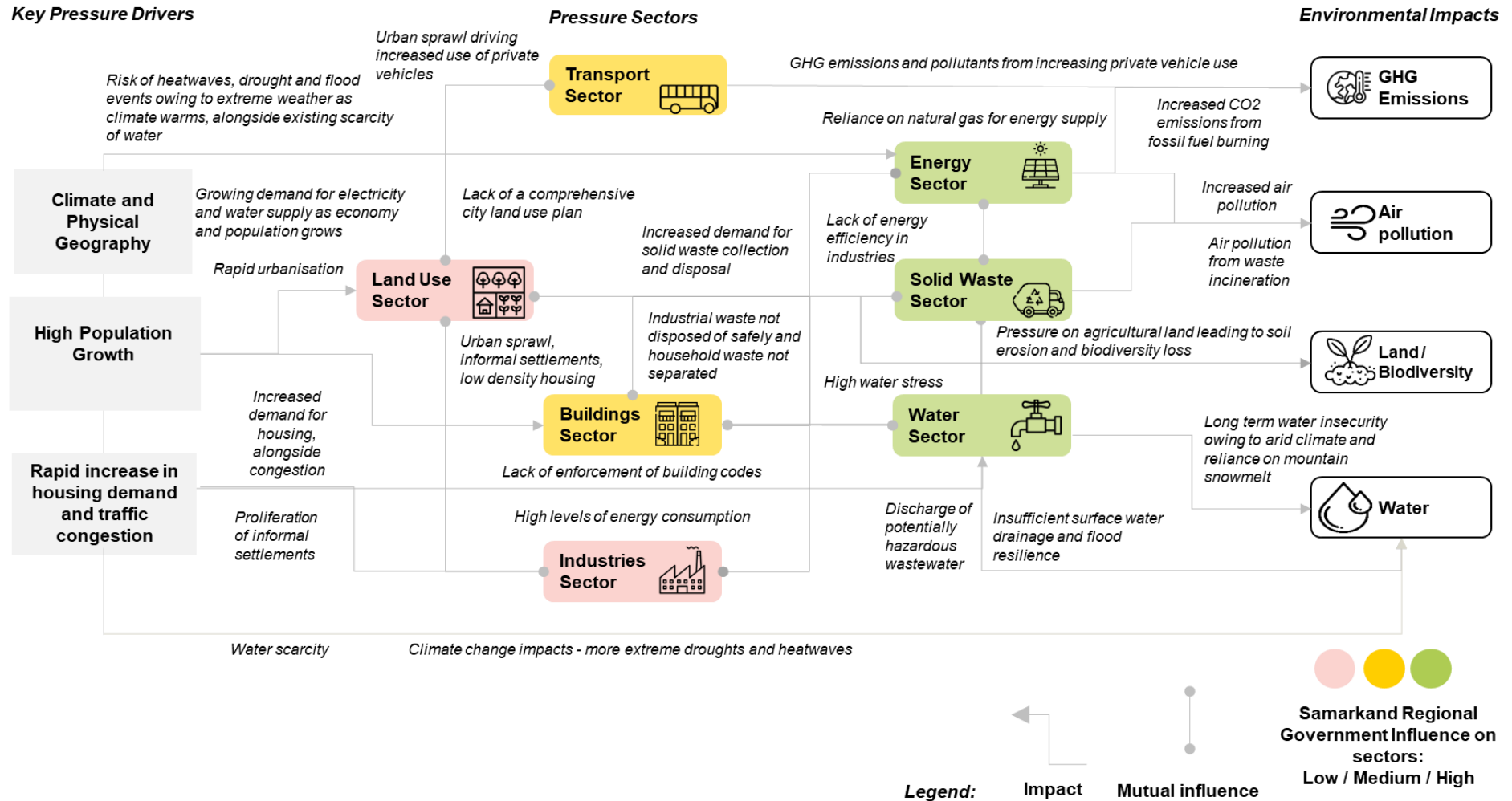


Figure 3-1 above demonstrates the **high-level interconnections between environmental challenges in Samarkand**. The inputs are the key pressure drivers, which are: **the city's climate and physical geography; high population growth; and rapid increase in housing demand and congestion**. The diagram shows how these key pressure drivers impact and have mutual influence on the pressure sectors: from left to right, **urban development and green space, transport, buildings, industries, energy, solid waste and water**. All of these pressure sectors are inherently interrelated by virtue of being **critical aspects of Samarkand's society and economy**. However, the diagram points out additional key interlinkages. The outputs of the diagram are the **environmental impacts**, which in the case of Samarkand are **greenhouse gas (GHG) emissions, air pollution, and land / biodiversity and water impacts**.

Actions in this GCAP were developed with reference to these interconnections to maximise their ability to mitigate these environmental challenges and to support Samarkand in achieving its **Green City Vision and Strategic Goals**, which are described in the next section.



## Green City Challenges






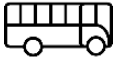

**Green City Challenges complement and build on the Priority Environmental Challenges by focussing the baseline assessment of key issues in Samarkand on each of the GCAP sectors relevant to the urban built environment. This enables all challenges identified to be consolidated in a single place, including:**

- All **PECs and additional (non-priority) challenges defined for each of the seven GCAP infrastructure sectors**, namely Buildings, Energy, Industry, Urban Development and Green Space, Solid Waste, Transport and Water; and
- the **non-priority environmental challenges** previously defined for the same topic areas

As described in Chapter 1, the process for identifying the Green City Challenges included technical analysis, policy review as well as stakeholder engagement. Table 3-2 below brings together the full set of Green City Challenges considered in developing the GCAP Actions.

**Table 3-2. Green City Challenges in Samarkand**

Sector	Green City Challenges (PECs first, in bold text)
<b>Climate Change and Resilience</b> 	<ul style="list-style-type: none"> <li>• <b>Increasing greenhouse gas emissions</b></li> <li>• <b>Lack of clarity on local government role in emissions reduction</b></li> <li>• <b>Insufficient focus on climate change-related hazards</b></li> <li>• <b>Lack of clarity on disaster risk and resilience (DRR) role for local government</b></li> <li>• Energy-intensive economy</li> <li>• High risk of drought</li> <li>• Lack of dedicated DRR fund</li> </ul>
<b>Environment and Biodiversity</b> 	<ul style="list-style-type: none"> <li>• <b>Lack of clear, consistent air quality data</b></li> <li>• <b>Elevated values of PM2.5 and PM10</b></li> <li>• <b>Pollution of important surface water sources</b></li> <li>• <b>Overall high level of water stress</b></li> <li>• <b>Lack of consistent soil quality monitoring and data collection</b></li> <li>• <b>Excessive use of fertilisers</b></li> <li>• <b>Tensions between urban growth and biodiversity conservation</b></li> <li>• <b>Inadequate provision of open/green spaces across the urban area</b></li> <li>• Possible contamination of groundwater</li> <li>• Reported discharges of untreated wastewater</li> <li>• No regular data on or monitoring of urban biodiversity</li> </ul>

Sector	Green City Challenges (PECs first, in bold text)
<p><b>Buildings</b></p> 	<ul style="list-style-type: none"> <li>• <b>Old, poor quality public building stock</b></li> <li>• <b>Poor enforcement of building safety and energy efficiency regulations</b></li> <li>• <b>Poor energy efficiency in residential and commercial buildings</b></li> <li>• Too little incentivisation/investment in renewable energy for buildings</li> <li>• Too little development meeting recognised international standards for green buildings</li> <li>• Lack of available, good-quality general data on city buildings</li> <li>• Significant seismic risk to buildings</li> <li>• Building accessibility, health and safety issues</li> </ul>
<p><b>Energy</b></p> 	<ul style="list-style-type: none"> <li>• <b>Ageing and inefficient network infrastructure</b></li> <li>• <b>Increasing energy demand</b></li> <li>• High reliance on fossil fuels for power generation and heating</li> <li>• Lack of information, data and awareness</li> <li>• Potential lack of resilience in the energy network</li> </ul>
<p><b>Industries</b></p> 	<ul style="list-style-type: none"> <li>• <b>High levels of energy consumption and energy inefficiency</b></li> <li>• <b>Potentially hazardous industrial wastewater is discharged</b></li> <li>• <b>Sector generates high level of GHG and dust emissions</b></li> <li>• Industrial waste, including hazardous waste, is not disposed of safely</li> <li>• Lack of good quality data on industries</li> </ul>
<p><b>Urban Development and Green Space</b></p> 	<ul style="list-style-type: none"> <li>• <b>Risks to heritage assets from unregulated or unsympathetic development</b></li> <li>• <b>Lack of green/open spaces</b></li> <li>• <b>Illegal or poorly planned development</b></li> <li>• Lack of a strategic land use plan</li> <li>• Rapid population growth</li> <li>• Urban sprawl on greenfield land</li> <li>• Car-based development as the default</li> </ul>
<p><b>Solid Waste</b></p> 	<ul style="list-style-type: none"> <li>• <b>Lack of source separation of recyclables</b></li> <li>• <b>Lack of adequate recycling facilities</b></li> <li>• <b>Water, air and soil pollution from landfills</b></li> <li>• <b>Illegal waste dumping</b></li> <li>• <b>Lack of proper industrial/construction waste disposal</b></li> <li>• <b>Lack of proper hazardous waste disposal</b></li> <li>• Lost municipal revenue from recyclables and collection contracts</li> <li>• Outdated/insufficient infrastructure</li> <li>• Lack of waste-to-energy initiatives</li> </ul>
<p><b>Transport</b></p> 	<ul style="list-style-type: none"> <li>• <b>Traffic congestion</b></li> <li>• <b>Poor air quality from vehicle emissions</b></li> <li>• <b>Inadequate walking and cycling infrastructure</b></li> <li>• <b>Inadequate public transport</b></li> </ul>
<p><b>Water</b></p> 	<ul style="list-style-type: none"> <li>• <b>Poor maintenance of drainage infrastructure</b></li> <li>• <b>Drought/water shortage</b></li> <li>• <b>High household water consumption</b></li> <li>• <b>Inadequate wastewater treatment</b></li> <li>• <b>Ageing/poor quality drinking water supply</b></li> <li>• Lack of flood resilience</li> <li>• Sewage sludge sent to landfill</li> </ul>

Source: GCAP Samarkand Technical Baseline Report, AECOM, 2023.

# 4. Green City Vision and Strategic Goals

The development of Actions in the GCAP for Samarkand must be informed by a Green City Vision that forms an overall guiding statement of the city’s environmental ambitions over the next twenty years. Flowing from this Vision are Strategic Goals, each of which identify appropriate areas of focus for each sector to help address the Green City Challenges for each sector identified in previous chapters through GCAP baseline analysis and stakeholder engagement.

Figure 4-1. Relationship between Green City Vision, Strategic Goals, and Green City Actions



Source: AECOM, 2023.

## Green City Vision

The Green City Vision is a guiding statement designed as a single, simple focus for all GCAP Strategic Goals and Actions. It has been developed to reflect Samarkand’s aspirations for its future environmental state and was co-created with the Regional and City governments with input from other relevant stakeholders across the city. The purpose of the Green City Vision is to act like a compass for travellers. It sets a simple, consistent and integrated direction for sustainable and resilient urban development in the city over the coming twenty-years and serves as the basis for the sector-specific Sectoral Goals.

As described in Chapter 1, the process for developing a Vision statement made use of participatory exercises with a range of stakeholders. Exercises were used to help participants consider their ‘city of the future’ and to identify key words that resonate.

Table 4-1. Words and phrases commonly used in urban plan Vision Statements

Clean	Green	Healthy	Sustainable	Distinctive	Unique	Historic	Attractive
Beautiful	Residents	Visitors	Businesses	Equal	Inclusive	Fair	Community
Safe	Resilient	Liveable	High-quality	Innovation	Smart	Opportunity	Development
Comfortable	Pleasant	Protecting	Infrastructure	Investment	Life	Active	Intelligent
Capacity	Integrated	Participative	Engagement	Economy	Technology	Happiness	Prosperity

Source: AECOM, 2023.

Based on the results of stakeholder engagement as presented above, and on the knowledge and experience of Samarkand gained through the baseline information gathering stage of the GCAP, the Consultant Team was able to develop a draft Vision statement, which was then reviewed and approved by the GCAP Steering Group to convert it into the **final Green City Vision for Samarkand**, as follows:

**Figure 4-2 Final Green City Vision for Samarkand**

A historic, green, safe and comfortable city, with clean air, beautiful heritage and modern infrastructure. A city where fair governance and smart technology improves environmental sustainability and the quality of residents' lives.







Source: AECOM, 2023.


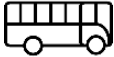

## Strategic Goals

**GCAP Strategic Goals articulate medium-term areas of focus for each of the nine sectors to help achieve the Green City Vision.** Strategic Goals provide a tangible target around which 'hard' and 'soft' actions within each sector may be identified and developed. **In many cases, individual actions will help achieve more than one Strategic Goal across different sectors**, providing a foundation for an integrated approach to sustainable and resilient urban development. The Strategic Goals were, like the Vision statement, **developed on the basis of stakeholder engagement as well as baseline information stage gathering.**

The final list of Strategic Goals is set out in Table 4-2 below.

**Table 4-2 Final Sectoral Strategic Goals**

Sector	Strategic Goal(s)
<b>Environment and Biodiversity</b> 	<ul style="list-style-type: none"> <li>Improve air and water quality in Samarkand</li> <li>Protect and enhance biodiversity in Samarkand</li> </ul>
<b>Climate Change and Resilience</b> 	<ul style="list-style-type: none"> <li>Improve Samarkand's resilience to climate and natural disasters</li> <li>Continue transition to renewable energy</li> </ul>
<b>Buildings</b> 	<ul style="list-style-type: none"> <li>Promote energy efficiency within buildings in Samarkand</li> </ul>
<b>Energy</b> 	<ul style="list-style-type: none"> <li>Use smart and renewable technologies to reduce energy consumption in Samarkand</li> <li>Modernise Samarkand's energy infrastructure</li> </ul>
<b>Industries</b> 	<ul style="list-style-type: none"> <li>Reduce the environmental impact of industries</li> </ul>
<b>Urban Development and Green Space</b> 	<ul style="list-style-type: none"> <li>Develop land use plans for Samarkand, incorporating heritage management</li> <li>Increase extent of Samarkand's green and open space</li> </ul>

Sector	Strategic Goal(s)
<p><b>Solid Waste</b></p> 	<ul style="list-style-type: none"> <li>• Introduce comprehensive system of waste recycling in Samarkand</li> </ul>
<p><b>Transport</b></p> 	<ul style="list-style-type: none"> <li>• Decarbonise Samarkand's transport sector through low-emission vehicles</li> <li>• Improve pedestrian and cycling infrastructure in Samarkand</li> </ul>
<p><b>Water</b></p> 	<ul style="list-style-type: none"> <li>• Increase reuse/recycling of water in Samarkand</li> <li>• Improve Samarkand's water supply and drainage infrastructure</li> </ul>

Source: AECOM, 2023.

## 5. Green City Actions

The actions developed for this GCAP have been developed in a collaborative manner, taking into account Samarkand’s unique environmental and sectoral challenges, as well as the Green City Vision and Strategic Goals. The actions also build on key opportunity areas identified with the Regional Government and other key stakeholders, in line with the city’s ambitions and existing potential.

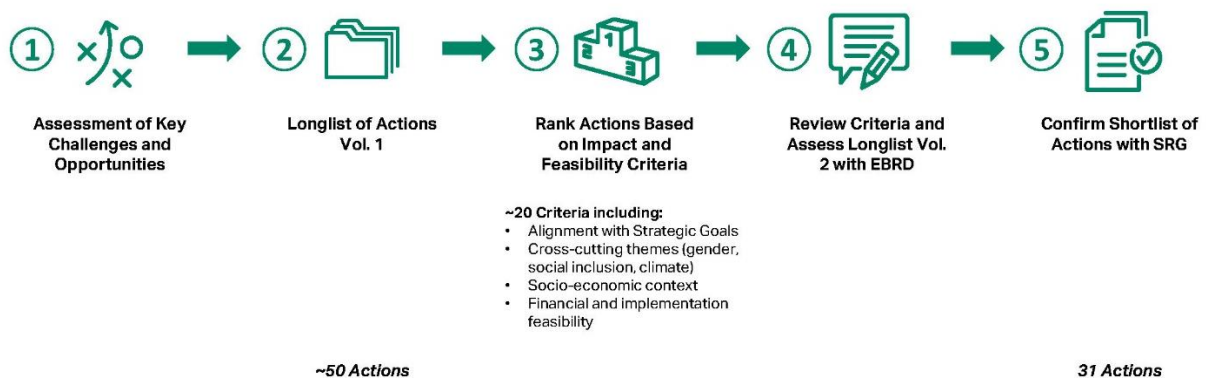
### Actions Overview

Following on from the technical assessment, and completion of the Green City Vision and Strategic Goals, the **Consultant Team compiled a longlist of over 60 Actions**. The development of those actions was tailored to specific environmental and sectoral challenges in Samarkand, as well as with the **Strategic Goals** identified for each sector and the overall **Vision Statement** (see Chapter 4).

Each of the actions was then thoroughly evaluated using **multiple criteria** grouped under two key headings: **‘Action Impact’** (each action was assessed in terms of its alignment with the Strategic Goals for the sector, support for cross-cutting themes, and the potential to improve socio-economic outcomes) and **‘Action Feasibility’** (each action was assessed in terms of how difficult or easy it would be to implement in terms of institutional and financial resources and capacity). The **40 Actions** performing best in this assessment were compiled into a final longlist provided to Samarkand Regional Government.

Provision of the longlist was accompanied by **an online workshop** between the Consultant Team and the Regional Government explaining the process thus far to assist the GCAP Steering Committee in its task of selecting the thirty Actions they would most like to include in the final GCAP. A ‘top ten’ list of Actions was agreed with the Regional Government immediately following the online workshop, and then the final twenty Actions were selected a few weeks later. **The process is illustrated in Figure 5-1 below.**

**Figure 5-1. GCAP Action Development Process**



Source: AECOM, 2023.

As set out in the remainder of this chapter, each of the final Actions selected has been assessed in detail, covering general information including **action owner and supporting institutions, location and type of action, and expected impact** (ranging from impact on key GCAP indicators, estimated carbon emissions reduction, to jobs created). Further sections outline **implementation details, including operational requirements, timeframes, indicative costs, key technical aspects of the action and implementation steps, expected co-benefits** (including, where relevant, water and energy savings)<sup>42</sup>, **suggested financing approach, stakeholders** that could be brought in to support the implementation, and some of the **potential risks and barriers** that may apply to each Action.

It was identified at an early stage of Actions development that **some Actions could be defined as Crosscutting**, i.e. having positive impacts across multiple sectors and aligning with multiple Strategic Goals. This means that **the Actions defined in this chapter are divided into ten categories**, with Crosscutting now added as a new category alongside the existing two environmental topic areas and the seven GCAP infrastructure sectors.

<sup>42</sup> In cases where water and energy savings resulting from Action implementation are directly quantifiable, whether in percentage terms or in units (cubic metres and watt hours/tons of oil equivalent, respectively), these have been estimated.

## Estimates of Investment Needs and Finance Sources

It is estimated that **EUR 1.18bn<sup>43</sup> would be required for development and advisory support** for Samarkand's GCAP Actions. **Capital expenditures** are estimated at **EUR 1.08bn** and **operational expenditures** over the first five years are estimated at **EUR 96.04m**.

Combining estimated capital expenditures and development and advisory costs, the total investment needs for the 31 GCAP actions by investor type are estimated to be as follows: around 10% directly by national and/or local government, about 10% by the private sector and SOEs, and about 80% by international development partners, either through concessional or other types of loans. This estimated breakdown of financing sources is based on the financial situation and capital market maturity in Uzbekistan, recognising that **debt sustainability has strengthened significantly in recent years thanks to rapid economic growth**. More advanced financing modalities – for instance **green bonds** – are starting to be offered; the first in Uzbekistan's history were launched by the national government in October 2023 during GCAP preparation<sup>44</sup>, but these are **not yet available at city/local government level**.

In this context of strong growth and rapid financial development, an ambitious but realistic approach was taken to identify, scope, and detail GCAP actions to form achievable propositions. Based on the overall GCAP budget as set out above, the actions entail annual investment costs on the part of Samarkand Regional and City Governments (supported as appropriate by grants and/or loans from central government) of around EUR 118m (1.66bn UZS ) over the 5-year period, which is well within demonstrated resource capacity. An existing annual capital expenditure budget of EUR 33.55m (UZS 471.33bn) was reported for 2022, alongside an increase in revenue generation. This should help enable investment from international development partners, which is estimated at an annual EUR 188.8m across all actions.

In addition, there is an **important non-financial role for central government, particularly for those actions that are dependent on or influenced by policymaking and incentive-setting at the national level**. Central government can also provide sovereign guarantees for international development loans targeted at development in Samarkand. Given their still important role in the economy, **state-owned enterprises (SOEs) are likely also to be important actors in the financing and implementation of GCAP actions**, especially in relation to utility infrastructure.

## Estimates of Emission Reductions

Based on the limited local data and employing assumptions informed by international good practice, **the carbon emissions reductions for the GCAP Actions are estimated to be 223,342 tCO<sub>2</sub>e per annum** – making a direct contribution to Uzbekistan's Nationally Determined Contribution (NDC). 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.

## Estimates of Job Creation

In addition to those environmental benefits, it is estimated that several of the GCAP Actions have the **potential for job creation, with an estimated 20,727 new jobs** being created through the construction, operation and maintenance works associated with the Actions, as well as green economy services linked to several of the GCAP actions.

## Natural Capital Valuation

Natural Capital Valuation (NCV) is an exercise that assesses the economic value of natural resources and ecosystems such as, for example, wetlands or forests, based on the services they provide to humanity. Such services include, for example, recreation, water purification or carbon sequestration. NCV is a critical tool in guiding sustainable development because it demonstrates the economic contributions of natural capital and therefore informs important decisions on how to balance economic growth with environmental benefit.

<sup>43</sup> Note at the time of writing the exchange rate was EUR 1 – UZS 14,234 (30 September 2024), so this figure in UZS is 16.824tn.

<sup>44</sup> UNDP, (2023). Uzbekistan Issues First Ever Green Sovereign Eurobonds worth 4.25 trillion UZS on the London Stock Exchange, available at <https://www.undp.org/uzbekistan/press-releases/uzbekistan-issues-first-ever-green-sovereign-eurobonds-worth-425-trillion-uzs-london-stock-exchange>

In recent years, EBRD has developed an NCV model that has been applied in a number of locations across the world, including in Uzbekistan and elsewhere in Central Asia, to assess the economic value of nature risks and opportunities associated with its projects.<sup>45</sup> EBRD took the opportunity of Samarkand joining the Green Cities programme to apply for the first time the emerging NCV model to a largely urban context.

The EBRD's NCV approach has three key outputs:

1. **A “nature-related risk heat map,”** which charts key nature-related risks in the landscape of interest against their anticipated impact and likelihood;
2. **A quantitative scenario analysis,** which evaluates how the value of ecosystem services in the landscape of interest might evolve over time under a “business-as-usual” (BAU) as well as “sustainable future” scenarios; and
3. **A list of nature-related risk management actions and Priority Investment Areas (PIAs),** which highlights the activities that would most effectively protect and enhance natural capital.

All three of these outputs can inform key aspects of a GCAP. Specifically, the nature-related risk heat map identifies the most critical nature-related threats to include in Green City Challenges, while the scenario analysis and list of priority investments highlight the most impactful nature-related interventions to include in Green City Actions.

The Samarkand NCV exercise therefore is linked closely to this GCAP and has been provided in full in Appendix B. At the same time, its conclusions in terms of PIAs have been taken account of in each relevant GCAP Action under the ‘Natural Capital’ heading.

As this pilot exercise in applying EBRD's NCV model to an urban context and linking it appropriately with a GCAP was successful, there are good opportunities to carry out NCV exercises for other cities where EBRD operates and to integrate them into future GCAPs.

## Linking Actions to Strategic Goals

The thirty-one Green City Actions were developed as the logical next step from defining the Strategic Goals introduced in Chapter 4 above. To the nine Strategic Goals has been added a tenth category- Cross-Cutting, for Actions that relate most obviously to more than one Strategic Goal. However, due to the integrated nature of this GCAP, most Actions listed under one Sector contribute to the achievement of other Strategic Goals to some extent. The Strategic Goal(s) to which each Action contributes is listed within the information table for each Action.

## Linking Actions to Individual Projects

As with all other EBRD GCAPs, the Actions have been developed on a sectoral basis. However, it is recognised that in many cases, specific projects that the Regional and/or city governments may wish to pursue will require a cross-sectoral, integrated approach. Often, such improvement projects are defined on a zonal or area basis- for example, it is understood that in the medium term, the Regional Government plans to move its head office from the city centre to a more peripheral location, which will free the current government quarter for strategic-scale redevelopment.

Zonal projects like this might include integrating the whole or even just parts of the Actions set out in the GCAP; in the case of the government quarter redevelopment, for example, it could incorporate all or selected elements of Actions including E3 (energy efficient street lighting), T2 (congestion reduction on existing roads), T3 (new cycling and walking infrastructure), UD1 (street tree planting), UD2 (new urban green space) and so on. In this sense, therefore, it is important to understand that, where necessary and appropriate to do so, Action boundaries can be flexibly applied depending on urban priorities over the GCAP period, and Actions can be integrated where benefit is maximised from doing so.

<sup>45</sup> EBRD, (2022). Transforming Our Economies into Nature Positive, available at <https://www.ebrd.com/news/2022/transforming-our-economies-into-nature-positive.html>

# Crosscutting Actions

Action C1: Establish a team for environmental data collection to gather and monitor data on buildings, industry, energy and DRR (Disaster Risk Reduction)	Estimated Total Cost: €213,000 <sup>46</sup>
<p><b>Description</b></p>	<p>The existing processes for collection of environmental data in Samarkand do not appear integrated and also are lacking in terms of scope and coverage. For example, there appears to be no consistent and established process for regular collection of air quality data that would enable trend-based assessment of concentration of air pollutants such as PM2.5, PM10, SO2 and NOx, even though there is an existing network of air quality monitoring stations across Samarkand. Similarly, there is limited data currently being collected on soil contamination or on water quality, meaning that the environmental impact of Samarkand’s highly polluting industrial sector (including fertiliser production, cement and asbestos, cotton refineries, etc) remains likely underestimated. Samarkand Region also has no inventory of its greenhouse gas (GHG) emissions (hence Action CR2), which makes it much harder to determine the sectors where carbon emissions reduction should be prioritised.</p> <p>There is therefore a need to establish consistent and comprehensive processes for collecting and monitoring selected environmental data for Samarkand. Where possible, that data should be open data to facilitate sharing across team, departmental and organisational boundaries, though it is recognised that this may not always be possible or desirable- for this reason, the development of an open data platform is not included within the scope of this Action. As the rationale for the Action is to consolidate, streamline and improve access to data more than the direct gathering of new data, it does not include the costs or operation of e.g. new data sensors in the field.</p> <p>Once implemented, the additional environmental data resulting from this Action will provide a firm basis for enabling, derisking and justifying green development and infrastructure investments that are not yet possible (or carry high financial risk) in Samarkand due to a lack of basic data. These include investments such as: large-scale contaminated land remediation programmes; water quality improvements through targeted nature-based solutions in specific locations; and safe removal of asbestos in places where it poses a danger to human health.</p> <p>The Action will be implemented by establishing a new team within the Regional Government to drive the data consolidation process. The team, which will consist of two full-time members, should initially focus on the data from four sectors identified as information-gathering priorities in Samarkand: these are Buildings, Industry, Energy, and Climate and Resilience. A Terms of Reference will be developed for each of the two members of the data team to specify their roles and responsibilities. The data collection process must cover, as a minimum, the following data for each sector at Region or city level (see also State Indicators section below for the specific EBRD indicators this Action would help improve performance on)<sup>47</sup>:</p> <p><u>Industries:</u></p> <ul style="list-style-type: none"> <li>• Quarterly data on air quality provided by monitoring stations in proximity to large industrial centres and transport hubs (see also Action EB1);</li> <li>• Annual data on water and soil quality in areas where large polluters store or dispose of waste;</li> <li>• Annual data on water pollution from relevant industrial premises (this will require appropriate reporting protocols to be established- see also Action I3);</li> <li>• Annual data on GHG emissions from relevant industrial premises (using the appropriate standard reporting protocols required to meet Uzbekistan’s NDC- see Action CR2) ;</li> <li>• Annual data on the share of industrial energy consumption from renewable sources;</li> <li>• Annual data on the quantity of, and recycling rate of, industrial waste.</li> </ul> <p><u>Buildings:</u></p> <ul style="list-style-type: none"> <li>• Baseline data on extent of asbestos use in buildings;</li> </ul>

<sup>46</sup> Please note that for all Actions, the estimated total cost may not equate exactly to the three components of Indicative Project Cost (CAPEX, OPEX and Feasibility/Advisory, all provided below) due to rounding of figures.

<sup>47</sup> Some of this information already exists at national level, but is missing at regional or city level.

	<ul style="list-style-type: none"> <li>Annual data on percentage of population using coal or wood burning stoves for heating.</li> </ul> <p><u>Energy:</u></p> <ul style="list-style-type: none"> <li>Annual data on the share of renewables in total energy consumption;</li> <li>Annual data on energy consumption across all types of buildings (see also Action B1);</li> <li>Annual data on GHG emissions associated with the energy sector;</li> <li>Annual data on power outages caused by climate extremes (gathering this data particular may need to be authorised and supported by national government- see Other Stakeholders section below)</li> </ul> <p><u>Disaster Risk Reduction:</u></p> <ul style="list-style-type: none"> <li>Number and type of buildings most exposed to seismic risk (see also Action B3);</li> <li>Annual data on estimated economic damage<sup>48</sup> associated with climatic extremes in Samarkand (including drought, flooding, wildfires, and extreme heat);</li> <li>Annual or two-year data on average response time (as a performance indicator of effectiveness) of emergency teams.</li> <li>Capture and apply data emerging from Action CR3 (Participatory mapping of hazards using GIS)</li> <li>The newly established environmental data management team will bring together technical and policy experts across a number of key departments in the local, regional and national government within Samarkand, including from the Mayor's office, Ministry of Emergency Situations, Regional Department for Ecology and Environmental Protection, Uzhydromet and Uzstat. The team will receive training on best practice on data collection, processing and analysis prior to commencing the collection process.</li> </ul>	
<b>Sector</b>	<input checked="" type="checkbox"/> Cross-cutting	
<b>Action Type</b>	<input type="checkbox"/> Investment ('Hard')	<input checked="" type="checkbox"/> Policy ('Soft')
<b>Implementation Timeframe</b>	<ul style="list-style-type: none"> <li>2025 – 2026 initially, then ongoing</li> </ul>	
<b>Status</b>	<input checked="" type="checkbox"/> New <input type="checkbox"/> Planned <input type="checkbox"/> Ongoing	
<b>GCAP Action Classification</b>	<input type="checkbox"/> Capital Investment <input checked="" type="checkbox"/> Other Investment	<p>If 'Other Investment,' what type?</p> <input type="checkbox"/> Standards, guidelines, and regulations <input type="checkbox"/> Strategies, plans, and programmes <input type="checkbox"/> Investment-related feasibility study <input type="checkbox"/> Awareness, demonstration, training, and capacity building <input checked="" type="checkbox"/> Organisational measure <input type="checkbox"/> Behavioural measure <input checked="" type="checkbox"/> Monitoring, data collection, analysis, and studies
<b>Action Owner(s)</b>	<ul style="list-style-type: none"> <li>Samarkand Regional Department for Ecology and Environmental Protection (in charge of coordination)</li> <li>Samarkand City Government (Mayor's Office and Department of Architecture and Construction)</li> <li>Uzhydromet</li> <li>Uzstat</li> </ul>	
<b>Other Stakeholders</b>	<ul style="list-style-type: none"> <li>Management of housing and communal services of Samarkand Region</li> <li>Ministry of Emergency Situations</li> <li>Ministry of Energy</li> <li>Ministry of Environment</li> </ul>	

<sup>48</sup> Defined by EBRD in its Pressure-State-Response Indicators for Green Cities as 'overall losses (not only uninsured losses) of floods, droughts, earthquakes etc. as a share of GDP.'

	<ul style="list-style-type: none"> <li>• Samarkand State University</li> <li>• Samarkand Regional Investment and Foreign Trade Department</li> <li>• Samarkand Suvta'minot</li> </ul>			
<b>Location</b>	Samarkand Regional Government, Kuksaroy Square, 1, Samarkand			
<b>Priority Environmental Challenge(s) Addressed</b>	<p><b>Climate Change and Resilience:</b></p> <ul style="list-style-type: none"> <li>• Increasing greenhouse gas emissions</li> <li>• Insufficient focus on climate-change related hazards</li> </ul> <p><b>Environment and Biodiversity:</b></p> <ul style="list-style-type: none"> <li>• Lack of clear, consistent data on air quality</li> <li>• Elevated values of PM2.5 and PM10</li> <li>• Pollution of important surface water sources</li> <li>• Lack of consistent monitoring and data collection on soils</li> </ul>			
<b>Strategic Goal(s) Addressed</b>	<p><b>Environment and Biodiversity:</b></p> <ul style="list-style-type: none"> <li>• Improve air and water quality in Samarkand</li> </ul> <p><b>Climate Change and Resilience:</b></p> <ul style="list-style-type: none"> <li>• Improve Samarkand's resilience to climate and natural disasters</li> </ul> <p><b>Industries:</b></p> <ul style="list-style-type: none"> <li>• Reduce the environmental impact of industries</li> </ul>			
<b>Link(s) to Existing Policies/Plans/ Projects</b>	<input checked="" type="checkbox"/> Yes <ul style="list-style-type: none"> <li>• The Government Resolution No. 737 (2019) on Improvement of Environmental Monitoring System in Uzbekistan</li> <li>• Law on Ambient Air Protection (1996)</li> <li>• Law on Water and Water Use (1993)</li> <li>• Concept of Environmental Protection by 2030</li> <li>• Presidential and Ministerial Decrees protecting waterbodies (PP-3286, 164, 302 and 303)</li> <li>• Uzbekistan Water Pollution Index</li> <li>• Building codes KMK 2.01.03-96 and KMK 2.07.01-94</li> <li>• First Biennial Update Report of the Republic of Uzbekistan (Nationally Determined Contribution on Greenhouse Gas mitigation in accordance with the Paris agreement)</li> </ul> <input type="checkbox"/> No			
<b>Link(s) to Other GCAP Actions</b>	<input checked="" type="checkbox"/> Yes <ul style="list-style-type: none"> <li>• <b>Action C2:</b> Build capacity of city to collect and share data (using GIS systems) to map and plan for climate and disaster risks</li> <li>• <b>Action C3:</b> Develop a digital reporting platform to engage citizens on environmental and climate issues and policy</li> <li>• <b>Action EB1:</b> Invest in air quality monitoring stations to track and improve air quality and enable the development of an Air Quality Action Plan</li> <li>• <b>Action CR1:</b> Establish a scenario-based approach to disaster risk management (DRM) and response across all sectors</li> <li>• <b>Action CR2:</b> Undertake a regional/city level GHG inventory to determine local climate mitigation opportunities</li> <li>• <b>Action CR3:</b> Identify/map hazards and vulnerabilities to climate risk in participatory way using GIS to improve urban resilience</li> </ul> <input type="checkbox"/> No			
<b>Cross-Cutting Themes</b>	<b>Climate and Disaster Risk</b>	<b>Smart Maturity</b>	<b>Gender and Social Inclusion</b>	<b>Heritage and Tourism</b>
	<input checked="" type="checkbox"/> Directly targeted <input type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> This Action will enable the Regional and city governments of Samarkand to make an inventory of their GHG emissions and	<input type="checkbox"/> Directly targeted <input checked="" type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> Through this Action, smart maturity will be enhanced through digitisation of environmental data	<input type="checkbox"/> Directly targeted <input checked="" type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> The establishment of the environmental data collection team will indirectly support	<input type="checkbox"/> Directly targeted <input checked="" type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> Improving environmental data collection will give a clearer picture of environmental risks

	develop feasible action plans to reduce them and support the implementation of Uzbekistan’s NDC.	collected by the environmental data team. Open data/ sharing of data across organisational boundaries will also improve; this is a prerequisite for smart maturity.	evidence-based environmental policies expected to benefit in particular populations most affected by air, water and soil pollution (children, elderly, and women).	and hazards that could negatively impact heritage assets and/or the attractiveness of Samarkand to tourists.
Implementation Process and Timeline	<b>Step</b>		<b>Duration</b>	
	1. Initial meeting to set the objectives and define the Terms of Reference/methodologies of the Environmental Data Collection Team		3 months	
	2. Embedding of the team into the workings of the wider city government, attendance of meetings, data collection capacity building etc.		6 months	
	3. Initiation of data collection and monitoring process		4 months	
	4. Continued process of data collection, review of group membership, data collected etc.		Ongoing	
Indicative Project Costs	CapEx [€]	OpEx over 5 years [€]	Feasibility / Advisory Costs [€]	
	N/A	208,000	5,400	
Potential Financing Instruments and Sources	Instrument (Own-Source, Grant, Debt, Equity, Other)		Source (Municipal Government, State-Owned Enterprise, National Government, Private Sector, International Development Partner, Other)	
	Own Source		Municipal Government	
	Grant		International Development Partner	
	Loan		International Financial Institution	
Revenue Opportunities	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No			
Impact Measures (Quantitative and Qualitative)	<b>Environmental Impacts</b>	State indicators	<p>The Action will support better <i>monitoring</i> of the following state indicators (noting that other Actions will result more directly in <i>better environmental performance</i> on each state indicator- monitoring on its own without associated Actions cannot result in better performance):</p> <ul style="list-style-type: none"> <li>1 – Average annual concentration of PM2.5</li> <li>1.1 – Average annual concentration of PM10</li> <li>1.2 – Average daily concentration of SO2</li> <li>1.3 – Average annual concentration of NOx</li> <li>2 – Biochemical Oxygen Demand (BOD) in rivers and lakes</li> <li>2.1 – Ammonium (NH4) concentration in rivers and lakes</li> <li>4 – Contaminated sites</li> <li>4.1 – Concentration of mercury in soil</li> <li>4.2 – Concentration of cadmium in soil</li> <li>4.3 – Concentration of zinc in soil</li> <li>4.4 – Concentration of mineral oil in soil (using infrared spectroscopy)</li> <li>5 – Water Exploitation Index</li> </ul>	

		<p>8 – Annual CO<sub>2</sub> equivalent emissions per capita</p> <p>8.1 – Annual CO<sub>2</sub> emissions per unit of GDP</p> <p>9 – Estimated economic damage from natural disasters</p> <p>9.1 – Percentage of public infrastructure at risk</p> <p>9.2 – Percentage of households at risk</p>	
	Pressure indicators	<p>The Action will support better <i>monitoring</i> of the following pressure indicators (noting that other Actions will result more directly in <i>better environmental performance</i> on each pressure indicator):</p> <p>16 – Share of renewable in total energy consumption</p> <p>17 – Power outages by climate extremes</p> <p>19 – Fossil fuels consumption for heating and cooling</p> <p>22.2 – Share of industrial energy consumption from renewable energy</p> <p>23 – Share of industrial waste recycled</p> <p>24 – Percentage of treated industrial wastewater</p>	
	<b>Socio-economic Impacts</b>	Jobs created	<p>0- As this Action focuses on allocation of additional responsibilities to existing employees within national and regional government entities, it is not expected to directly generate additional jobs. However, there is potential for establishment of the data collection team to lead indirectly to new job creation (e.g. through construction of new air quality monitoring stations).</p>
		Social inclusion benefits	<p>Not directly applicable to this Action.</p>
		Other socio-economic benefits	<p>Over the long-term, improving the process of collecting and processing environmental data has the potential to significantly reduce the health consequences of pollution, which can in turn reduce costs for both public and household budgets.</p>
	<b>Climate Impacts</b>	Estimated carbon emissions reduction	<p>No direct carbon emissions reduction associated with this Action.</p>
		Climate resilience benefits	<p>Improved environmental data gathering and accurate monitoring will, in the long term, support efforts to improve climate resilience.</p>
	<b>Nature &amp; Biodiversity Impacts</b>	Natural capital benefits	<p>Indirectly, this Action will support recovery of natural ecosystems in Samarkand through improved baseline data, which will inform evidence-based sustainable management in the future. Action consistent with Priority Investment Areas 1.1, 2.1 and 3.1 in Natural Capital Valuation for Samarkand (GCAP Appendix B).</p>
	<b>Other Indicators/Co-benefits</b>	Operational cost, water, and/or energy savings,	<p>Though difficult to quantify given number of variables, over time the new environmental data team will save the Regional and city government significant sums of money by reducing time and effort needed to gather basic</p>

		revenue generation, etc.	information and using it as evidence to support policies or Actions.
<b>Potential Project Risks and Mitigation Options</b>	<b>Area</b>	<b>Risks</b>	<b>Mitigation Options</b>
	<b>Social</b>	Existing data holders may be reluctant to share or pool their data.	Ensure high-level political support for new data team; communicate clearly to existing data holders the benefits of data sharing, including reduced time and budget expenditure for them.
	<b>Environmental</b>	Inappropriate data is collected, or collected but misinterpreted	Invest in training for team members on data collection, analysis and management. Regularly review and audit data collection and analysis to ensure accuracy and reliability.
	<b>Economic</b>	Financial/time resources seen as less justifiable relative to other policy priorities.	Ensure proper buy-in and support for the action from Regional and/or national leadership with authority to sign off the budget needed.
	<b>Other</b>	Multiplicity of actors involved, resulting in lack of ownership.	Ensure group is integrated into institutional structure of Regional Government, with backing of Regional Governor. Ensure single group lead reporting to Governor and leader aligns rest of group on roles/ responsibilities.

<p><b>Action C2: Strengthen capacity of city to collect and share data (using GIS systems) to map and plan response to climate and disaster risks</b></p>	<p><b>Estimated Total Cost: €617,000</b></p>
<p><b>Description</b></p>	<p>The regulatory and legislative context for responding to disasters in Samarkand is comprehensive. However, there is a lack of capacity at Regional and city level in the use of digital hardware and software – including geographical information systems (GIS) – to map, plan for, and manage climate and disaster risks in a proactive, strategic way.</p> <p>This Action is recommended in combination with the establishment of an environmental data team (see Action C1) to help improve presentation of and access to integrated demographic, economic, and climate information, currently held in silos by a range of different entities at both national and regional level. While Action C1 focusses on the gathering and analysis of environmental data, this Action focusses on the hardware and software needed to support that process and to make responses to climate and disaster risk more data driven. This difference between the Actions is highlighted by the fact that Action C1 will be progressed through a new team, whereas this Action will be progressed by the Regional Government’s existing IT department.</p> <p>Increased use of GIS is recommended because it is used globally by local governments as a cost-effective mechanism to analyse and map data that can support planning and monitoring efforts to municipal resilience. For Samarkand, using and presenting GIS data can help to improve the way in which climate and disaster risks (i.e. earthquakes, droughts and extreme temperatures) are monitored, managed and mitigated.</p> <p>Once implemented, the improved data resulting from this Action will provide a firm basis for enabling, derisking and justifying development and infrastructure investments that are not yet possible (or carry high financial risk) in Samarkand due to a lack of basic data. These include investments such as: flood defence infrastructure of the right type, in the right locations; stormwater management infrastructure in the right locations (see also Action W1); locations suffering most from the urban heat island effect and hence where new planting of trees and/or green roofs and walls would be most justified; more targeted and cost-effective seismic retrofitting programmes (see also Action B3); improved fire protection and management; and new emergency shelters in the right locations.</p> <p>The Action has three main components:</p> <p><b>1. Development of cloud-based GIS platform:</b></p> <p>The creation of a cloud-based GIS platform will enable integration and presentation of all relevant datasets pertaining to climate and disaster risks in Samarkand (including historical data on earthquakes, climate projections, hydrometeorological and environmental hazards, as well as the features of key infrastructure and natural assets such as age, material, state that would reveal their vulnerability characteristics; and latest demographic and economic data for the region). The datasets uploaded will have been gathered by the environmental data team (Action C1). Once established, the GIS platform will be updated on an annual basis and maintained by the city’s IT department. At this design stage, the Action owners need to determine if the platform could or should be accessible to non-governmental entities, for example academic institutions. It is recommended that it is made accessible in this way (subject to appropriate cybersecurity measures being taken) as this will improve capacity further.</p> <p><b>2. Provision of appropriate hardware to maximise access to the platform:</b></p> <p>The GIS platform will require appropriate hardware (standard PCs and/or laptops) for employees of the Regional Government and its partner entities to access so that the full range of specialists needing access are able to do so on a regular basis. The current number of devices per one hundred employees across the Regional Government and its partners is unknown, but this Action has been costed to allow for the purchase of an additional five devices with GIS software installed as it is estimated that this will be sufficient, assuming a reasonable existing level of hardware provision across relevant entities. Based on communication with the Regional Government, this assumption is considered reasonable.</p>

	<p><b>3. Training and capacity building:</b></p> <p>GIS experts will need to deliver at least five capacity building sessions and potentially retained for online support for a period of six months so that selected staff of relevant entities are fully trained and confident in using the GIS platform to analyse, map and present relevant spatial data, as well as necessary training in data sharing and security.</p>	
<b>Sector</b>	<input checked="" type="checkbox"/> Climate and Resilience	
<b>Action Type</b>	<input type="checkbox"/> Investment ('Hard')	<input checked="" type="checkbox"/> Policy ('Soft')
<b>Implementation Timeframe</b>	2025 – 2027	
<b>Status</b>	<input checked="" type="checkbox"/> New <input type="checkbox"/> Planned <input type="checkbox"/> Ongoing	
<b>GCAP Action Classification</b>	<input type="checkbox"/> Capital Investment <input checked="" type="checkbox"/> Other Investment	If 'Other Investment,' what type? <input type="checkbox"/> Standards, guidelines, and regulations <input type="checkbox"/> Strategies, plans, and programmes <input type="checkbox"/> Investment-related feasibility study <input checked="" type="checkbox"/> Awareness, demonstration, training, and capacity building <input type="checkbox"/> Organisational measure <input type="checkbox"/> Behavioural measure <input checked="" type="checkbox"/> Monitoring, data collection, analysis, and studies
<b>Action Owner(s)</b>	<ul style="list-style-type: none"> <li>Samarkand Regional Government Department of Information and Communication</li> <li>Samarkand City Government</li> </ul>	
<b>Other Stakeholders</b>	<ul style="list-style-type: none"> <li>Uzhydromet</li> <li>Samarkand State University</li> <li>Samarkand Electric Company Joint Stock Company (JSC)</li> <li>Samarkand Suvta'minot</li> <li>Samarkand Hududgaz</li> <li>Emergency Situations Department- Samarkand Region branch</li> </ul>	
<b>Location</b>	Samarkand Regional Government head office, Kuksaroy Square, 1, Samarkand Samarkand City Government office, Emergency Situations Department- Samarkand Office	
<b>Priority Environmental Challenge(s) Addressed</b>	<p><b>Climate Change and Resilience:</b></p> <ul style="list-style-type: none"> <li>Insufficient focus on climate change-related hazards</li> <li>Lack of clarity on disaster risk and resilience (DRR) role for local government</li> </ul>	
<b>Strategic Goal(s) Addressed</b>	<p><b>Climate Change and Resilience:</b></p> <ul style="list-style-type: none"> <li>Improve Samarkand's resilience to climate and natural disasters</li> </ul>	
<b>Link(s) to Existing Policies/Plans/Projects</b>	<input checked="" type="checkbox"/> Yes <ul style="list-style-type: none"> <li>Law On Protection of Population and Territories Against Emergency Situations of Natural and Manmade Character</li> <li>Presidential Decree No. 585 On Disaster Prevention and Relief Measures Related to Flooding, Mud Flows, Avalanches and Landslides</li> <li>State Programme on Earthquake Risk Reduction</li> <li>State Programme on Forecasting Emergency Situations of Natural and Technological Character</li> <li>Presidential Decree PP-426 On Measures to Protect the Population and Territories From Emergency Situations Associated with Dangerous Hydrometeorological Phenomena and Geological Processes</li> </ul>	

	<ul style="list-style-type: none"> <li>Decree 171 of the Cabinet of Ministers On Measures to Effectively Organize the Activities of the State System to Prevent Emergency Situations and Act in Such Situations in the Republic of Uzbekistan</li> <li>Presidential Decree On Measures for Radical Improvement of the Efficiency of Early Warning Systems for the Prevention of Emergency Situations and Liquidation of the Consequences Thereof</li> </ul> <input type="checkbox"/> No													
<b>Link(s) to Other GCAP Actions</b>	<input checked="" type="checkbox"/> Yes <ul style="list-style-type: none"> <li><b>Action C1:</b> Invest in improvements (i.e., establish a team) in environmental data collection to gather and monitor data- particularly on buildings, industry, energy and DRR</li> <li><b>Action C3:</b> Develop a digital reporting platform to engage citizens on environmental and climate issues and policy</li> <li><b>Action CR1:</b> Establish a scenario-based approach to disaster risk management (DRM) and response across all sectors</li> <li><b>Action CR3:</b> Identify/map hazards and vulnerabilities to climate risk in participatory way using GIS to improve urban resilience</li> </ul> <input type="checkbox"/> No													
<b>Cross-Cutting Themes</b>	<b>Climate and Disaster Risk</b>  <input checked="" type="checkbox"/> Directly targeted <input type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> This Action will directly support efforts to build resilience to climate and disaster risk by strengthening capacity of local and regional governments to prepare for, plan, and respond to disasters.	<b>Smart Maturity</b>  <input checked="" type="checkbox"/> Directly targeted <input type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> Through creation of a cloud-based GIS platform and capacity building on the use of data and GIS, this Action will directly support the smart maturity of Samarkand.	<b>Gender and Social Inclusion</b>  <input type="checkbox"/> Directly targeted <input checked="" type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> Improving local Government ability to manage and mitigate risk likely to have indirect benefits for the poorest and most excluded/vulnerable population.	<b>Heritage and Tourism</b>  <input type="checkbox"/> Directly targeted <input checked="" type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> Through enabling GIS-based mapping of vulnerable heritage assets, this Action will support conservation in Samarkand and help maintain an environment attractive to tourism.										
<b>Implementation Process and Timeline</b>	<table border="1"> <thead> <tr> <th>Step</th> <th>Duration</th> </tr> </thead> <tbody> <tr> <td>1. Design of the GIS platform, integration of data, and testing</td> <td>18 months</td> </tr> <tr> <td>2. Provision of appropriate hardware for access, and software installation</td> <td>2 months</td> </tr> <tr> <td>3. Training and capacity building for relevant staff</td> <td>2-4 months</td> </tr> <tr> <td>4. Updates and maintenance of the platform</td> <td>Ongoing</td> </tr> </tbody> </table>				Step	Duration	1. Design of the GIS platform, integration of data, and testing	18 months	2. Provision of appropriate hardware for access, and software installation	2 months	3. Training and capacity building for relevant staff	2-4 months	4. Updates and maintenance of the platform	Ongoing
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<b>Indicative Project Costs</b>	<b>CapEx [€]</b>  267,000 <ul style="list-style-type: none"> <li>Development of cloud-based GIS platform: 232,000</li> <li>Contingency (15%): 35,000</li> </ul>	<b>OpEx over 5 years [€]</b>  250,000	<b>Feasibility / Advisory Costs [€]</b>  100,000 <ul style="list-style-type: none"> <li>Training and capacity building: 87,000</li> <li>Contingency (15%): 13,000</li> </ul>											
<b>Potential Financing Instruments and Sources</b>	<table border="1"> <thead> <tr> <th>Instrument (Own-Source, Grant, Debt, Equity, Other)</th> <th>Source (Municipal Government, State-Owned Enterprise, National Government, Private Sector, International Development Partner, Other)</th> </tr> </thead> <tbody> <tr> <td><b>Own Source</b></td> <td>Municipal Government</td> </tr> <tr> <td><b>Grant</b></td> <td>National Government</td> </tr> </tbody> </table>				Instrument (Own-Source, Grant, Debt, Equity, Other)	Source (Municipal Government, State-Owned Enterprise, National Government, Private Sector, International Development Partner, Other)	<b>Own Source</b>	Municipal Government	<b>Grant</b>	National Government				
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<b>Own Source</b>	Municipal Government													
<b>Grant</b>	National Government													

	<b>Loan</b>		International Development Partner
<b>Revenue Opportunities</b>	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		
<b>Impact Measures (Quantitative and Qualitative)</b>	<b>Environmental Impacts</b>		State indicators 9 – Estimated economic damage from natural disasters 9.1 – Percentage of public infrastructure at risk 9.2 – Percentage of households at risk
			Pressure indicators N/A
	<b>Socio-economic Impacts</b>		Jobs created 22
			Social inclusion benefits Better monitoring and mitigation of climate hazards through this and related Actions is likely to benefit the poorest and most excluded residents in particular, as they tend to be more vulnerable to climate and disaster risk.
			Other socio-economic benefits Improvement of digital skills as one element in the evolving smart maturity of government in Samarkand and Uzbekistan.
	<b>Climate Impacts</b>		Estimated carbon emissions reduction No direct carbon emissions reduction associated with this Action.
			Climate resilience benefits The Action is directly aimed at improving the capacity of the local and regional government to prepare for and address climate and disaster risks.
	<b>Nature &amp; Biodiversity Impacts</b>		Natural capital benefits Natural capital valuation and accounting is a process that relies on GIS data, including, for example, the Copernicus land use dataset. Increasing regional and city government GIS capacity will facilitate ongoing and future management and monitoring of natural capital. This Action is also consistent with Priority Investment Areas 2.1 and 2.6 in the Natural Capital Valuation for Samarkand (see GCAP Appendix B)
	<b>Other Indicators/Co-benefits</b>		Operational cost, water, and/or energy savings, revenue generation, etc. In the long-term, digitising currently offline data and bringing it together into a single platform will save significant costs currently incurred by needing to regularly communicate across data silos.
	<b>Potential Project Risks and Mitigation Options</b>	<b>Area</b>	<b>Risks</b>
<b>Social</b>		Disruption to established ways of working; resistance among potential users.	Ensure benefits, including time and money saved, are directly communicated to those staff most affected by the change; capacity building and training at appropriate level may help improve acceptance of new methods of working; emphasise long-term digital/smart maturity benefits.

		Lack of engagement among potential users.	As above.
	<b>Environmental</b>	Issues with environmental data quality.	Assign staff responsible for environmental data quality control in each participating institution.
	<b>Economic</b>	Potential for high implementation, maintenance, software licenses and/or upgrade cost  Funding and financing unclear.	Recognised project management procedures; conduct cost-benefit analysis and feasibility studies, minimise costs, track costs and expenses, establish contingency funds.  Ensure clear funding and financing plan and forecasting as part of project setup.
	<b>Other</b>	Connectivity issues to the platform, due to unstable cloud network or technical performance issues.	Maintenance and monitoring of the cloud-based system by IT team, including creation of a staff helpline and/or maintaining an online support presence.
		Lack of availability of hazard and vulnerability datasets for cloud-based storage and future analysis.	Completion of a gap analysis prior to data collection (potentially by the environmental data team- see Action C1).

<b>Action C3: Develop a digital reporting platform to engage citizens on environmental and climate issues and policy</b>	<b>Estimated Total Cost: €66,000</b>
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<b>Description</b>	<p>With the recent adoption of a new framework for the implementation of smart city technologies – ‘Digital Uzbekistan 2030’ – over 270 online services have been made available to Uzbek citizens, ranging from digital ID, tax reporting and payments, issuance of licences and permits, and so on. However, this national-level initiative is not yet always mirrored at Regional and city government level, including in Samarkand, where the use of digital platforms and IT tools for e-governance remains underdeveloped. Among other drawbacks, this means environmental and climate-related information – ranging from air pollution, GHG emissions, water quality, climate risk etc – is not generally available digitally to third parties for free. There is also a general absence of government-citizen dialogue, engagement or reporting on these topics in Samarkand, including on the development and implementation of locally effective climate and environmental strategies or on the ability of citizens to report local environmental problems (for example, flooding, illegal waste dumping and so on) instantly to the authorities via, for example, a smartphone app.</p> <p>Digital platforms offer a cost-effective way for municipal governments to engage a broad range of local residents on multiple issues, including environmental and climate topics. By using digital platforms, residents can benefit from greater access to existing environmental data; these platforms can also promote transparency in dissemination of environmental information and enable evidence-based decision making through the integration of citizen feedback into early drafts of environmental and climate policies. At present, the Regional Government does not appear to hold an existing platform that could be built on and there is likely low capacity for it to be developed in-house. However, this does not negate the ability of any digital platform, once developed, to be able to be scaled up in future to integrate new data.</p> <p>In this context, and to support efforts to make Samarkand a smart city, the Regional Government’s Department of Information and Communication will establish a dedicated digital platform enabling Samarkand residents to easily access and engage with a broad range of environmental issues relevant for the city. There is greater potential for the platform to be successful if is developed subsequent to work starting on Actions C1 and C2, but this is not obligatory.</p> <p>Once implemented, the improved data resulting from this Action will provide a firm basis for enabling, derisking and justifying development and infrastructure investments that are not yet possible (or carry high financial risk) in Samarkand due to a lack of basic data. These include investments such as: reduction of leaks and water savings through targeted, cost-effective upgrade of drinking water pipes in the right locations; development of authorised waste collection points of the right type and in the right locations to tackle most effectively the problem of, and the environmental issues arising from, illegal dumping.</p> <p>This Action will have four elements:</p> <ol style="list-style-type: none"> <li>1. <b>The selection and procurement of the platform</b> will be undertaken in consultation with the Ministry of Digital Technologies and Samarkand City Government. This stage can include targeted consultation with key city stakeholders such as academia, utilities and/or private sector businesses (for example, an online survey) on what are likely to be the most popular and/or effective functions and benefits for an online citywide environmental platform.</li> <li>2. <b>Development and testing of the platform.</b> The platform will be multifunctional. Its key features will include: <ul style="list-style-type: none"> <li>• A public-facing page presenting the latest information on air, water, and soil pollution across the local area collected by Samarkand’s environmental data collection team (this is effectively the public-facing element of the work progressed under Action C1)</li> <li>• An overview of the Region’s and city’s climate and environmental commitments and initiatives e.g. policies, strategies, campaigns and how residents can get involved</li> <li>• Information for citizens and community groups, helping them to benefit from and support the city’s green agenda (e.g. energy efficiency measures, upskilling opportunities, electric vehicle charging locations, funding for property upgrades etc.)</li> </ul> </li> </ol>
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	<ul style="list-style-type: none"> <li>Information for local business, communicating the case for carbon reduction and providing good practice tips and guidance on government initiatives (e.g. low carbon and efficient energy practices, tree-planting campaigns etc.)</li> <li>Social media app allowing citizens to ask questions, report environmental issues, and submit feedback on existing environmental and climate initiatives and actions.</li> </ul> <p>3. <b>Platform launch-</b> with <b>public and internal awareness raising campaigns</b> required to support the launch. Internally, awareness raising efforts will target relevant Regional Government departments and partner organisations (for example, Maroqand Obod for reports of waste dumping, Samarkand Suvta'minot for reports of water leaks) to ensure they are fully appraised of and ready for new public reporting function of environmental issues. Platform owners (Regional Government Department of Information and Communication) to lead on distributing public reports (automatically or manually) to relevant department.</p> <p>4. <b>Implementation of feedback mechanisms</b> to secure public inputs into the decision making process on environmental matters, alongside ongoing platform monitoring and maintenance.</p>
<b>Sector</b>	<input checked="" type="checkbox"/> Environment and Biodiversity
<b>Action Type</b>	<input checked="" type="checkbox"/> Investment ('Hard') <input type="checkbox"/> Policy ('Soft')
<b>Implementation Timeframe</b>	2025 - 2028
<b>Status</b>	<input checked="" type="checkbox"/> New <input type="checkbox"/> Planned <input type="checkbox"/> Ongoing
<b>GCAP Action Classification</b>	<input type="checkbox"/> Capital Investment <input checked="" type="checkbox"/> Other Investment <input type="checkbox"/> Standards, guidelines, and regulations <input type="checkbox"/> Strategies, plans, and programmes <input type="checkbox"/> Investment-related feasibility study <input checked="" type="checkbox"/> Awareness, demonstration, training, and capacity building <input type="checkbox"/> Organisational measure <input type="checkbox"/> Behavioural measure <input checked="" type="checkbox"/> Monitoring, data collection, analysis, and studies
<b>Action Owner(s)</b>	<ul style="list-style-type: none"> <li>Samarkand Regional Government - Department of Information and Communication</li> <li>Samarkand City Government (Mayor's Office)</li> </ul>
<b>Other Stakeholders</b>	<ul style="list-style-type: none"> <li>State Committee on Ecology and Environmental Protection</li> <li>Samarkand Regional Government – Department of Innovation</li> <li>Ministry of Digital Technologies</li> <li>Innovative Development Agency</li> <li>Maroqand Obod</li> <li>Uzhydromet</li> <li>Uzstat</li> <li>State Unitary Enterprise E-Government and Digital Economy Project Management Centre</li> </ul>
<b>Location</b>	Samarkand Regional Government, Kuksaroy Square, 1, Samarkand
<b>Priority Environmental Challenge(s) Addressed</b>	<b>Environment and Biodiversity:</b> <ul style="list-style-type: none"> <li>Lack of clear, consistent air quality data</li> <li>Elevated values of PM2.5 and PM10</li> <li>Pollution of important surface water sources</li> <li>Lack of consistent soil quality monitoring and data collection</li> </ul>
<b>Strategic Goal(s) Addressed</b>	<b>Environment and Biodiversity:</b> <ul style="list-style-type: none"> <li>Improve air and water quality in Samarkand</li> <li>Protect and enhance biodiversity in Samarkand</li> </ul> <b>Climate Change and Resilience:</b> <ul style="list-style-type: none"> <li>Improve Samarkand's resilience to climate and natural disasters</li> </ul>

<b>Link(s) to Existing Policies/Plans/Projects</b>	<input checked="" type="checkbox"/> Yes <ul style="list-style-type: none"> <li>Resolution of the Cabinet of Ministers No. 232 of August 7, 2015</li> <li>Strategy for Innovative Development of Uzbekistan for 2019-2021</li> <li>Digital Uzbekistan 2030 strategy</li> <li>Development Strategy of New Uzbekistan for 2022-2026</li> </ul> <input type="checkbox"/> No			
<b>Link(s) to Other GCAP Actions</b>	<input checked="" type="checkbox"/> Yes <ul style="list-style-type: none"> <li><b>Action C1:</b> Establish a team for environmental data collection to gather and monitor data on buildings, industry, energy and DRR (Disaster Risk Reduction)</li> <li><b>Action C2:</b> Build capacity of city to collect and share data (using GIS systems) to map and plan for climate and disaster risks</li> <li><b>Action EB1:</b> Invest in air quality monitoring stations to track and improve air quality and enable the development of an Air Quality Action Plan</li> <li><b>Action CR3:</b> Identify/map hazards and vulnerabilities to climate risk in participatory way using GIS to improve urban resilience</li> </ul> <input type="checkbox"/> No			
<b>Cross-Cutting Themes</b>	<b>Climate and Disaster Risk</b>	<b>Smart Maturity</b>	<b>Gender and Social Inclusion</b>	<b>Heritage and Tourism</b>
	<input checked="" type="checkbox"/> Directly targeted <input type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> Through creating a collaborative and open access platform enabling residents of Samarkand to learn more about environmental and climate initiatives, this Action directly support efforts to address climate and environmental hazards.	<input checked="" type="checkbox"/> Directly targeted <input type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> This Action is central to making Samarkand a digitally mature city. Through the creation of an online platform for disclosing environmental performance and enabling citizens to ask questions and report issues, this Action will harness the potential of digital infrastructure to support transparent, inclusive and data-driven governance.	<input type="checkbox"/> Directly targeted <input checked="" type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> Through increasing the accessibility of government to all digitally enabled citizens, this Action can benefit gender and social inclusion.	<input type="checkbox"/> Directly targeted <input checked="" type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> This Action has potential to ensure environmental problems and issues are resolved more quickly, hence making Samarkand a more attractive destination for tourism.
<b>Implementation Process and Timeline</b>	<b>Step</b>		<b>Duration</b>	
	<b>1. Selection and procurement of platform</b>		9 months	
	<b>2. Platform development and testing</b>		18 months	
	<b>3. Platform launch and awareness-raising campaigns</b>		6 months	
	<b>4. Implementation of feedback mechanisms</b>		Ongoing	
<b>Indicative Project Costs</b>	<b>CapEx [€]</b>		<b>OpEx over 5 years [€]</b>	<b>Feasibility / Advisory Costs [€]</b>
	38,000		28,000	n/a
<b>Potential Financing Instruments and Sources</b>	<b>Instrument (Own-Source, Grant, Debt, Equity, Other)</b>		<b>Source (Municipal Government, State-Owned Enterprise, National Government, Private Sector, International Development Partner, Other)</b>	
	<b>Own Source</b>		Municipal Government	
	<b>Grant</b>		National Government	
	<b>Loan</b>		International Development Partner	
<b>Revenue Opportunities</b>	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No			

<b>Impact Measures (Quantitative and Qualitative)</b>	<b>Environmental Impacts</b>	State indicators	<p>This Action will not directly contribute to improvements in state indicators, but will improve the accuracy of reporting of the following indicators:</p> <ul style="list-style-type: none"> <li>1 – Average annual concentration of PM2.5</li> <li>1.1 – Average annual concentration of PM10</li> <li>1.2 – Average daily concentration of SO2</li> <li>1.3 – Average annual concentration of NOx</li> <li>2 – Biochemical Oxygen Demand (BOD) in rivers and lakes</li> <li>2.1 – Ammonium (NH4) concentration in rivers and lakes</li> <li>4 – Contaminated sites</li> <li>4.1 – Concentration of mercury in soil</li> <li>4.2 – Concentration of cadmium in soil</li> <li>4.3 – Concentration of zinc in soil</li> <li>4.4 – Concentration of mineral oil in soil (using infrared spectroscopy)</li> <li>8.1 - Annual CO<sub>2</sub> emissions per unit of GDP</li> <li>8.2 – Annual CO<sub>2</sub> emissions per capita</li> </ul>
		Pressure indicators	<p>This Action will not directly contribute to improvements in pressure indicators, but has potential to improve performance on the following indicators:</p> <ul style="list-style-type: none"> <li>14.1 – Electrical interruptions</li> <li>17 – Power outages by climate extremes</li> <li>24 – Percentage of industrial wastewater that is treated according to applicable national standards</li> <li>25.1 – Non-revenue water</li> <li>26 – Percentage of residential and commercial wastewater that is treated according to applicable national standards</li> <li>26.2 – Percentage of wastewater from energy generation activities that is treated according to applicable national standards</li> <li>27 – Sewer network integrity (pipe break)</li> <li>28.1 – Annual number of storm water or sewerage overflows per 100km of network length</li> </ul>
	<b>Socio-economic Impacts</b>	Jobs created	2
		Social inclusion benefits	This Action will support social inclusion objectives through enabling equal access to data and reporting opportunities for local residents.
		Other socio-economic benefits	The Action will indirectly contribute to an improved environment, which offers long-term socio-economic benefit in terms of attracting new investment (including tourism).

	<b>Climate Impacts</b>		Estimated carbon emissions reduction	No direct carbon emissions reduction associated with this Action.
			Climate resilience benefits	Through providing a platform to learn about applicable climate risks, this Action will help build the awareness local residents on climate change issues and support resilience building.
	<b>Nature &amp; Biodiversity Impacts</b>		Natural capital benefits	The indirect result of this Action is likely to be reduced pollution and contamination of the natural environment. This Action is also consistent with Priority Investment Area 2.1 in the Natural Capital Valuation for Samarkand (see GCAP Appendix B)
	<b>Other Indicators/Co-benefits</b>		Operational cost, water, and/or energy savings, revenue generation, etc.	<p>This Action will indirectly reduce municipal operational costs by reducing the time and effort needed to gather environmental and climate information and data.</p> <p>Significant potential to save water by improving response times for reported network leaks. Water savings (in cubic metres) should be quantified as Action is implemented and reported to new data team (Action C1).</p> <p>Some potential for energy savings in terms of efficiency of reporting, i.e. devolving it to third parties rather than relying on public sector environmental patrols using vehicles and other energy-consuming technology such as monitoring equipment. Again, can be quantified as Action is implemented, and reported to data team.</p>
<b>Potential Project Risks and Mitigation Options</b>	<b>Area</b>	<b>Risks</b>	<b>Mitigation Options</b>	
	<b>Social</b>	<p>Inadequate digital literacy among residents could reduce levels of engagement with the digital platform.</p> <p>Platform is only used by special interest groups.</p>	<p>Public awareness campaign to encourage residents to use the platform.</p> <p>Monitor platform usage and if only used by special interest groups, develop options/strategy for wider application/uptake.</p>	
	<b>Environmental</b>	Inaccurate reporting of environmental problems by citizens, or inaccurate capture of reporting data by government, could dilute the positive environmental benefits of this Action.	Design platform to maximise accuracy of citizen reporting (for example, provide a multi-choice interface rather than open questions)- ensure platform operators are correctly and regularly trained on accurate data standards and reporting protocols.	
	<b>Economic</b>	Although development of a	Explore external sources of funding, and consider in-kind support from a range of potential funders.	

		national e-governance platform was prioritised, to date, there has not been a confirmed budget allocation for regional governments to implement such activities.	
	<b>Other – Political</b>	Relevant government entities may not be willing to disclose or share certain environmental data.	Undertake engagement with data holders at the early stages of Action implementation to make a case for data transparency, and obtain buy-in from high-level leaders.
	<b>Other – Technical</b>	<p>Lack of technical/digital capacity in regional government departments may impede implementation.</p> <p>Risk of vendor lock-in given requirement for third-party platform to be procured</p>	<p>Organise training to build capacity, and if needed, seek financial or technical support from external grant-awarding agencies or e-government consultancies, respectively.</p> <p>Conduct research on vendors, define clear functional requirements, and seek platform with open standards and interoperability. Negotiate appropriate contract terms and develop a detailed platform migration plan designed to mitigate risk of lock-in.</p>

# Buildings Actions

Action B1: Invest in energy efficiency in buildings through thermal performance retrofit and building design standards		Estimated Cost over GCAP Period: €71,375,000 <sup>49</sup>
Description	<p>The buildings sector is one of the largest drivers of energy consumption in Samarkand, and key driver of high consumption is the age of the building stock and resulting poor thermal comfort levels. There is a need to significantly improve energy efficiency across all types of buildings in Samarkand, to reduce carbon emissions and improve thermal comfort of residents. This Action contributes to the overall target by improving energy efficiency in multi-story public apartment blocks through retrofit (where appropriate) and improving building design standards, including thermal performance.<sup>50</sup></p> <p>Data provided by the Regional Government to EBRD indicates that there are 2,214 multi-story apartment blocks in Samarkand. On average each block contains thirty apartments, each of an average floorspace of 60m<sup>2</sup>. For the purposes of this Action, it is considered that five hundred of these apartment blocks that are most in need of upgrade could be retrofitted for energy efficiency.</p> <p>A suite of inter-linked activities will be implemented across two workstreams as detailed below:</p>	
	<p><b>1. Improve building design standards:</b></p> <ul style="list-style-type: none"> <li>Determine if there is scope to improve existing building energy efficiency standards, code(s) and Energy Performance Certificates (EPCs) for multi-story apartment buildings in Samarkand.</li> <li>Consultation on any resulting updates/revisions of building energy efficiency standards or guidelines, such as green building codes.</li> </ul> <p><b>2. Incentivise energy efficiency retrofit of existing buildings:</b></p> <ul style="list-style-type: none"> <li>The following interventions could be considered for implementation based on a cost-benefit analysis and depending on building type: (i) installation of double-glazed windows with high thermal performance standards, (ii) retrofit of design features to enable natural / passive ventilation, (iii) insulation of external walls, roofs, and floors, (iv) installation of passive heating and cooling systems, (v) electrification of heating systems [e.g., heat pumps] with smart thermostats, (vi) nature-based solutions (green roofs, walls, etc.)</li> <li>Identify and deliver a pilot retrofitting scheme for existing public housing in Samarkand</li> <li>Upscale retrofitting schemes across five hundred multi-story public apartment blocks after pilot projects have been implemented and any lessons learnt and applied.</li> </ul>	
Sector	<input checked="" type="checkbox"/> Buildings <input checked="" type="checkbox"/> Energy	
Action Type	<input checked="" type="checkbox"/> Investment ('Hard') <input type="checkbox"/> Policy ('Soft')	
Implementation Timeframe	2025 – 2034	
Status	<input type="checkbox"/> New <input type="checkbox"/> Planned <input checked="" type="checkbox"/> Ongoing	

<sup>49</sup> For this and some other Actions, the estimated lifetime cost of the Action exceeds its cost over the 5-year GCAP period. Where this is the case, this headline provides only the cost over the GCAP Period, but the lifetime cost is specified elsewhere in the Action description (under CAPEX cost, because both 5-year OPEX and Feasibility/Advisory costs are already included in the 5-year GCAP period total).

<sup>50</sup> Samarkand Regional Government has confirmed that a programme of electricity and gas smart meter rollout across Samarkand is now 100% complete, meaning that there is no need for this Action to include smart metering; however, data from the new smart meters will greatly assist in measuring the energy savings envisaged from this Action.

<b>GCAP Action Classification</b>	<input checked="" type="checkbox"/> Capital Investment <input type="checkbox"/> Other Investment	If 'Other Investment,' what type? <input type="checkbox"/> Standards, guidelines, and regulations <input type="checkbox"/> Strategies, plans, and programmes <input type="checkbox"/> Investment-related feasibility study <input type="checkbox"/> Awareness, demonstration, training, and capacity building <input type="checkbox"/> Organisational measure <input type="checkbox"/> Behavioural measure <input type="checkbox"/> Monitoring, data collection, analysis, and studies		
<b>Action Owner(s)</b>	<ul style="list-style-type: none"> <li>• Samarkand City Government Management of Housing and Communal Services</li> <li>• Ministry of Construction, Housing and Communal Services</li> <li>• Ministry of Finance</li> </ul>			
<b>Other Stakeholders</b>	<ul style="list-style-type: none"> <li>• Green Building Council of Uzbekistan (NGO)</li> <li>• Private sector developers/building contractors</li> <li>• Individual home renters</li> </ul>			
<b>Location</b>	Action designed to apply to five hundred multi-story apartment buildings within the city boundary; specific locations for intervention depending on needs assessment data (held by, or to be collected by, the Regional/city government).			
<b>Priority Environmental Challenge(s) Addressed</b>	<b>Buildings:</b> <ul style="list-style-type: none"> <li>• Poor enforcement of building safety and energy efficiency regulations</li> <li>• Poor energy efficiency in residential and commercial buildings</li> <li>• Too little incentivisation/investment in renewable energy for buildings</li> <li>• Too little development meeting recognised international standards for green buildings</li> </ul> <b>Energy:</b> <ul style="list-style-type: none"> <li>• Lack of economic incentives for building level renewable power and heat generation</li> <li>• High reliance on fossil fuels for power generation and heating</li> </ul>			
<b>Strategic Goal(s) Addressed</b>	<b>Buildings:</b> <ul style="list-style-type: none"> <li>• Promote energy efficiency within buildings in Samarkand</li> </ul>			
<b>Link(s) to Existing Policies/Plans/Projects</b>	<input checked="" type="checkbox"/> Yes <ul style="list-style-type: none"> <li>• National Standard KMK 2.01.18-2000 Energy Use Standards for Heating, Ventilation and Air Conditioning in Buildings and Constructions</li> <li>• KMK 2.01.12-2000 (norms of energy consumption for heating ventilation and air conditioning of buildings and structures)</li> <li>• Clean Energy for Public Buildings in Uzbekistan project, (Ministry of Energy,World Bank)</li> <li>• Promoting Energy Efficiency in Public Buildings programme, funded by United Nations Development Programme (UNDP) and Global Environment Facility (GEF)</li> <li>• Presidential Decree No. PD-4477 (2019), which aims for further automatic control and metering of heat networks and hot water provision</li> <li>• Uzbekistan National Building Energy Efficiency Program supported by World Bank</li> <li>• Requirement for energy audit passports in new public/commercial buildings</li> <li>• Programme of rockwool insulation retrofit for public housing being progressed by Samarkand City Government Management of Housing and Communal Services</li> <li>• EPCs have been required for all new buildings in Uzbekistan since 2016</li> <li>• UNDP Uzbekistan Sectoral Adaptation Plan for Buildings, Goals 4,6,9 and 10</li> </ul> <input type="checkbox"/> No			
<b>Link(s) to Other GCAP Actions</b>	<input checked="" type="checkbox"/> Yes <ul style="list-style-type: none"> <li>• <b>Action I1:</b> Invest in energy efficiency in industrial enterprises in Samarkand</li> <li>• <b>Action E2:</b> Introduce fiscal incentives for households and businesses to adopt renewable energy technology</li> <li>• <b>Action E3:</b> Invest in energy efficient street lighting</li> </ul> <input type="checkbox"/> No			
<b>Cross-Cutting Themes</b>	<b>Climate and Disaster Risk</b>	<b>Smart Maturity</b>	<b>Gender and Social Inclusion</b>	<b>Heritage and Tourism</b>
	<input checked="" type="checkbox"/> Directly targeted <input type="checkbox"/> Some elements	<input type="checkbox"/> Directly targeted <input checked="" type="checkbox"/> Some elements	<input type="checkbox"/> Directly targeted <input checked="" type="checkbox"/> Some elements	<input type="checkbox"/> Directly targeted <input type="checkbox"/> Some elements

	<input type="checkbox"/> No direct links <u>Reason:</u> There is scope for meeting reductions in greenhouse gas emissions via investment towards building energy efficiency measures as targeted in this Action.	<input type="checkbox"/> No direct links <u>Reason:</u> Data from the new gas and electricity smart meters recently rolled out by the Regional Government will enable measurements of the energy savings envisaged from this Action; this information can be passed to the new environmental data team established under Action C1.	<input type="checkbox"/> No direct links <u>Reason:</u> Energy efficient buildings reduce energy spend, thus helping poorer residents.	<input checked="" type="checkbox"/> No direct links <u>Reason:</u> There are no direct links between this Action and heritage and tourism.
Implementation Process and Timeline	<b>Step</b>		<b>Duration</b>	
	<b>1. Improve building design standards</b> <ul style="list-style-type: none"> <li>Review potential improvements to building energy efficiency codes and standards</li> <li>Consult with key stakeholders and develop recommendations and reporting</li> </ul>		6 months	
<b>2. Incentivise energy efficiency retrofit of existing buildings</b> <ul style="list-style-type: none"> <li>Develop financial incentives for energy efficiency retrofitting, identifying suitable interventions that could be applied</li> <li>Identify and deliver pilot retrofitting scheme for public housing and public buildings</li> <li>Upscale and roll out further retrofitting schemes across all buildings after pilot projects have been implemented and lessons learnt and applied</li> </ul>		1 year  1-2 years  3-6 years		
Indicative Project Costs	<b>CapEx [€]</b>		<b>OpEx over 5 years [€]</b>	<b>Feasibility / Advisory Costs [€]</b>
	(GCAP Period) 60,000,000 (Lifetime of Action) 108,000,000 <ul style="list-style-type: none"> <li>Residential buildings retrofit: 108,000,000</li> </ul>		10,800,000	575,000 <ul style="list-style-type: none"> <li>Building Design Standards: 250,000</li> <li>Incentivise Energy Efficiency Retrofit of Existing Buildings: 250,000</li> <li>Contingency (15%): 75,000</li> </ul>
Potential Financing Instruments and Sources	<b>Instrument (Own-Source, Grant, Debt, Equity, Other)</b>		<b>Source (Municipal Government, State-Owned Enterprise, National Government, Private Sector, International Development Partner, Other)</b>	
	<b>Loan</b>		International Financial Institution (IFI), International Development Partner, Private Sector	
	<b>Grant</b>		IFI, International Development Partner	
	<b>PPP</b>		Municipal Government/Private sector	
Revenue Opportunities	<input checked="" type="checkbox"/> Yes Energy efficiency retrofit of public buildings saves the municipality significant expenditure on heating and cooling. <input type="checkbox"/> No			

<b>Impact Measures (Quantitative and Qualitative)</b>	<b>Environmental Impacts</b>	State indicators	8 – Annual CO <sub>2</sub> equivalent emissions per capita 8.1 – Annual CO <sub>2</sub> emissions per unit of GDP 9.1 – Percentage of public infrastructure at risk 9.2 – Percentage of households at risk
		Pressure indicators	19 – Fossil fuels consumption for heating and cooling 19.1 – Fossil fuels consumption for heating and cooling in residential buildings 19.4 – Share of new buildings with green certification 19.5 – Share of buildings with energy performance certificates (EPC)
	<b>Socio-economic Impacts</b>	Jobs created	1,474
		Social inclusion benefits	Poorer families still use coal or wood burning stoves. Affordable retrofitting schemes/incentives should be designed to benefit lower income households.
		Other socio-economic benefits	Enhanced thermal performance of buildings and improved energy efficiency allows for potential reduced energy bills.
	<b>Climate Impacts</b>	Estimated carbon emissions reduction	20,700 tCO <sub>2</sub> e over lifetime of Action
		Climate resilience benefits	This Action will contribute to climate resilience by reducing dependency on fossil fuels and resulting in buildings that are more resilient to climate extremes and require less energy for heating and cooling.
	<b>Nature &amp; Biodiversity Impacts</b>	Natural capital benefits	This Action is consistent with Priority Investment Area 2.5 in the Natural Capital Valuation for Samarkand (see GCAP Appendix B).
	<b>Other Indicators/Co-benefits</b>	Operational cost, water, and/or energy savings, revenue generation, etc.	In addition to the municipal financial benefits identified above, the Action has potential to reduce heating and cooling bills for residents, businesses and the public sector across the city.  Based on previous studies reviewing the potential for energy efficiency retrofit in the buildings

			sector in Uzbekistan <sup>51,52</sup> , it is estimated that this Action would result in energy savings of around 71% from the baseline (92.94 GWh) if implemented in full.
<b>Potential Project Risks and Mitigation Options</b>	<b>Area</b>	<b>Risks</b>	<b>Mitigation Options</b>
	<b>Social</b>	Reductions in energy use depend on end-user behaviours.	Enhanced education, awareness, and consumer guidance to enable householders to change behaviours.
	<b>Environmental</b>	Efficiency measures offset by greater energy use as a result of cost savings, thus no net benefit.	Can be mitigated through the ongoing decarbonisation of the electricity grid at the same time as progressing energy efficiency incentives and behaviour change- which will mean no net environmental loss if more energy is consumed.
	<b>Economic</b>	Public-Private Partnership (PPP) not designed appropriately.	If PPP contracts are developed, it will be important to build awareness and knowledge of the operations, benefits and risks of such contracts among relevant stakeholders, possibly through training and capacity building.
	<b>Other</b>	N/A	N/A

<sup>51</sup> Centre for Energy Efficiency (CENEf) and Copenhagen Centre on Energy Efficiency (C2E2), (2015). Energy Efficiency Orbits for Transition Economies, available at [http://www.cenef.ru/file/Final%20Report\\_C2E2\\_CENEf\\_June2\\_2015.pdf](http://www.cenef.ru/file/Final%20Report_C2E2_CENEf_June2_2015.pdf)

<sup>52</sup> International Energy Charter, (2022) In-Depth Review of the Energy Efficiency Policy of the Republic of Uzbekistan, available at <https://www.energycharter.org/what-we-do/energy-efficiency/energy-efficiency-country-reviews/in-depth-review-of-energy-efficiency-policies-and-programmes/in-depth-review-of-the-energy-efficiency-policy-of-the-republic-of-uzbekistan-2022/>

Action B2: Invest in decarbonisation of district heating systems	Estimated Total Cost: €112,816,000
Description	<p>This Action aims to decarbonise district heating systems for apartment blocks within the city boundary, which currently are mainly fuelled by natural gas, but entirely by fossil fuel sources. Although dwellings relying on district heat systems are not extensive in Samarkand relative to other Uzbek cities, they still number in the tens of thousands. Multistorey buildings are often served by centralised district heating managed by the municipality.</p> <p>A programme to refurbish district heating is ongoing, so system infrastructure including pipework is being modernised, but without a specific focus on decarbonisation; however, this enables this Action to focus only on the decarbonisation of the systems rather than any other elements of refurbishment. This Action aims to reduce greenhouse gas emissions by retrofitting electric-powered air source heat pumps to minimise reliance on fossil fuel as the energy source for heating. This would significantly reduce carbon emissions of district heating systems while maintaining heating and hot water supply reliability for multi-storey apartments.</p> <p>EBRD has confirmed that there are 2,214 apartment blocks in total in Samarkand to which these works could apply in the long-term, but that within the scope of the GCAP Action the Regional Government should select an initial tranche of two hundred blocks, which is considered reasonable and achievable within the five-year GCAP period. The selection criteria for these first two hundred should be: a) blocks connected to a district heating system rather than to central boilers fed by gas piping, and b) blocks within the highest density residential developments. For efficiency and economy of scale, the air source heat pumps will be installed at existing district heating centres rather than in individual apartments. As they are heavy, they will need to be installed on a firm concrete foundation; the costs of foundations are, however, excluded from this Action because at some sites they may already exist (there are extensive paved areas in most apartment block estates)- but a site-by-site assessment would be necessary once the initial tranche of 200 blocks is selected.</p> <p>Specific activities related to this Action are as detailed below:</p> <ol style="list-style-type: none"> <li><b>1. Heat Mapping and Feasibility Assessment:</b> <ol style="list-style-type: none"> <li><b>a) Undertake heat load and heat source analysis:</b> Review current heat load demand across multi-storey apartment blocks connected to the existing district heating network in Samarkand. Understand district heating network sources/energy centres serving multi-storey apartment blocks. Map and assess renewable or waste heat-based energy sources within urban area which could be used as heat sources for district heating supply.</li> <li><b>b) Road map to full decarbonisation:</b> Deliver a road map which outlines the decarbonisation potential for apartment blocks connected to the district heating network, with appropriate scope for integrating both low carbon and renewable and waste heat-based energy systems (i) at the centralised/ energy centre level (e.g. large/ very large air/ground source heat pumps, renewable electricity) including whether recommendations may be incorporated to the current district heating refurbishment programme, and (ii) at the local building level (e.g. air/ground source heat pumps, solar PV/thermal). Identify gaps in analysis, investment, capacity building and workforce required to meet the strategy proposed in the road map.</li> <li><b>c) Techno-economic assessment:</b> Review the potential for technology accessibility, investment potential and financial incentives for consumers in upgrading and decarbonising the current district heating network to serve multi-storey apartment blocks in the city.</li> </ol> </li> <li><b>2. Design and deliver Pilot Studies:</b> <ol style="list-style-type: none"> <li><b>a) Pilot design and selection:</b> Identify and present a series of pilot candidate projects to decarbonise the district heating network serving multi-storey apartments. The following elements should be considered and assessed for each pilot e.g. via cost-benefit analysis and/ or techno-economic modelling to estimate each pilot's cost savings and decarbonisation potential and inform candidate selection: <ul style="list-style-type: none"> <li>• Air source heat pumps at energy centre level</li> </ul> </li> </ol> </li> </ol>

	<ul style="list-style-type: none"> <li>• Smart thermostats/heat meters at building and/ or apartment level</li> <li>• Rooftop solar panels for hot water supply and/or heating at building level</li> <li>• Pipework insulation, radiators and associated internal infrastructure at district, building, or apartment level</li> <li>• Greater interconnection between existing district heating systems; and</li> <li>• Potential for use of thermal storage to allow for more efficient operation of generation plants.</li> </ul> <p><b>b) Implementation and monitoring:</b> With support from appropriate stakeholders, secure approvals and funding to procure the services required to roll out the selected pilots to their candidate sites. Develop and implement a suitable monitoring plan to ensure data and lessons learnt are systematically captured and analysed to inform pilot delivery and upscaling (see step 3 below).</p> <p><b>c) Evaluation:</b> Once sufficient monitoring data is available from the pilots (e.g. one year to cover multiple heating seasons) review the monitoring data and other information (e.g. Capex and OpEx), conduct building occupants surveys, etc. to evaluate actual pilot performance vs models (see step a) and draw conclusions and lessons for potential upscaling (step 3 below).</p> <p><b>3. Upscale and monitor decarbonisation of the district heating network across other multi-storey apartments in Samarkand.</b> Based on the findings of the pilot, further analysis (e.g. scale up modelling) and further engagement with key stakeholders (e.g. existing operators, investors, etc.), develop a multi-year programme to scale up successful approaches to other city district heating networks and/ or buildings in scope. Allow for continual reporting on progress and performance to monitor impact vs forecast and incorporate lessons learnt in later phases of the programme.</p>	
<b>Sector</b>	<input checked="" type="checkbox"/> Buildings <input checked="" type="checkbox"/> Energy	
<b>Action Type</b>	<input checked="" type="checkbox"/> Investment ('Hard')	<input type="checkbox"/> Policy ('Soft')
<b>Implementation Timeframe</b>	2025 – 2034	
<b>Status</b>	<input checked="" type="checkbox"/> New <input type="checkbox"/> Planned <input type="checkbox"/> Ongoing	
<b>GCAP Action Classification</b>	<input checked="" type="checkbox"/> Capital Investment <input type="checkbox"/> Other Investment	If 'Other Investment,' what type? <input type="checkbox"/> Standards, guidelines, and regulations <input type="checkbox"/> Strategies, plans, and programmes <input type="checkbox"/> Investment-related feasibility study <input type="checkbox"/> Awareness, demonstration, training, and capacity building <input type="checkbox"/> Organisational measure <input type="checkbox"/> Behavioural measure <input type="checkbox"/> Monitoring, data collection, analysis, and studies
<b>Action Owner(s)</b>	<ul style="list-style-type: none"> <li>• Samarkand City Government Management of Housing and Communal Services</li> <li>• Ministry of Energy</li> <li>• Ministry of Construction, Housing and Communal Services</li> </ul>	
<b>Other Stakeholders</b>	<ul style="list-style-type: none"> <li>• Green Building Council of Uzbekistan (NGO)</li> <li>• Samarkand Region Investment and Foreign Trade Department</li> <li>• Private sector building contractors if necessary for capacity reasons</li> </ul>	
<b>Location</b>	Location designed to apply to existing multi-storey apartment blocks within the city boundary. The highest density spatial concentrations of such blocks are found: a) to the south of Rudakiy Street and the west of Beruni Street, to the north-west of the city centre; b) south of Narpay Yuli Street and north of Amir Temur Street, including Aligushchi Street Corridor, to the west of the city centre; c) in Sat-Tepo, to the south-west of the city centre and d) to the south of Spitamen Avenue in the outer north-west suburbs.	

<p><b>Priority Environmental Challenge(s) Addressed</b></p>	<p><b>Climate Change and Resilience:</b></p> <ul style="list-style-type: none"> <li>Increasing greenhouse gas emissions</li> </ul> <p><b>Buildings:</b></p> <ul style="list-style-type: none"> <li>Poor energy efficiency in residential and commercial buildings</li> <li>Poor enforcement of building safety and energy efficiency regulations</li> </ul> <p><b>Energy:</b></p> <ul style="list-style-type: none"> <li>Lack of economic incentives for building level renewable power and heat generation</li> </ul>			
<p><b>Strategic Goal(s) Addressed</b></p>	<p><b>Climate Change and Resilience:</b></p> <ul style="list-style-type: none"> <li>Continue transition to renewable energy</li> </ul> <p><b>Buildings:</b></p> <ul style="list-style-type: none"> <li>Promote energy efficiency within buildings in Samarkand</li> </ul> <p><b>Energy:</b></p> <ul style="list-style-type: none"> <li>Use smart and renewable technologies to reduce energy consumption in Samarkand</li> <li>Modernise Samarkand’s energy infrastructure</li> </ul>			
<p><b>Link(s) to Existing Policies/Plans/Projects</b></p>	<p><input checked="" type="checkbox"/> Yes</p> <ul style="list-style-type: none"> <li>Recently completed programme of district heating modernisation in Samarkand (but which did not decarbonise the system)</li> <li>Presidential Decree No. UP-220- tax incentives for renewable energy producers for a period of 3 years post-installation</li> <li>District Heating Energy Efficiency Project progressed by the Ministry of Housing and Communal Services<sup>53</sup> and funded by the International Development Association (IDA).</li> <li>UNDP Uzbekistan Sectoral Adaptation Plan for Buildings, Goal 12</li> </ul> <p><input type="checkbox"/> No</p>			
<p><b>Link(s) to Other GCAP Actions</b></p>	<p><input checked="" type="checkbox"/> Yes</p> <ul style="list-style-type: none"> <li><b>Action B1:</b> Invest in energy efficiency in buildings through thermal performance retrofit and building design standards</li> <li><b>Action E2:</b> Introduce fiscal incentives for households and businesses to adopt renewable energy technology</li> </ul> <p><input type="checkbox"/> No</p>			
<p><b>Cross-Cutting Themes</b></p>	<p><b>Climate and Disaster Risk</b></p>	<p><b>Smart Maturity</b></p>	<p><b>Gender and Social Inclusion</b></p>	<p><b>Heritage and Tourism</b></p>
	<p><input checked="" type="checkbox"/> Directly targeted <input type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> The Action will directly contribute to the reduction of Greenhouse gas (GHG) emissions by minimising fossil fuel use in the heating systems of multi storey apartment blocks in the city.</p>	<p><input type="checkbox"/> Directly targeted <input checked="" type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> This Action offers opportunities for smart technology, including Supervisory Control and Data Acquisition (SCADA) systems for monitoring central district heating networks, smart thermostats, and heat meters.</p>	<p><input type="checkbox"/> Directly targeted <input type="checkbox"/> Some elements <input checked="" type="checkbox"/> No direct links <u>Reason:</u> No direct links between this Action and gender and social inclusion.</p>	<p><input type="checkbox"/> Directly targeted <input type="checkbox"/> Some elements <input checked="" type="checkbox"/> No direct links <u>Reason:</u> No direct links between this Action and heritage and tourism.</p>
<p><b>Implementation Process and Timeline</b></p>	<p><b>Step</b></p>		<p><b>Duration</b></p>	
	<p><b>1. Heat mapping</b></p>		<p>1 year</p>	
	<p><b>2. Deliver pilot studies</b></p>		<p>2 years</p>	
	<p><b>3. Monitor and upscale decarbonisation of the district heating network across other multi-storey apartments in Samarkand</b></p>		<p>5-10 years</p>	
<p><b>CapEx [€]</b></p>	<p><b>OpEx over 5 years [€]</b></p>	<p><b>Feasibility / Advisory Costs [€]</b></p>		

<sup>53</sup> [Development Projects : District Heating Energy Efficiency Project - P146206 \(worldbank.org\)](https://www.worldbank.org/en/projects-operations/development-projects/district-heating-energy-efficiency-project-p146206)

<b>Indicative Project Costs</b>	102,369,000	10,237,000	210,000
	<ul style="list-style-type: none"> <li>Deliver pilot studies: 16,755,000</li> <li>Monitor/upscale network decarbonisation: 50,264,000</li> <li>Main contractor preliminaries (15%): 10,053,000</li> <li>Main contractor overheads and profits (5%): 3,854,000</li> <li>Fees (10%): 8,092,000</li> <li>Contingency (15%): 13,352,000</li> </ul>		<ul style="list-style-type: none"> <li>Heat mapping: 183,000</li> <li>Contingency (15%): 27,000</li> </ul>
<b>Potential Financing Instruments and Sources</b>	<b>Instrument (Own-Source, Grant, Debt, Equity, Other)</b>		<b>Source (Municipal Government, State-Owned Enterprise, National Government, Private Sector, International Development Partner, Other)</b>
	<b>Own Source</b>	Municipal Government	
	<b>Grant</b>	National Government	
	<b>Loan</b>	International Development Partner	
	<b>PPP</b>	Municipal Government and Private Sector	
<b>Revenue Opportunities</b>	<input checked="" type="checkbox"/> Yes Long-term savings on purchase of fossil fuels (gas and fuel oil) for district heating <input type="checkbox"/> No		
<b>Impact Measures (Quantitative and Qualitative)</b>	<b>Environmental Impacts</b>	State indicators	8 – Annual CO <sub>2</sub> equivalent emissions per capita 8.1 – Annual CO <sub>2</sub> emissions per unit of GDP
		Pressure indicators	15 – Share of population with access to quality heating/cooling 15.1 – Share of households connected to district heating 15.2 – Share of district heating from carbon intensive sources 15.4 – Share of district heating from renewable sources
	<b>Socio-economic Impacts</b>	Jobs created	1,556
		Social inclusion benefits	Reduces air pollution, thus improving health outcomes for the poorest and most excluded residents.
		Other socio-economic benefits	Decarbonisation potential for the existing district heating network provides scope for reduced energy bills in the longer term.
	<b>Climate Impacts</b>	Estimated carbon emissions reduction	5,060 tCO <sub>2</sub> e annually

		Climate resilience benefits	Upgrading and rehabilitating district heating system will mitigate the impacts of climate change by improving the system's reliability in a context of increasing demand and extreme weather hazards.
	<b>Nature &amp; Biodiversity Impacts</b>	Natural capital benefits	Reductions in air pollution from less burning of fossil fuels.
	<b>Other Indicators/Co-benefits</b>	Operational cost, water, and/or energy savings, revenue generation, etc.	This Action will entail reduced spend by the city on fuel for district heating and in reduced energy bills for residents.
<b>Potential Project Risks and Mitigation Options</b>	<b>Area</b>	<b>Risks</b>	<b>Mitigation Options</b>
	<b>Social</b>	There may be public resistance to changes in heating systems because of cost, and disruption.	Ensure feasibility assessments include community engagement to clearly communicate the benefits of district heating network upgrade schemes. Demonstrate long-term fuel bill savings as key rationale for upgrade. Adequate planning and scheduling of works to minimise disruption to residents.
	<b>Environmental</b>	Inadequate reduction in emissions.  Hazardous waste generated as a result of disposal of existing fossil-fuel-powered heating components.	Use pilot as an opportunity to test and refine emissions reductions achieved, and apply lessons learned to full rollout.  Dispose of construction/installation waste responsibly through Maroqand Obod or approved private-sector waste collection service.
	<b>Economic</b>	High upfront costs of scheme; return on investment only over a long-term horizon.	As part of pilot rollout, experiment with options to cut costs; secure appropriate funding from private sector partners, national government (potentially through green bonds) and/or International Financial Institutions (IFIs).
	<b>Other</b>	Technical failures that disrupt service.	Ensure warranties for components, regular maintenance and ensure proper training of technical support staff to minimise downtime.

Action B3: Pilot review of seismic resilience of existing critical infrastructure to inform investment in retrofit measures		Estimated Total Cost: €21,977,000
<b>Description</b>	<p>Samarkand is in seismic risk zone eight. An important element of resilience to earthquakes is to ensure that critical infrastructure (energy pipes and cables, hospitals, and schools) is resilient to seismic shock. Retrofitting all existing buildings for earthquake resilience can be costly and impractical, but there is potential to retrofit the most important civic buildings and infrastructure that need to remain functional and safe if an earthquake strikes.</p> <p>Building codes for seismic safety already exist, and some heritage assets in Samarkand have already been retrofitted for seismic resilience. However, across the city the extent of conformity with seismic safety building codes is not clear. Moreover, the building codes date from the mid-1990s, and hence may not take account of new techniques or technology available for retrofits.</p> <p>Specific activities related to this Action are detailed below:</p> <ol style="list-style-type: none"> <li><b>1. Survey seismic resilience of critical infrastructure:</b> <ol style="list-style-type: none"> <li>a) Undertake a survey of the current seismic resilience of key infrastructure across Samarkand to determine the extent of the retrofitting that may be needed. This will cover government buildings, hospitals/medical centres, fire stations, police stations and infrastructure (electricity networks, water supply) within the city boundary.</li> <li>b) As part of review, consider whether building materials remain appropriate/safe and check whether enforcement/inspection of the seismic building standards took place (i.e. if records exist)</li> <li>c) Where problems are identified, outline practical, affordable options for seismic retrofit that align with recognised international standards and guidelines<sup>54</sup>.</li> </ol> </li> <li><b>2. Deliver pilot retrofitting measures for fifty of the most vulnerable buildings/services:</b> <ol style="list-style-type: none"> <li>a) Review data from stage 1 to determine fifty buildings or locations most in critical need of seismic safety improvement; the analysis might consider elements such as design, detailing, materials, construction methods and maintenance.</li> <li>b) Based on this review, design and deliver pilot projects to implement effective seismic retrofitting to the selected buildings and infrastructure. Pilot measures may include building structure or infrastructure pipe/cable modifications to enhance resilience to seismic activity and/or ground motion (e.g. supporting structural columns, base isolators, beam-column joint connections, precast seismic structural systems).</li> <li>c) All data generated by the project in terms of building survey, implementation and programming of retrofitting measures should be captured digitally and uploaded to GIS as a permanent digital record.</li> </ol> </li> <li><b>3. Conduct costing exercise to determine required investment for all critical infrastructure in need:</b> <ol style="list-style-type: none"> <li>a) Applying lessons learned from the pilot in Stage 2 and based on the evidence that emerged from Stage 1, conduct a costing exercise to determine the required investment for seismic retrofits to all critical infrastructure determined to be in need that were not already covered by the pilot in Stage 2. Based on the results of the costing exercise, the scale of feasible investment, its timeframe, and likely sources of financing can be determined.</li> </ol> </li> </ol>	
<b>Sector</b>	<ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Buildings</li> <li><input checked="" type="checkbox"/> Energy</li> <li><input checked="" type="checkbox"/> Water</li> </ul>	

<sup>54</sup> Such relevant standards include European Commission (1998). Eurocode 8: Design of structures for earthquake resistance, available at <https://eurocodes.jrc.ec.europa.eu/EN-Eurocodes/eurocode-8-design-structures-earthquake-resistance>. Guidelines include European Commission (2015). New European Technical Rules for the Assessment and Retrofitting of Existing Structures, available at <https://publications.jrc.ec.europa.eu/repository/handle/JRC94918>.

<b>Action Type</b>	<input checked="" type="checkbox"/> Investment ('Hard')	<input type="checkbox"/> Policy ('Soft')
<b>Implementation Timeframe</b>	2025 – 2036	
<b>Status</b>	<input checked="" type="checkbox"/> New <input type="checkbox"/> Planned <input type="checkbox"/> Ongoing	
<b>GCAP Action Classification</b>	<input checked="" type="checkbox"/> Capital Investment <input type="checkbox"/> Other Investment	If 'Other Investment,' what type? <input type="checkbox"/> Standards, guidelines, and regulations <input type="checkbox"/> Strategies, plans, and programmes <input type="checkbox"/> Investment-related feasibility study <input type="checkbox"/> Awareness, demonstration, training, and capacity building <input type="checkbox"/> Organisational measure <input type="checkbox"/> Behavioural measure <input type="checkbox"/> Monitoring, data collection, analysis, and studies
<b>Action Owner(s)</b>	<ul style="list-style-type: none"> <li>Samarkand Regional Architecture and Construction Department</li> <li>Ministry of Construction, Housing and Communal Services</li> <li>Ministry of Emergency Situations</li> </ul>	
<b>Other Stakeholders</b>	<ul style="list-style-type: none"> <li>Samarkand City Management of Housing and Communal Services</li> <li>Ministry of Education.</li> <li>Samarkand Suvta'minot</li> <li>Samarkand Electric Company Joint Stock Company (JSC)</li> <li>Hududgaz/Shahargaz</li> </ul>	
<b>Location</b>	Across all of Samarkand city boundaries- the most important civic buildings and infrastructure identified by the Regional Government as crucial for continuity of function in an earthquake. This will comprise community and government facilities and services across all residential suburbs and within the city centre, where they are particularly concentrated in the Russian town to the west of Registan Square.	
<b>Priority Environmental Challenge(s) Addressed</b>	<b>Climate Change and Resilience:</b> <ul style="list-style-type: none"> <li>Lack of clarity on disaster risk and resilience (DRR) role for local government</li> </ul> <b>Buildings:</b> <ul style="list-style-type: none"> <li>Poor enforcement of building safety and energy efficiency regulations</li> </ul> <b>Energy:</b> <ul style="list-style-type: none"> <li>Ageing and inefficient network infrastructure</li> </ul> <b>Water:</b> <ul style="list-style-type: none"> <li>Ageing/poor quality drinking water supply</li> </ul>	
<b>Strategic Goal(s) Addressed</b>	<b>Climate Change and Resilience:</b> <ul style="list-style-type: none"> <li>Improve Samarkand's resilience to climate and natural disasters</li> </ul> <b>Energy:</b> <ul style="list-style-type: none"> <li>Modernise Samarkand's energy infrastructure</li> </ul> <b>Water:</b> <ul style="list-style-type: none"> <li>Improve Samarkand's water supply and drainage infrastructure</li> </ul>	
<b>Link(s) to Existing Policies/Plans/Projects</b>	<input checked="" type="checkbox"/> Yes <ul style="list-style-type: none"> <li>Building codes KMK 2.01.03-96 and KMK 2.07.01-94 set out seismic resistant design principles</li> <li>Previous programme of seismic retrofit of heritage assets</li> </ul> <input type="checkbox"/> No	
<b>Link(s) to Other GCAP Actions</b>	<input checked="" type="checkbox"/> Yes <ul style="list-style-type: none"> <li><b>Action C2:</b> Build capacity of city to collect and share data (using GIS systems) to map and plan for climate and disaster risks</li> <li><b>Action CR1:</b> Establish a scenario-based approach to disaster risk management (DRM) and response across all sectors</li> </ul> <input type="checkbox"/> No	

<b>Cross-Cutting Themes</b>	<b>Climate and Disaster Risk</b>	<b>Smart Maturity</b>	<b>Gender and Social Inclusion</b>	<b>Heritage and Tourism</b>
	<input checked="" type="checkbox"/> Directly targeted <input type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> This Action directly supports and builds resilience against earthquakes, which are Samarkand's main non-climate related disaster hazard.	<input type="checkbox"/> Directly targeted <input checked="" type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> This Action has obvious potential for digitisation of project records and uploading these to a GIS webspace- for example, the buildings assessed as most in need of retrofitting, those retrofitted, those due for retrofit.	<input type="checkbox"/> Directly targeted <input checked="" type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> Integration of gender and social considerations into the assessment will increase the likelihood that services being utilised by the most vulnerable will be prioritized.	<input type="checkbox"/> Directly targeted <input checked="" type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> While it is understood that seismic retrofit has already taken place for heritage assets across Samarkand, the more resilient the city is to seismic shock, the less of an economic impact on tourism.
<b>Implementation Process and Timeline</b>	<b>Step</b>		<b>Duration</b>	
	<b>1. Review existing seismic resilience of critical infrastructure</b> a) <b>Review current resilience</b> b) <b>Consider building materials and inspection records</b> c) <b>Outline practical options for retrofit</b>		1 year	
	<b>2. Deliver pilot retrofitting measures for fifty most affected buildings and services</b> a) <b>Review Stage 1 data and determine most critical buildings/services</b> b) <b>Design and deliver pilot projects</b>		2 years	
	<b>3. Deliver retrofitting measures to all critical infrastructure in need</b>		8 years	
<b>Indicative Project Costs</b>	<b>CapEx [€]</b>		<b>OpEx over 5 years [€]</b>	<b>Feasibility / Advisory Costs [€]</b>
	21,767,000 <ul style="list-style-type: none"> <li>Deliver pilot retrofitting measures: 14,250,000</li> <li>Main contractor preliminaries (15%): 2,138,000</li> <li>Main contractor overheads and profits (5%): 819,000</li> <li>Fees (10%): 1,721,000</li> <li>Contingency (15%): 2,839,000</li> </ul>		n/a	210,000 <ul style="list-style-type: none"> <li>Review existing seismic resilience of critical infrastructure: 183,000</li> <li>Contingency (15%): 27,000</li> </ul>
<b>Potential Financing Instruments and Sources</b>	<b>Instrument (Own-Source, Grant, Debt, Equity, Other)</b>		<b>Source (Municipal Government, State-Owned Enterprise, National Government, Private Sector, International Development Partner, Other)</b>	
	<b>Own Source</b>		Municipal Government	
	<b>Own Source</b>		State-Owned Enterprise	
	<b>Grant</b>		National Government	
<b>Revenue Opportunities</b>	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No			
<b>Impact Measures (Quantitative and Qualitative)</b>	<b>Environmental Impacts</b>		State indicators	9 – Estimated economic damage from natural disasters

		9.1 – Percentage of public infrastructure at risk 9.2 – Percentage of households at risk	
	Pressure indicators	14.1 – Electrical interruptions 14.2 – Percentage of network line losses 27 – Sewer network integrity (pipe break)	
	<b>Socio-economic Impacts</b>	Jobs created	303
		Social inclusion benefits	Improved continuity of social and civic services, including healthcare, to socially excluded population in the event of an earthquake.
		Other socio-economic benefits	Enhanced public safety, including for the most vulnerable residents.  Improved city resilience to disaster risk, for example the local economy is likely to be less affected by and/or return to business as usual more quickly following earthquake event.
	<b>Climate Impacts</b>	Estimated carbon emissions reduction	No direct carbon emissions reduction associated with this Action.
		Climate resilience benefits	No direct climate resilience benefits, as Action focussed instead on seismic resilience. Action would result in estimated 88 million EUR cost avoidance associated with earthquakes in Samarkand Region.
	<b>Nature &amp; Biodiversity Impacts</b>	Natural capital benefits	N/A
	<b>Other Indicators/Co-benefits</b>	Operational cost, water, and/or energy savings, revenue generation, etc.	This Action will provide significant long-term cost savings in the event of an earthquake by reducing the expenditure needed for reconstructing infrastructure and buildings.  This reduction in effort and time needed to reconstruct infrastructure and buildings will also result in significant energy savings, which can be quantified following the pilot study and extrapolated to full rollout.

	Area	Risks	Mitigation Options
<b>Potential Project Risks and Mitigation Options</b>	<b>Social</b>	Construction activities may impact on local communities. For example, key services and facilities may need to temporarily close to implement retrofit for seismic resilience.	Engage with affected communities to raise awareness of works schedule, and to clarify alternative services that could be used instead; and/or temporary decanting of key service providers into neighbouring buildings while retrofitting takes place.
	<b>Environmental</b>	Increasing the seismic resilience of critical buildings and infrastructure could increase their embodied carbon due to the need for additional structural components. In some cases, earthquake-resistant buildings may be considered to be more carbon intensive.	Ensure seismic retrofitting measures that may increase embodied carbon are offset by other Actions across the city that will mitigate or reduce carbon emissions, such as incorporation of renewable energy, energy efficiency and/or low-emission vehicles.
	<b>Economic</b>	High costs of retrofitting for no (perceived, immediate) return on investment (e.g. if no major earthquake for decades after retrofitting) could be considered a waste of resources.	Review appropriate funding sources; be open and clear that return on investment is not guaranteed within fixed timeframe; however, highlight the many lives and millions of dollars in damage that the Action could save. Use value/cost-effectiveness as one criterion when deciding which buildings to retrofit.
	<b>Other</b>	<p>This Action focuses on critical buildings only, leaving the majority of other buildings in the city (i.e. households, businesses) less protected in case of earthquakes.</p> <p>Lack of local skills in retrofitting for seismic building resilience, which can be technically complex. Limited technical capacity to design and implement programme.</p>	<p>Design the Action as the first step in a longer-term plan for enhanced seismic safety for other buildings, whether through updated seismic codes, a stronger enforcement/compliance regime or retrofitting.</p> <p>Upskill and/or recruit specialist workforce, building education and awareness of seismic retrofit as appropriate. Seek lessons learned or best practices from previous seismic retrofit of key heritage assets in Samarkand.</p>

# Climate and Resilience Actions

Action CR1: Establish a scenario-based approach to disaster risk management (DRM) and response across all sectors	Estimated Total Cost: €44,000
<p><b>Description</b></p>	<p>Samarkand is exposed to geophysical hazards (especially earthquakes), as well as climate-related hazards, including floods and droughts. At the national level, the estimated losses from disasters in Uzbekistan amount to almost \$3 billion annually. While there are multiple policies, regulations and laws seeking to respond to, manage and mitigate climate and natural disasters at present there is no comprehensive regional disaster risk management (DRM) plan- that makes use of scenario-based approaches in place for Samarkand that would enable fast and effective response at the regional level. This gap results in delays in response and overall inadequate level of preparedness to respond to key hazards.</p> <p>To address these gaps, Samarkand Regional Government will develop a scenario-based approach to DRM for the Region. The new approach should cover all relevant infrastructure sectors (transport, energy, land use, solid waste, buildings, water, industries) and help build the capacity of local emergency services, government officials, and local communities in disaster planning and response. Particular attention is needed to ensure that vulnerable groups (i.e. women, children, elderly) are actively considered throughout the development of the DRM.</p> <p>The key benefit of this Action is therefore to strengthen the capacity of local government to respond better to disasters through effective forward planning, based on a selection of most likely disaster scenarios for Samarkand- thus more able to save lives, reduce injuries, and limit damage to property and infrastructure. The plan will complement existing efforts to build local resilience to climate and natural disasters, supporting the work various non-government organisations have been progressing in the Region over the past decade.</p> <p>Once implemented, the additional perspective in disaster risk management provided by this Action will provide a firm basis for enabling, derisking and justifying development and infrastructure investments that are not yet possible (or carry high financial risk) in Samarkand due to a lack of basic data; these include investments such as: flood defence infrastructure of the right type, in the right locations; stormwater management infrastructure in the right locations (see also Action W1); locations suffering most from the urban heat island effect and hence where new planting of trees and/or green roofs and walls would be most justified; more targeted and cost-effective seismic retrofitting programmes (see also Action B3); improved fire protection and management; and new emergency shelters in the right locations.</p> <p>A scenario-based approach to DRM for Samarkand will entail:</p> <ul style="list-style-type: none"> <li>• A comprehensive Regional DRM plan to cover scenarios for multiple disasters most relevant for Samarkand (i.e. earthquakes, floods and droughts) and outlining the most appropriate, effective and feasible responses, including the roles and responsibilities of relevant agencies. The responses will aim to utilise data and modern technologies to provide early warning of hazards;</li> <li>• The development of training sessions for relevant staff and stakeholders within Regional and city government and utilities Joint Stock Companies (JSCs) offices;</li> <li>• At least three simulation exercises involving local communities from the most vulnerable mahallas, civil society/non-governmental organisations, and emergency service employees and medical workers to help build awareness of and increase responsiveness and resilience to potential disasters.</li> </ul> <p>The Action, including the three elements listed above, will be led by the Samarkand Regional office of the Ministry of Emergency Situations, supported by the City Mayor’s office. It will be delivered in collaboration with local humanitarian agencies, NGOs, and mahalla committees. It will be implemented in three main phases:</p> <ul style="list-style-type: none"> <li>• Firstly, a consultation process will be established, involving key stakeholders. This will aim to gather stakeholder views and experience as critical inputs for the DRM plan and establish an accepted shared definition of roles and responsibilities among stakeholder organisations and individuals;</li> </ul>

	<ul style="list-style-type: none"> <li>Secondly, the DRM plan itself will be drafted and adopted; at the time of adoption, multiple training sessions on the contents of the plan and its implementation will be organised by the Regional Emergency Situations office for selected stakeholders from government and utility companies;</li> <li>Finally, multiple simultaneous planning and scenario-based exercises will be carried out with local communities in Samarkand to help inform future responses and ensure familiarity with response protocols during emergencies.</li> </ul>								
<b>Sector</b>	<input checked="" type="checkbox"/> Climate and Resilience								
<b>Action Type</b>	<input type="checkbox"/> Investment ('Hard') <input checked="" type="checkbox"/> Policy ('Soft')								
<b>Implementation Timeframe</b>	2025 - 2027								
<b>Status</b>	<input checked="" type="checkbox"/> New <input type="checkbox"/> Planned <input type="checkbox"/> Ongoing								
<b>GCAP Action Classification</b>	<input type="checkbox"/> Capital Investment <input checked="" type="checkbox"/> Other Investment <table border="1" style="margin-left: 20px;"> <tr> <td>If 'Other Investment,' what type?</td> </tr> <tr> <td><input type="checkbox"/> Standards, guidelines, and regulations</td> </tr> <tr> <td><input checked="" type="checkbox"/> Strategies, plans, and programmes</td> </tr> <tr> <td><input type="checkbox"/> Investment-related feasibility study</td> </tr> <tr> <td><input checked="" type="checkbox"/> Awareness, demonstration, training, and capacity building</td> </tr> <tr> <td><input checked="" type="checkbox"/> Organisational measure</td> </tr> <tr> <td><input checked="" type="checkbox"/> Behavioural measure</td> </tr> <tr> <td><input type="checkbox"/> Monitoring, data collection, analysis, and studies</td> </tr> </table>	If 'Other Investment,' what type?	<input type="checkbox"/> Standards, guidelines, and regulations	<input checked="" type="checkbox"/> Strategies, plans, and programmes	<input type="checkbox"/> Investment-related feasibility study	<input checked="" type="checkbox"/> Awareness, demonstration, training, and capacity building	<input checked="" type="checkbox"/> Organisational measure	<input checked="" type="checkbox"/> Behavioural measure	<input type="checkbox"/> Monitoring, data collection, analysis, and studies
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<input checked="" type="checkbox"/> Organisational measure									
<input checked="" type="checkbox"/> Behavioural measure									
<input type="checkbox"/> Monitoring, data collection, analysis, and studies									
<b>Action Owner(s)</b>	<ul style="list-style-type: none"> <li>Mayor's Office of Samarkand City</li> <li>Samarkand Regional Office of the Ministry of Emergency Situations</li> </ul>								
<b>Other Stakeholders</b>	<ul style="list-style-type: none"> <li>Samarkand City Government Management of Housing and Communal Services</li> <li>Energy State-Owned Enterprises (SOEs) (Samarkand Electric Company JSC, Hududgaz/Shahargaz)</li> <li>Samarkand Suvta'minot</li> <li>Samarkand Region and City Departments of Transport</li> <li>Maroqand Obod</li> <li>Mahalla committees</li> <li>General public</li> <li>NGOs and academia</li> <li>United Nations Development Programme (UNDP) and other international agencies working in Uzbekistan who are focused on DRM</li> </ul>								
<b>Location</b>	Simulation exercises to be undertaken at the following locations: <ul style="list-style-type: none"> <li>Samarkand Regional office of the Ministry of Emergency Situations</li> <li>Samarkand Regional Government offices</li> <li>Selected mahallas across the city- in particular, those assessed as most vulnerable to disaster risk (this may include those in the floodplain of the Zarafshan river and those assessed as at greater seismic risk, either geophysically or due to extensive illegal construction)</li> </ul>								
<b>Priority Environmental Challenge(s) Addressed</b>	<b>Climate Change and Resilience:</b> <ul style="list-style-type: none"> <li>Insufficient focus on climate change-related hazards</li> <li>Lack of clarity on disaster risk and resilience (DRR) role for local government</li> </ul>								
<b>Strategic Goal(s) Addressed</b>	<b>Climate Change and Resilience:</b> <ul style="list-style-type: none"> <li>Improve Samarkand's resilience to climate and natural disasters</li> </ul>								
<b>Link(s) to Existing Policies/Plans/Projects</b>	<input checked="" type="checkbox"/> Yes <ul style="list-style-type: none"> <li>Presidential Decree No. 585 On Disaster Prevention and Relief Measures Related to Flooding, Mud Flows, Avalanches and Landslides</li> <li>State Programme on Earthquake Risk Reduction</li> </ul>								

	<ul style="list-style-type: none"> <li>• Presidential Decree PP-426 On Measures to Protect the Population and Territories From Emergency Situations Associated with Dangerous Hydrometeorological Phenomena and Geological Processes</li> <li>• Law On Protection of Population and Territories Against Emergency Situations of Natural and Manmade Character</li> <li>• Presidential Decree PP-4204 On Measures to Increase the Efficiency of Combating Desertification and Drought in the Republic of Uzbekistan adopted in 2019</li> <li>• State Programme on Forecasting Emergency Situations of Natural and Technological Character</li> <li>• Decree 171 of the Cabinet of Ministers On Measures to Effectively Organize the Activities of the State System to Prevent Emergency Situations and Act in Such Situations in the Republic of Uzbekistan</li> <li>• Presidential Decree On Measures for Radical Improvement of the Efficiency of Early Warning Systems for the Prevention of Emergency Situations and Liquidation of the Consequences Thereof</li> <li>• UNDP Uzbekistan Sectoral Adaptation Plan for DRR Management, Goals 3, 4 and 10</li> </ul> <input type="checkbox"/> No													
<p><b>Link(s) to Other GCAP Actions</b></p>	<input checked="" type="checkbox"/> Yes <ul style="list-style-type: none"> <li>• <b>Action C1:</b> Establish a team for environmental data collection to gather and monitor data on buildings, industry, energy and DRR (Disaster Risk Reduction)</li> <li>• <b>Action C2:</b> Build capacity of city to collect and share data (using GIS systems) to map and plan for climate and disaster risks</li> <li>• <b>Action CR3:</b> Identify/map hazards and vulnerabilities to climate risk in participatory way using GIS to improve urban resilience</li> </ul> <input type="checkbox"/> No													
<p><b>Cross-Cutting Themes</b></p>	<p><b>Climate and Disaster Risk</b></p> <input checked="" type="checkbox"/> Directly targeted <input type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> This Action aims to increase adaptive capacity of local populations, and therefore directly supports efforts to build resilience.	<p><b>Smart Maturity</b></p> <input type="checkbox"/> Directly targeted <input checked="" type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> The Action will improve the quality of the evidence and data for DRM, and some or all of this data will be digital, thus indirectly improving smart maturity. In the longer term, other disaster-related digital infrastructure, such as mass notification systems, could be trialled.	<p><b>Gender and Social Inclusion</b></p> <input checked="" type="checkbox"/> Directly targeted <input type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> By increasing the level of preparedness to disasters of the most vulnerable segments of the population in Samarkand, this Action directly contributes to gender and social inclusion by tackling social inequalities.	<p><b>Heritage and Tourism</b></p> <input type="checkbox"/> Directly targeted <input checked="" type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> Better DRM planning, including use of scenarios, means that heritage assets are likely, as with the rest of the city's infrastructure, to be protected from the most severe impacts associated with climate change and natural disasters.										
<p><b>Implementation Process and Timeline</b></p>	<table border="1"> <thead> <tr> <th>Step</th> <th>Duration</th> </tr> </thead> <tbody> <tr> <td>1. Identify delivery partners (e.g. UN entities and relief / humanitarian agencies) and possible sources of funding</td> <td>3-6 months</td> </tr> <tr> <td>2. Develop a scenario-based DRM plan in collaboration with relevant stakeholders.</td> <td>4-6 months</td> </tr> <tr> <td>3. Organise and deliver training workshops for local government and utilities staff</td> <td>3-6 months</td> </tr> <tr> <td>4. Deliver simulation exercises involving local communities, not-for-profit entities and humanitarian organisations</td> <td>2-4 months</td> </tr> </tbody> </table>				Step	Duration	1. Identify delivery partners (e.g. UN entities and relief / humanitarian agencies) and possible sources of funding	3-6 months	2. Develop a scenario-based DRM plan in collaboration with relevant stakeholders.	4-6 months	3. Organise and deliver training workshops for local government and utilities staff	3-6 months	4. Deliver simulation exercises involving local communities, not-for-profit entities and humanitarian organisations	2-4 months
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3. Organise and deliver training workshops for local government and utilities staff	3-6 months													
4. Deliver simulation exercises involving local communities, not-for-profit entities and humanitarian organisations	2-4 months													
	<p><b>CapEx [€]</b></p>	<p><b>OpEx over 5 years [€]</b></p>	<p><b>Feasibility / Advisory Costs [€]</b></p>											

<b>Indicative Project Costs</b>	n/a	44,000	n/a
<b>Potential Financing Instruments and Sources</b>	<b>Instrument (Own-Source, Grant, Debt, Equity, Other)</b>		<b>Source (Municipal Government, State-Owned Enterprise, National Government, Private Sector, International Development Partner, Other)</b>
	<b>Own source</b>		Municipal Government
	<b>Grant</b>		National Government
<b>Revenue Opportunities</b>	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		
<b>Impact Measures (Quantitative and Qualitative)</b>	<b>Environmental Impacts</b>	State indicators	9 – Estimated economic damage from natural disasters 9.1 – Percentage of public infrastructure at risk 9.2 – Percentage of households at risk
		Pressure indicators	None directly linked to this Action.
	<b>Socio-economic Impacts</b>	Jobs created	2
		Social inclusion benefits	By increasing the level of preparedness to disasters of the most vulnerable segments of the population in Samarkand, this Action directly contributes to social inclusion.
		Other socio-economic benefits	This Action is expected to bring long-term benefits in terms of damage avoided to households and public infrastructure.
	<b>Climate Impacts</b>	Estimated carbon emissions reduction	No direct carbon emissions reduction associated with this Action.
		Climate resilience benefits	Climate resilience benefits from this Action can be estimated by assessing performance across state indicators – in terms of reduction of estimated economic damage from natural disasters –as well as the percentage of public infrastructure and households at risk.
	<b>Nature &amp; Biodiversity Impacts</b>	Natural capital benefits	This Action is consistent with Priority Investment Area 2.1 in the Natural Capital Valuation for Samarkand (see GCAP Appendix B).
	<b>Other Indicators/Co-benefits</b>	Operational cost, water, and/or energy savings, revenue generation, etc.	Implementation of this Action will result in significant energy savings as a result of more efficient and effective disaster

			response, which can be quantified relative to the pre-Action baseline in the event of any disaster and subsequent recovery effort
<b>Potential Project Risks and Mitigation Options</b>	<b>Area</b>	<b>Risks</b>	<b>Mitigation Options</b>
	<b>Social</b>	<p>The inherent risk in the preparation of DRM plans is that insufficient attention is paid to ensuring inclusion and participation of the most marginalised social groups who are particularly vulnerable to the impacts of disasters.</p> <p>Communities may resist or be unaware of the necessity and benefits of DRM measures.</p>	<p>Involve local social and gender experts as key stakeholders during the preparation of the plan and ensure most vulnerable communities are included and considered by the plan from the earliest stages of its preparation.</p> <p>Conduct extensive community awareness campaigns, involving mahalla committees, to specifically emphasize the positive impacts of DRM on community safety and well-being.</p>
	<b>Environmental</b>	N/A	N/A
	<b>Economic</b>	Funding for some exercises (especially simulations) may not be available within local budgets.	Seek fiscal support from humanitarian and not-for-profit entities, including UNDRR, UNDP, Red Cross, and others that have offices in Uzbekistan to close the funding gap, and / or rely on local volunteers.
	<b>Other (Technical)</b>	Insufficient knowledge and expertise in disaster risk reduction may result in ineffective planning and implementation	Hire or collaborate with capacity building experts in the field, provide training for project staff, and establish partnerships with organizations experienced in DRM.
	<b>Other (Political)</b>	Regulatory hurdles or conflicting policies can impede the implementation of coordinated DRR initiatives.	Engage with relevant policymakers, advocate for supportive regulations, and work closely with government agencies to align regional-level DRM efforts with existing policies.

Action CR2: Undertake a regional/city level GHG inventory to determine local climate mitigation opportunities		Estimated Total Cost: €230,000
<b>Description</b>	<p>Uzbekistan produced a national greenhouse gas (GHG) inventory as part of its Nationally Determined Contribution (NDC) under the Paris Climate Agreement. However, that inventory was not disaggregated to regional level to enable the main emissions sources for Samarkand Region (and other regions) to be determined.</p> <p>A greenhouse gas (GHG) inventory serves a dual purpose: firstly, it provides a baseline from which to measure progress on local climate mitigation programs and actions. Secondly, it gives a method for benchmarking the effectiveness of GCAP Actions. Therefore, the current lack of regional-level greenhouse gas (GHG) inventory is impeding evidence-based decision-making on emissions reduction in Samarkand.</p> <p>Once implemented, the improved data resulting from this Action will provide a firm basis for enabling, derisking and justifying green development and infrastructure investments that are not yet possible (or carry high financial risk) in Samarkand due to a lack of basic data. These include investments such as: future active and public transport expansion (see also Actions T1 and T3); waste-to-energy plants and biogas capture (see also Action SW2); further investment in industrial emissions reductions (see also Actions I1 and I2), further expansion of green infrastructure (see also Actions UD1 and UD2) and, eventually, more ambitious measures such as carbon capture and storage opportunities.</p> <p>One of the first tasks of the environmental data collection team (established through Action C1) should be to undertake or commission the first regional-level GHG inventory accounting for all emissions produced by Samarkand Region. Methodologically, the inventory will need to follow the GHG Protocol for Community-Scale GHG Inventories, as follows:</p> <ol style="list-style-type: none"> <li><b>1. Establish Scope 1 and Scope 2 emissions:</b></li> </ol> <p>Scope 1 refers to emissions attributable to activities within the regional boundaries (from controlled sources) and Scope 2 refers to emissions occurring as a result of using of grid-supplied electricity, heat and/or steam. These should cover six main sectors: i) stationary energy ii) transportation iii) waste iv) industrial processes and product use (IPPU) v) agriculture, forestry and other land use (AFOLU) vi) any other emissions resulting from urban activities. Gathering accurate and reliable information on Scope 1 and 2 emissions will require extensive stakeholder engagement, for example with local scientists and industry managers.</p> <ol style="list-style-type: none"> <li><b>2. Set target for emissions reduction:</b></li> </ol> <p>Depending on the availability of relevant data, it is likely that 2021 will be used as a baseline year (which is the same year as Uzbekistan’s updated Nationally Determined Contribution) to strategically align regional ambitions with those of the national government. The target setting for emissions reduction at the regional level should also be closely aligned and supportive of the national ambitions (reducing GHG emissions per unit of GDP by 35% by 2030 compared to 2010 levels) and focus on achieving this through decarbonisation of key sectors, including energy, transport, and industrial areas.</p> <ol style="list-style-type: none"> <li><b>3. Finalise and publish GHG inventory:</b></li> </ol> <p>The first GHG inventory will be finalised and made publicly available by the end of 2025, after which it should be reviewed and updated every three years. The review process should be led or commissioned by the environmental data collection team, in close collaboration with specific regional and city-level entities and/or other key partners.</p>	
<b>Sector</b>	<input checked="" type="checkbox"/> Climate and Resilience	
<b>Action Type</b>	<input type="checkbox"/> Investment ('Hard')	<input checked="" type="checkbox"/> Policy ('Soft')
<b>Implementation Timeframe</b>	2025-2027	

<b>Status</b>	<input checked="" type="checkbox"/> New <input type="checkbox"/> Planned <input type="checkbox"/> Ongoing			
<b>GCAP Action Classification</b>	<input type="checkbox"/> Capital Investment <input checked="" type="checkbox"/> Other Investment	If 'Other Investment,' what type? <input type="checkbox"/> Standards, guidelines, and regulations <input checked="" type="checkbox"/> Strategies, plans, and programmes <input type="checkbox"/> Investment-related feasibility study <input type="checkbox"/> Awareness, demonstration, training, and capacity building <input type="checkbox"/> Organisational measure <input type="checkbox"/> Behavioural measure <input checked="" type="checkbox"/> Monitoring, data collection, analysis, and studies		
<b>Action Owner(s)</b>	<ul style="list-style-type: none"> <li>Samarkand Regional Government (as sponsors of the new environmental data team- see Action C1)</li> <li>Ministry of Environmental Protection and Climate Change</li> <li>State Committee on Environmental Protection</li> </ul>			
<b>Other Stakeholders (max 5)</b>	<ul style="list-style-type: none"> <li>Uzstat</li> <li>Samarkand City Government Mayor's Office</li> <li>Energy State-Owned Enterprises (SOEs) (Samarkand Electric Company Joint Stock Company (JSC), Hududgaz/Shahargaz)</li> <li>Regional Department of Transport</li> </ul>			
<b>Location</b>	Samarkand Regional Government, Kuksaroy Square, 1, Samarkand			
<b>Priority Environmental Challenge(s) Addressed</b>	<b>Climate Change and Resilience:</b> <ul style="list-style-type: none"> <li>Increasing greenhouse gas emissions</li> <li>Lack of clarity on local government role in emissions reduction</li> </ul> <b>Industries:</b> <ul style="list-style-type: none"> <li>Sector generates high level of GHG and dust emissions</li> </ul>			
<b>Strategic Goal(s) Addressed</b>	<b>Climate Change and Resilience:</b> <ul style="list-style-type: none"> <li>Continue transition to renewable energy</li> </ul> <b>Industries:</b> <ul style="list-style-type: none"> <li>Reduce the environmental impact of industries</li> </ul> <b>Transport:</b> <ul style="list-style-type: none"> <li>Decarbonise Samarkand's transport sector through low-emission vehicles</li> </ul>			
<b>Link(s) to Existing Policies/Plans/Projects</b>	<input checked="" type="checkbox"/> Yes <ul style="list-style-type: none"> <li>Concept of Environmental Protection to 2030</li> <li>Uzbekistan's Nationally Determined Contribution (2021)</li> </ul> <input type="checkbox"/> No			
<b>Link(s) to Other GCAP Actions</b>	<input checked="" type="checkbox"/> Yes <ul style="list-style-type: none"> <li><b>Action C1:</b> Establish a team for environmental data collection to gather and monitor data on buildings, industry, energy and DRR (Disaster Risk Reduction)</li> <li><b>Action C3:</b> Develop a digital reporting platform to engage citizens on environmental and climate issues and policy</li> <li><b>Action EB2:</b> Develop financial, legal and other incentives for polluters to minimise pollution and improve city liveability and resilience</li> </ul> <input type="checkbox"/> No			
<b>Cross-Cutting Themes</b>	<b>Climate and Disaster Risk</b>	<b>Smart Maturity</b>	<b>Gender and Social Inclusion</b>	<b>Heritage and Tourism</b>
	<input checked="" type="checkbox"/> Directly targeted <input type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> This Action will directly support climate action	<input type="checkbox"/> Directly targeted <input checked="" type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> This Action indirectly supports smart	<input type="checkbox"/> Directly targeted <input type="checkbox"/> Some elements <input checked="" type="checkbox"/> No direct links <u>Reason:</u> There are no direct links between this	<input type="checkbox"/> Directly targeted <input type="checkbox"/> Some elements <input checked="" type="checkbox"/> No direct links <u>Reason:</u> There are no direct links between this

	in Samarkand by enabling evidence-based mitigation planning and by providing a benchmark against which to measure emission reduction.	maturity efforts in Samarkand because it facilitates the use of data, much of it digital, in the decision-making and policy process.	Action and Gender and Social Inclusion.	Action and heritage and tourism in Samarkand.
Implementation Process and Timeline	<b>Step</b>		<b>Duration</b>	
	1. Establish Scope 1 and Scope 2 emissions-including mobilisation and planning stage, stakeholder engagement, gathering and analysis of data		12-15 months	
	2. Set target for emissions reduction		3 months	
	3. Finalise and publish GHG inventory		3 months	
Indicative Project Costs	<b>CapEx [€]</b>	<b>OpEx over 5 years [€]</b>	<b>Feasibility / Advisory Costs [€]</b>	
	n/a	n/a	230,000 <ul style="list-style-type: none"> <li>Establish Scope 1 and Scope 2 emissions: 130,000</li> <li>Set target for emissions reduction: 58,000</li> <li>Finalise and publish GHG inventory: 13,000</li> <li>Contingency (15%): 30,000</li> </ul>	
Potential Financing Instruments and Sources	<b>Instrument (Own-Source, Grant, Debt, Equity, Other)</b>		<b>Source (Municipal Government, State-Owned Enterprise, National Government, Private Sector, International Development Partner, Other)</b>	
	<b>Grant</b>		National Government	
	<b>Own source</b>		Municipal Government	
	<b>Loan</b>		International Development Partner	
Revenue Opportunities	<input type="checkbox"/> Yes [if yes, explain which ones] <input checked="" type="checkbox"/> No			
Impact Measures (Quantitative and Qualitative)	<b>Environmental Impacts</b>	State indicators	8 – Annual CO <sub>2</sub> equivalent emissions per capita 8.1 – Annual CO <sub>2</sub> emissions per unit of GDP	
		Pressure indicators	10.1 – Percentage of diesel cars in total vehicle fleet 10.3 – Share of total passenger car fleet run by alternative energy (total and by type) 15.2 – Share of district heating from carbon intensive sources 15.4 – Share of district heating from renewable sources 16 – Share of renewable in total energy consumption 18 – Electricity consumption in building 18.1 – Electricity consumption in residential buildings 18.2 – Electricity consumption in commercial buildings 18.3 – Electricity consumption in public buildings	

			<p>19 – Fossil fuels consumption for heating and cooling</p> <p>19.1 – Fossil fuels consumption for heating and cooling in residential buildings</p> <p>19.2 – Fossil fuels consumption for heating and cooling in commercial buildings</p> <p>19.3 – Fossil fuels consumption for heating and cooling in public buildings</p> <p>22.1 – Fossil fuel combustion in industrial processes, per unit of industrial GDP</p>
	<b>Socio-economic Impacts</b>	Jobs created	2
		Social inclusion benefits	N/A
		Other socio-economic benefits	N/A
	<b>Climate Impacts</b>	Estimated carbon emissions reduction	No direct carbon emissions reduction associated with this Action.
		Climate resilience benefits	Improves climate resilience as a tool to help mitigate local emissions.
	<b>Nature &amp; Biodiversity Impacts</b>	Natural capital benefits	The Action will indirectly benefit natural capital as a first step towards understanding and eventually helping to mitigate human-caused climate change impacts on natural capital (e.g. droughts).
<b>Other Indicators/Co-benefits</b>	Operational cost, water, and/or energy savings, revenue generation, etc.	<p>Indirectly the GHG inventory will enable the selection of appropriate low-carbon mitigation options with the potential to be more cost-effective than fossil fuel alternatives.</p> <p>This Action also offers very significant indirect potential for energy savings by identifying the largest baseline energy uses across the Region. This will facilitate subsequent large-scale measures to save energy and very likely also water use, which could be quantified with respect to the GHG inventory as a baseline.</p>	
<b>Potential Project Risks and Mitigation Options</b>	<b>Area</b>	<b>Risks</b>	<b>Mitigation Options</b>
	<b>Social</b>	N/A	N/A
	<b>Environmental</b>	Incorrect GHG data or analysis of data results in wrong recommendations.	Ensure data quality control of raw inputs; technical quality check of data analysis to ensure accurate interpretation and application; verification of draft GHG inventory ‘on the ground.’
	<b>Economic</b>	Limited technical capacity for	Commission technical work from appropriately qualified staff, either in-house or by contracting external academics,

		undertaking a GHG inventory.  Cost of GHG inventory is prohibitive.	consultants or International Financial Institution (IFI) staff if necessary.  Review appropriate funding sources- potential for support from IFI or development entities (e.g. the World Bank), grant assistance, etc.
	<b>Other (Technical)</b>	Relevant data is unavailable and/or available only at prohibitive cost.	Partner with third parties (e.g. academia, not for profit, private sector) to obtain the most appropriate, high-quality data required for the inventories, and use proxies when appropriate and necessary.

<b>Action CR3: Identify/map hazards and vulnerabilities to climate risk in participatory way using GIS to improve urban resilience</b>	<b>Estimated Total Cost: €88,000</b>
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<b>Description</b>	<p>According to the United Nations Development Programme (UNDP), the economic cost of climate change impacts could amount to 1% of Uzbekistan’s GDP by 2030<sup>55</sup>. Despite this, insufficient attention is currently focussed on climate hazards in Samarkand, although the region is exposed to heat waves, droughts, and flash floods.</p> <p>Currently, existing climate adaptation planning in Uzbekistan is highly centralised with little or no input from or engagement with affected local populations. This results in information gaps on how Samarkand’s climate risk profile is affected by demographic, socio-economic, and gender factors. The existing top-down approach needs to be complemented with bottom-up mechanisms that can allow for more locally specific understanding and responses to climate risk.</p> <p>Community mapping of climate hazards and vulnerabilities using GIS is a proven, cost-effective and powerful way to help build urban climate resilience. Leveraging local knowledge promotes community engagement, social inclusion and well-being, improves disaster preparedness, and allows for responsive urban planning sensitive to the needs of the community. While Samarkand Regional Government and its partner organisations already make use of GIS within the water, energy and buildings sectors, its use to support climate resilience is at present an untapped opportunity, and has potential to lead to wider use of GIS across related sectors and projects.</p> <p>Once implemented, the additional data provided by this Action will provide a firm basis for enabling, derisking and justifying development and infrastructure investments that are not yet possible (or carry high financial risk) in Samarkand due to a lack of basic data; these include investments such as: flood defence infrastructure of the right type, in the right locations; stormwater management infrastructure in the right locations (see also Action W1); and locations particularly vulnerable to the effects of drought and hence where water supply and/or water saving infrastructure, for example rainwater harvesting, would have the most benefit.</p> <p>This Action will comprise:</p> <p>a) <b>an initial series of ten interactive workshops</b>, to be hosted by the Regional Government, for mahalla leaders and committees to map specific local climate hazards and vulnerabilities, and share information about non-mappable elements within their areas. As there are 219 mahallas in Samarkand as of 2023<sup>56</sup>, there will need to be 20-22 mahalla representatives invited to each workshop. Mahalla committees will be asked to prepare for each workshop by reviewing the local knowledge of its community to generate highly location-specific information including:</p> <ul style="list-style-type: none"> <li>• Locations of surface water and fluvial flooding after storm events;</li> <li>• Vulnerability of local water, gas and electricity supply to climate extremes;</li> <li>• Qualitative data on recent climate events, such as socio-economic impacts of droughts, urban heat island effects and/or extreme winter cold (including on health and mortality);</li> <li>• Recent demographic/land use changes and their impact on climate vulnerability;</li> <li>• Specific examples of how local populations have adapted and may need to adapt further to climate extremes (both in terms of daily activities and any new infrastructure needed).</li> </ul> <p>Each of the ten workshops will follow a consistent structure to allow for accurate comparison between the data gathered by each one. The workshops will need to be divided geographically (for example, inner north-eastern suburbs, outer eastern suburbs and so on) and need to be driven by accurate base mapping (either generated from the city’s existing cadastral mapping or available for free from OpenStreetMap<sup>57</sup>).</p>
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<sup>55</sup> UNDP. 2023. Climate Public Expenditure and Institutional Review: Uzbekistan. Available at: [https://www.undp.org/sites/g/files/zskgkq326/files/2024-01/cpeir\\_uzbekistan\\_2023\\_eng.pdf](https://www.undp.org/sites/g/files/zskgkq326/files/2024-01/cpeir_uzbekistan_2023_eng.pdf)

<sup>56</sup> Egis (2023). Samarkand E-bus Project: Draft Environmental and Social Assessment Report, not available online.

<sup>57</sup> Available at [Openstreetmap.org](https://www.openstreetmap.org).

	<p>b) <b>Creation of spatial data sets:</b> The information generated by the workshops can then be processed by the newly established environmental data team (see Action C1), and, where spatial, can be fed into municipal GIS mapping (see Action C2). This will allow it to be interrogated and applied to inform the local government’s disaster preparedness (including modern technologies for early warning of hazards) and response planning (see Action CR1).</p> <p>c) <b>Conduct analysis using the data gathered:</b> For example, new green spaces in the right locations (see Action UD2) can reduce the urban heat island effect and provide flood attenuation benefits. The evidence from the workshops should also inform the strategic land use plan (see Action UD3) to ensure its robustness.</p>	
<b>Sector</b>	<input checked="" type="checkbox"/> Climate and Resilience <input checked="" type="checkbox"/> Land Use	
<b>Action Type</b>	<input type="checkbox"/> Investment ('Hard')	<input checked="" type="checkbox"/> Policy ('Soft')
<b>Implementation Timeframe</b>	2025-2027	
<b>Status</b>	<input checked="" type="checkbox"/> New <input type="checkbox"/> Planned <input type="checkbox"/> Ongoing	
<b>GCAP Action Classification</b>	<input type="checkbox"/> Capital Investment <input checked="" type="checkbox"/> Other Investment	<input type="checkbox"/> Standards, guidelines, and regulations <input type="checkbox"/> Strategies, plans, and programmes <input type="checkbox"/> Investment-related feasibility study <input type="checkbox"/> Awareness, demonstration, training, and capacity building <input type="checkbox"/> Organisational measure <input type="checkbox"/> Behavioural measure <input checked="" type="checkbox"/> Monitoring, data collection, analysis, and studies
<b>Action Owner(s)</b>	<ul style="list-style-type: none"> <li>Mayor’s Office of Samarkand City</li> <li>Samarkand Regional office of the Ministry of Emergency Situations</li> <li>Samarkand Regional Government (new environmental data team)</li> </ul>	
<b>Other Stakeholders</b>	<ul style="list-style-type: none"> <li>Mahallas (representing city residents)</li> <li>Regional Government department of construction</li> <li>NGOs and academia</li> <li>UNDP, Red Cross and other international agencies working in Uzbekistan focused on disaster risk management (DRM)</li> </ul>	
<b>Location</b>	Action geography is entire city; workshops to be hosted by Samarkand Regional Government at suitable venue(s) accessible to mahallas; this could be a third-party venue such as a hotel or it could be mahalla meeting spaces, or rooms in the Regional Government offices as appropriate.	
<b>Priority Environmental Challenge(s) Addressed</b>	<b>Climate Change and Resilience:</b> <ul style="list-style-type: none"> <li>Insufficient focus on climate change-related hazards</li> <li>Lack of clarity on disaster risk and resilience (DRR) role for local government</li> </ul>	
<b>Strategic Goal(s) Addressed</b>	<b>Climate Change and Resilience:</b> <ul style="list-style-type: none"> <li>Improve Samarkand’s resilience to climate and natural disasters</li> </ul>	
<b>Link(s) to Existing Policies/Plans/Projects</b>	<input checked="" type="checkbox"/> Yes <ul style="list-style-type: none"> <li>Presidential Decree No. 585 On Disaster Prevention and Relief Measures Related to Flooding, Mud Flows, Avalanches and Landslides</li> <li>Presidential Decree PP-426 On Measures to Protect the Population and Territories From Emergency Situations Associated with Dangerous Hydrometeorological Phenomena and Geological Processes</li> <li>Law On Protection of Population and Territories Against Emergency Situations of Natural and Manmade Character</li> <li>Presidential Decree PP-4204 On Measures to Increase the Efficiency of Combating Desertification and Drought in the Republic of Uzbekistan adopted in 2019</li> <li>State Programme on Forecasting Emergency Situations of Natural and Technological Character</li> </ul>	

	<ul style="list-style-type: none"> <li>Decree 171 of the Cabinet of Ministers On Measures to Effectively Organize the Activities of the State System to Prevent Emergency Situations and Act in Such Situations in the Republic of Uzbekistan</li> <li>Presidential Decree On Measures for Radical Improvement of the Efficiency of Early Warning Systems for the Prevention of Emergency Situations and Liquidation of the Consequences Thereof</li> </ul> <input type="checkbox"/> No											
<b>Link(s) to Other GCAP Actions</b>	<input checked="" type="checkbox"/> Yes <ul style="list-style-type: none"> <li><b>Action C1:</b> Establish a team for environmental data collection to gather and monitor data on buildings, industry, energy and DRR (Disaster Risk Reduction)</li> <li><b>Action C2:</b> Build capacity of city to collect and share data (using GIS systems) to map and plan for climate and disaster risks</li> <li><b>Action C3:</b> Develop a digital reporting platform to engage citizens on environmental and climate issues and policy</li> <li><b>Action CR1:</b> Establish a scenario-based approach to disaster risk management (DRM) and response across all sectors</li> <li><b>Action UD2:</b> Plan for and invest in new urban green space in Samarkand</li> <li><b>Action UD3:</b> Develop and adopt a strategic land use plan and heritage framework to guide spatial decision-making</li> </ul> <input type="checkbox"/> No											
<b>Cross-Cutting Themes</b>	<b>Climate and Disaster Risk</b>  <input checked="" type="checkbox"/> Directly targeted <input type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> This Action will directly support climate resilience building through collaboration with local communities on hazard and vulnerability mapping and climate adaptation planning.	<b>Smart Maturity</b>  <input checked="" type="checkbox"/> Directly targeted <input type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> By encouraging and facilitating the use of GIS systems for climate hazard and vulnerability mapping, this Action will improve the quantity and quality of digital data and hence contribute to the smart maturity of Samarkand.	<b>Gender and Social Inclusion</b>  <input checked="" type="checkbox"/> Directly targeted <input type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> Through consultation and engagement with local residents, including vulnerable and excluded populations, this Action will directly support gender and social inclusion objectives.	<b>Heritage and Tourism</b>  <input type="checkbox"/> Directly targeted <input checked="" type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> As the Action will build resilience to climate risks and hazards during the engagement process, it will indirectly support efforts to protect and enhance heritage sites in Samarkand.								
<b>Implementation Process and Timeline</b>	<table border="1"> <thead> <tr> <th>Step</th> <th>Duration</th> </tr> </thead> <tbody> <tr> <td>1. Planning, delivery of and stakeholder engagement for workshops to map specific local hazards and vulnerabilities</td> <td>15 months</td> </tr> <tr> <td>2. Creation of spatial data sets</td> <td>9 months</td> </tr> <tr> <td>3. Conduct analysis using the data gathered</td> <td>Ongoing</td> </tr> </tbody> </table>				Step	Duration	1. Planning, delivery of and stakeholder engagement for workshops to map specific local hazards and vulnerabilities	15 months	2. Creation of spatial data sets	9 months	3. Conduct analysis using the data gathered	Ongoing
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1. Planning, delivery of and stakeholder engagement for workshops to map specific local hazards and vulnerabilities	15 months											
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<b>Indicative Project Costs</b>	<b>CapEx [€]</b> n/a	<b>OpEx over 5 years [€]</b> 88,000	<b>Feasibility / Advisory Costs [€]</b> n/a									
<b>Potential Financing Instruments and Sources</b>	<table border="1"> <thead> <tr> <th>Instrument (Own-Source, Grant, Debt, Equity, Other)</th> <th>Source (Municipal Government, State-Owned Enterprise, National Government, Private Sector, International Development Partner, Other)</th> </tr> </thead> <tbody> <tr> <td>Loan</td> <td>International Development Partner</td> </tr> <tr> <td>Own Source</td> <td>Municipal Government</td> </tr> <tr> <td>Grant</td> <td>National Government</td> </tr> </tbody> </table>				Instrument (Own-Source, Grant, Debt, Equity, Other)	Source (Municipal Government, State-Owned Enterprise, National Government, Private Sector, International Development Partner, Other)	Loan	International Development Partner	Own Source	Municipal Government	Grant	National Government
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Loan	International Development Partner											
Own Source	Municipal Government											
Grant	National Government											
<b>Revenue Opportunities</b>	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No											

<b>Impact Measures (Quantitative and Qualitative)</b>	<b>Environmental Impacts</b>	State indicators	9 – Estimated economic damage from natural disasters 9.1 – Percentage of public infrastructure at risk 9.2 – Percentage of households at risk
		Pressure indicators	N/A
	<b>Socio-economic Impacts</b>	Jobs created	0 - No additional jobs created directly by this Action.
		Social inclusion benefits	This Action will promote social inclusion through collaborative, participatory mapping of climate- and natural disaster-related hazards and vulnerabilities that will engage with some of the most vulnerable and excluded populations in Samarkand.
		Other socio-economic benefits	Through raising awareness of relevant climate- and natural disaster-related hazards and vulnerabilities, this Action has the potential to increase hazard preparedness (including the use of modern technology for early warning and response), and therefore reduce socio-economic losses and damages associated with the impacts of climate change and natural disasters.
	<b>Climate Impacts</b>	Estimated carbon emissions reduction	No direct carbon emissions reduction associated with this Action.
		Climate resilience benefits	Through building capacity to proactively identify hazard hotspots and prepare adaptation measures, this Action directly supports efforts to build climate resilience in Samarkand.
	<b>Nature &amp; Biodiversity Impacts</b>	Natural capital benefits	The Action could indirectly support natural capital if the responses it informs, such as the provision of new open space, have natural capital benefits. This Action is also consistent with Priority Investment Area 2.1 in the Natural Capital Valuation for Samarkand (see GCAP Appendix B)

	<b>Other Indicators/Co-benefits</b>	Operational cost, water, and/or energy savings, revenue generation, etc.	N/A
<b>Potential Project Risks and Mitigation Options</b>	<b>Area</b>	<b>Risks</b>	<b>Mitigation Options</b>
	<b>Social</b>	<p>Failure to make the workshops truly inclusive (especially with regards to the most vulnerable populations) will negatively affect the workshop objectives.</p> <p>Mahallas do not trust the process or its results or see no potential benefit in engagement.</p>	<p>Prepare a stakeholder engagement plan and register; ensure that no urban mahalla is excluded, all should be invited to participate and be engaged with on an equal basis; identify most appropriate approaches to engage with individual mahallas, tailoring where necessary.</p> <p>Clear communication from the start from Action owners and workshop organisers to mahallas on the benefits of engagement, including how the information provided will be used to directly benefit all local residents.</p>
	<b>Environmental</b>	Workshops may generate inappropriate, miscalculated, or misinterpreted environmental data, especially if qualitative rather than quantitative; mahalla representatives are not environmental experts in a technical sense.	Apply appropriate data protocols suitable for the capture of qualitative information; these include caveats such as confidence intervals; environmental data team to cross-reference qualitative data gathered from workshops with quantitative data from other sources to maximise accuracy/benchmarking. Invest in training for workshop groups on data collection, analysis and management.
	<b>Economic</b>	Cost of workshops, given how many are needed and the number of participants to be invited; venue hire in particular could be a significant outlay.	Where possible, workshops to be hosted on the premises of Regional Government itself to minimise venue hire costs; develop standard, centralised approach to stakeholder engagement and workshop planning to minimise organisation costs.
	<b>Other</b>	N/A	N/A

# Energy Actions

Action E1: Invest in electricity network infrastructure upgrades for performance improvement	Estimated Total Cost: €104,166,000
<p><b>Description</b></p>	<p>Electricity losses and interruptions are a significant problem in the electricity grid serving the Samarkand Region due to ageing transmission and distribution network infrastructure. This Action aims to identify and modernise specific electricity grid transmission and distribution assets (i.e. transformers, distribution cabling, and substations) in the Samarkand urban area that require upgrading and replacement. The Action aims to achieve a reduction in grid losses and interruptions while at the same time contributing to greater efficiency across the electricity network.</p> <p>Existing electricity distribution networks are 0.4 kV to 110 kV and include power lines at both 35-110 kV and 0.4 -10 kV.<sup>58</sup> The network also includes transformer stations. Emerging policy at national level is highly supportive of this Action and, as such, Samarkand Region-specific upgrades are already being progressed through the Asian Development Bank (ADB) Distribution Network Modernisation Project (which started in 2019).<sup>59</sup></p> <p>The ADB actions to upgrade a proportion of the existing electricity infrastructure in Samarkand Region as described in its report, and its estimated cost, have been excluded from this Action to avoid double-counting. Additionally, the cost of replacement of power lines has been estimated and it is high enough (c. 6bn EUR) to exclude it from the scope of a GCAP action and should be considered instead a national level action.</p> <p>The Action scope has therefore been defined by a) reviewing the proportion of the existing Region infrastructure excluded from the ADB project, and then b) engaging with Samarkand Regional Government to determine the proportion of that infrastructure within or directly serving the Samarkand urban area rather than the rest of the Region. The Regional Government has confirmed on this basis that the Action should cover upgrades to 4 Medium Voltage and 93 Low Voltage substations.</p> <p>The main elements of this action are:</p> <ol style="list-style-type: none"> <li><b>1. Energy master planning and feasibility assessment to determine the scale of upgrading requirements:</b> <ol style="list-style-type: none"> <li><b>a)</b> Conduct a baseline assessment to understand the current status of the existing Regional grid network (including any work already completed under the existing ADB Distribution Network Modernisation Project<sup>60</sup>) and prioritize key areas for improvements:           <ol style="list-style-type: none"> <li>i. Review data on current system design, age, and condition, supplemented as required by condition surveys to determine appropriate intervention points.</li> <li>ii. Review existing distribution performance, assess drivers and possible interventions for reducing energy losses across the distribution network.</li> <li>iii. Determine progress of existing investment and upgrade programmes to ensure no overlap of budget or time with this Action.</li> <li>iv. Consider the impact of climate and disaster risks across the network.</li> </ol> </li> <li><b>b)</b> Conduct a feasibility assessment to determine the scope and scale of upgrading the network inclusive of renewable energy potential:           <ol style="list-style-type: none"> <li>i. Estimate the technical feasibility and/or planned renewable energy generation capacity (i.e. solar, hydro power) based on seasonal variation and local geography (e.g. elevation/altitude, accessibility to water courses).</li> </ol> </li> </ol> </li> </ol>

<sup>58</sup> The cost of power line replacement across Samarkand Region have been calculated at several billion EUR, and have therefore been excluded from this Action because this level of investment is for the national government as part of its multiple countrywide electricity sector modernisation projects rather than for an individual GCAP.

<sup>59</sup> Asian Development Bank, (2020). Uzbekistan: Distribution Network Modernization Project. Available at: [https://het.uz/uploads/65c11e33-aea8-6f08-4870-cbfdffe7dadf\\_media\\_.pdf](https://het.uz/uploads/65c11e33-aea8-6f08-4870-cbfdffe7dadf_media_.pdf)

<sup>60</sup> The ADB project's Initial Environmental Examination states that annual investment plans (AIPs) will be prepared at the start of each year of the project and these plans will specify the locations where activities will be undertaken during that specific year. Therefore, the Energy Master Planning and Feasibility Assessment will need to cross-reference the most recent AIP for consistency and to avoid double-counting.

	<ul style="list-style-type: none"> <li>ii. Determine the cost for power generated by source, including cost of connection to existing grid.</li> <li>iii. Feasibility assessment for integrating enhanced energy storage, grid monitoring, automation and protection solutions. Review lessons learned from other cities/regions in Uzbekistan or beyond.</li> </ul> <p><b>c) Develop recommendations for grid resilience and connectivity upgrades via an energy masterplan for the region, including:</b></p> <ul style="list-style-type: none"> <li>i. Interventions for enhanced resilience of system as follows:                             <ul style="list-style-type: none"> <li>o Renewals: of ageing power distribution network assets (i.e. transmission/distribution cables transformers, HV/LV substations, grid connections).</li> <li>o Upgrades: connections to low carbon and renewable energy systems to reduce reliance on fossil fuels (most likely solar PV and hydroelectricity).</li> </ul> </li> <li>ii. Propose standards/policy and regulations: to enhance energy efficiency and climate resilience across distribution network assets.</li> </ul> <p><b>2. Delivery/implementation of upgrades:</b></p> <ul style="list-style-type: none"> <li>a) Determine potential delivery options, commercial supply arrangements and delivery timescales for technologies considered viable. This includes technical and economic modelling of preferred options to confirm most viable approach (business case).</li> <li>b) Implement upgrades to existing and construction of new distribution networks to align with national Electricity Supply Security Concept for 2020-2030 as follows:                             <ul style="list-style-type: none"> <li>i. Construct additional 35/10 kV substations and upgrade existing 35/10 kV substations to a higher voltage.</li> <li>ii. Upgrade 35 kV and 10 kV substations for climate and earthquake resilience (as necessary) within urban areas.</li> <li>iii. Construct 35/0.4 kV step-down transformers within urban areas.</li> <li>iv. Phase out 6 kV power systems, transitioning to 10 kV and 35 kV systems.</li> </ul> </li> <li>c) Accommodate digital monitoring and control system upgrades to reflect grid/network upgrades.</li> </ul>	
<b>Sector</b>	<input checked="" type="checkbox"/> Energy	
<b>Action Type</b>	<input checked="" type="checkbox"/> Investment ('Hard')	<input type="checkbox"/> Policy ('Soft')
<b>Implementation Timeframe</b>	2025 – 2030	
<b>Status</b>	<input type="checkbox"/> New <input type="checkbox"/> Planned <input checked="" type="checkbox"/> Ongoing	
<b>GCAP Action Classification</b>	<input checked="" type="checkbox"/> Capital Investment <input type="checkbox"/> Other Investment	If 'Other Investment,' what type? <input type="checkbox"/> Standards, guidelines, and regulations <input type="checkbox"/> Strategies, plans, and programmes <input type="checkbox"/> Investment-related feasibility study <input type="checkbox"/> Awareness, demonstration, training, and capacity building <input type="checkbox"/> Organisational measure <input type="checkbox"/> Behavioural measure <input type="checkbox"/> Monitoring, data collection, analysis, and studies
<b>Action Owner(s)</b>	<ul style="list-style-type: none"> <li>• Ministry of Energy</li> <li>• Samarkand Electric Networks Joint Stock Company (JSC)</li> </ul>	
<b>Other Stakeholders</b>	<ul style="list-style-type: none"> <li>• Samarkand Regional Department of Investment and Foreign Trade</li> <li>• Samarkand City Government Mayor's Office</li> <li>• Ministry of Investment and Foreign Trade</li> <li>• Private sector designers/developers of energy infrastructure e.g. Enter Engineering, Eriell)</li> <li>• Electricity end-users (local homes, businesses and institutions)</li> </ul>	

<b>Location</b>	Across whole of Samarkand Region (grid-scale investment) where determined to be most necessary in terms of improving continuity and resilience of electric supply- this could be within Samarkand city boundary, within wider Samarkand urban area, or in other parts of the Region.			
<b>Priority Environmental Challenge(s) Addressed</b>	<b>Climate Change and Resilience:</b> <ul style="list-style-type: none"> <li>Increasing greenhouse gas emissions</li> <li>Insufficient focus on climate change-related hazards</li> </ul> <b>Energy:</b> <ul style="list-style-type: none"> <li>Ageing and inefficient network infrastructure</li> <li>Increasing energy demand</li> </ul>			
<b>Strategic Goal(s) Addressed</b>	<b>Climate Change and Resilience:</b> <ul style="list-style-type: none"> <li>Improve Samarkand’s resilience to climate and natural disasters</li> </ul> <b>Energy:</b> <ul style="list-style-type: none"> <li>Use smart and renewable technologies to reduce energy consumption in Samarkand</li> <li>Modernise Samarkand’s energy infrastructure</li> </ul>			
<b>Link(s) to Existing Policies/Plans/Projects</b>	<input checked="" type="checkbox"/> Yes <ul style="list-style-type: none"> <li>World Bank’s Electricity Sector Transformation and Resilient Transmission Project</li> <li>ADB’s District Network Modernisation Project</li> <li>Law on Electric Energy No. ZRU-225</li> <li>EBRD’s Concept Note for Ensuring Electricity Supply in Uzbekistan 2020-2030</li> </ul> <input type="checkbox"/> No			
<b>Link(s) to Other GCAP Actions</b>	<input checked="" type="checkbox"/> Yes <ul style="list-style-type: none"> <li><b>Action B1:</b> Invest in energy efficiency in buildings through thermal performance retrofit and building design standards</li> <li><b>Action I1:</b> Invest in energy efficiency in industrial enterprises in Samarkand</li> <li><b>Action E2:</b> Introduce fiscal incentives for households and businesses to adopt renewable energy technology</li> </ul> <input type="checkbox"/> No			
<b>Cross-Cutting Themes</b>	<b>Climate and Disaster Risk</b>	<b>Smart Maturity</b>	<b>Gender and Social Inclusion</b>	<b>Heritage and Tourism</b>
	<input checked="" type="checkbox"/> Directly targeted <input type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> This Action allows both for less wasted power generation and greater potential for renewable power generation, thus contributing towards Greenhouse gas (GHG) emissions reductions. It also seeks disaster resilience upgrades as part of infrastructure investment.	<input type="checkbox"/> Directly targeted <input checked="" type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> This Action seeks smart and digital elements in infrastructure upgrades, including system control and monitoring.	<input type="checkbox"/> Directly targeted <input type="checkbox"/> Some elements <input checked="" type="checkbox"/> No direct links <u>Reason:</u> There are no direct links between this action and gender and social inclusion in Samarkand.	<input type="checkbox"/> Directly targeted <input checked="" type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> Greater reliability of electricity support will maintain and enhance attractiveness of city to tourists.
<b>Implementation Process and Timeline</b>	<b>Step</b>		<b>Duration</b>	
	<b>1. Energy master planning and feasibility assessment</b> a) <b>Conduct baseline assessment of existing Region power system</b> b) <b>Conduct upgrade feasibility assessment on upgrading the system</b> c) <b>Recommendations for infrastructure resilience connectivity and upgrades</b>		2 years	
	<b>2. Delivery/implementation of upgrades</b>		2 years for a) and c) to e)	

	<ul style="list-style-type: none"> <li>a) <b>Determine potential delivery options to confirm the most viable approach</b></li> <li>b) <b>Implement upgrades</b></li> <li>c) <b>Monitor local energy usage</b></li> <li>d) <b>Capacity building of utility staff</b></li> </ul>	<p>5 years for b) (likely concurrent)</p>	
<p><b>Indicative Project Costs</b></p>	<p><b>CapEx [€]</b></p>	<p><b>OpEx over 5 years [€]</b></p>	<p><b>Feasibility / Advisory Costs [€]</b></p>
	<p>101,578,000</p> <ul style="list-style-type: none"> <li>• Construction and upgrade of network: 66,500,000</li> <li>• Main contractor preliminaries (15%): 9,975,000</li> <li>• Main contractor overheads and profits (5%): 3,824,000</li> <li>• Fees (10%): 8,030,000</li> <li>• Contingency (15%): 13,249,000</li> </ul>	<p>Savings</p>	<p>2,588,000</p> <ul style="list-style-type: none"> <li>• Baseline assessment of existing system: 250,000</li> <li>• Feasibility assessment for upgrading system: 1,000,000</li> <li>• Recommendations for resilience and connectivity upgrades: 250,000</li> <li>• Delivery/implementation of upgrades: 750,000</li> <li>• Contingency (15%): 338,000</li> </ul>
<p><b>Potential Financing Instruments and Sources</b></p>	<p><b>Instrument (Own-Source, Grant, Debt, Equity, Other)</b>      <b>Source (Municipal Government, State-Owned Enterprise, National Government, Private Sector, International Development Partner, Other)</b></p>		
	<p><b>Grant</b></p>	<p>National Government</p>	
	<p><b>Loan</b></p>	<p>National Government</p>	
	<p><b>Equity</b></p>	<p>Public-Private Partnership (State-Owned Enterprise and Private Sector)</p>	
<p><b>Revenue Opportunities</b></p>	<p><input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</p>		
<p><b>Impact Measures (Quantitative and Qualitative)</b></p>	<p><b>Environmental Impacts</b></p>	<p>State indicators</p>	<p>8 – Annual CO<sub>2</sub> equivalent emissions per capita 8.1 – Annual CO<sub>2</sub> emissions per unit of GDP 9 – Estimated economic damage from natural disasters as a share of GDP 9.1 – Percentage of public infrastructure at risk 9.2 – Percentage of households at risk</p>
		<p>Pressure indicators</p>	<p>14.1 – Electrical interruptions 14.2 – Percentage of network line losses 17 – Power outages by climate extremes</p>
	<p><b>Socio-economic Impacts</b></p>	<p>Jobs created</p>	<p>1,380</p>
		<p>Social inclusion benefits</p>	<p>Poorer residents may have to supplement (or substitute) electric or gas-powered appliances with indoor fires, detrimental to respiratory health. Ensuring a more</p>

			reliable supply of electricity will help to mitigate this. Additionally, women are the main consumers of domestic electricity in Uzbekistan for cooking, and a more reliable supply will benefit them.
		Other socio-economic benefits	N/A
	<b>Climate Impacts</b>	Estimated carbon emissions reduction	480 tCO <sub>2</sub> e annually
		Climate resilience benefits	Current lack of data on electrical/energy interruptions caused by climate and disasters; Action likely to generate the missing data and hence improve resilience. Climate and resilience upgrades to substations will result in further benefits.
	<b>Nature &amp; Biodiversity Impacts</b>	Natural capital benefits	N/A
<b>Other Indicators/Co-benefits</b>	Operational cost, water, and/or energy savings, revenue generation, etc.	The Action supports and extends the coverage of the existing ADB electricity upgrade project, which is estimated to provide cost savings of 11.2 million EUR from the current baseline, and result in energy savings of 31% (51.7 KWh) from the current Samarkand Region baseline. <sup>61</sup>	
<b>Potential Project Risks and Mitigation Options</b>	<b>Area</b>	<b>Risks</b>	<b>Mitigation Options</b>
	<b>Social</b>	Impact to residents and communities through upgrade works.	Early communications and engagement with any affected communities.
	<b>Environmental</b>	Environmental impact (even if temporary) of upgrade works- e.g. loss of habitats, pollution from construction.	Assess likely environmental impacts of works at planning stage and seek to minimise/mitigate them.  Implement good practice construction management to minimise environmental impacts of construction
	<b>Economic</b>	Project cost over-runs.  Challenges in securing funding.	The risk of over-run is significant because this is a complex intervention with many sub-projects which will take years to implement. Most effective mitigation is clear and strong project management, financial controls and commitment from the start.  Consider a range of public and private partnership funding sources in order to spread the funding risk.

<sup>61</sup> The Initial Environmental Examination for the ADB project provides these figures in Table 13. Cost savings cover both maintenance cost savings and annual prevention of emergency shutdowns. While Action E1 supports and extends the coverage of the ADB project, it does so through transformer upgrade only, whereas the ADB project includes both transformer upgrade and new distribution line construction and rehabilitation. The latter element accounts for an unspecified proportion of the overall cost and energy savings, but will nevertheless be supported and extended through the additional implementation of Action E1.

	<b>Other</b>	<p>Cybersecurity risks, as in any project seeking to implement smart and digital elements.</p> <p>Regulatory and political landscape changes- long-term project needs stability and certainty.</p>	<p>Ensure design of smart technology/infrastructure takes full account of known and potential threats to cybersecurity.</p> <p>In the Uzbekistan context the direction of travel in terms of regulation and political priorities appears strongly aligned with project objectives. However, those implementing the Action should, of course, seek to mitigate any residual risk in this respect by regular monitoring of central and regional government policies, priorities and budgetary allocations, and adapt if necessary.</p>
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Action E2: Introduce fiscal incentives for households and businesses to adopt renewable energy technology	Estimated Total Cost: €170,876,000
<p><b>Description</b></p>	<p>The existing energy supply to households and businesses in Samarkand is largely dominated by fossil fuels, mainly natural gas (approx. 92%), with less than 5% attributable to renewables<sup>62</sup>. As a result, there is a need to reduce dependency on fossil fuel power generation and optimise renewable energy sources to support international and national climate ambitions.</p> <p>While property and land tax exemptions already exist for the adoption of renewable technology in residential development, alongside a Government requirement to install solar panels on at least 50% of roofs, and a requirement for all new public and commercial buildings to hold an energy audit passport, all three of these incentives are currently limited to new buildings only, and there appear to be no incentives in place for existing residents or businesses.</p> <p>The purpose of this Action is to encourage fiscal incentives such as tax credits, rebates, or grants to make renewable energy technology (e.g. solar panels, solar-heated water tanks) more accessible to a wider range of households and businesses in Samarkand and contribute to emissions reductions.</p> <p>Samarkand City Power Supply company states that it has 155,327 domestic customers and 11,963 business customers to whom this Action could apply. However, because installation of renewable energy technology by households in public sector apartment blocks is more complex or may not be possible, this Action can be assumed to exclude them (number of households in public sector apartment blocks calculated for Action B1) and thus this Action applies only to 131,451 households.</p> <p>This Action incorporates the following elements:</p> <ol style="list-style-type: none"> <li><b>1. Review Existing Measures:</b> <ol style="list-style-type: none"> <li>a) Review existing fiscal instruments and incentives for renewable energy installation applying to residential and business sectors in Samarkand (e.g. government grants/schemes, or tax benefits for green building investments and renewable energy).</li> <li>b) Undertake a city-wide feasibility assessment of the potential for building-scale renewable energy installations, identifying any investment opportunities for both existing and new residential buildings.</li> </ol> </li> <li><b>2. Facilitate the design and delivery of an incentive scheme:</b> <p>Based on the research in Step 1, design and develop a strategy of financial incentives/instruments (i.e. tax incentives, grants, subsidised loans) that could be applied by national government to encourage retrofit of renewable energy systems to existing residential and commercial buildings.</p> </li> <li><b>3. Pilot new incentives/fiscal instruments:</b> <ol style="list-style-type: none"> <li>a) Implement a pilot delivery of new fiscal incentives in a specific location including both homes and businesses that has been identified as not covered by existing incentives but potentially suitable for retrofit encouraged through new incentives.</li> <li>b) Depending on the location selected, residents or businesses might be encouraged to invest in the following infrastructure through the pilot scheme:                             <ul style="list-style-type: none"> <li>• Installation of passive heating and cooling systems;</li> <li>• Electrification of heating systems [e.g. heat pumps] with smart thermostats;</li> <li>• Rooftop solar panels for hot water and/or electricity supply</li> <li>• Batteries to store energy produced from solar panels</li> </ul> </li> </ol> </li> </ol>

<sup>62</sup> International Energy Charter (2022), In-Depth Review of the Energy Efficiency Policy of the Republic of Uzbekistan, available at <https://www.energycharter.org/what-we-do/energy-efficiency/energy-efficiency-country-reviews/in-depth-review-of-energy-efficiency-policies-and-programmes/in-depth-review-of-the-energy-efficiency-policy-of-the-republic-of-uzbekistan-2022/>

	<p><b>4. Rollout of wider scheme:</b></p> <p>Applying lessons learned from monitoring the pilot project to maximise effectiveness, roll out renewable energy incentives/instruments for all residents and businesses designed to maximise uptake. Allow for continual reporting on progress to monitor impact, including unforeseen circumstances.</p>	
<b>Sector</b>	<input checked="" type="checkbox"/> Climate and Resilience <input checked="" type="checkbox"/> Buildings <input checked="" type="checkbox"/> Energy	
<b>Action Type</b>	<input type="checkbox"/> Investment ('Hard')	<input checked="" type="checkbox"/> Policy ('Soft')
<b>Implementation Timeframe</b>	2025 – 2030	
<b>Status</b>	<input type="checkbox"/> New <input type="checkbox"/> Planned <input checked="" type="checkbox"/> Ongoing	
<b>GCAP Action Classification</b>	<input type="checkbox"/> Capital Investment <input checked="" type="checkbox"/> Other Investment	<p>If 'Other Investment,' what type?</p> <input type="checkbox"/> Standards, guidelines, and regulations <input type="checkbox"/> Strategies, plans, and programmes <input checked="" type="checkbox"/> Investment-related feasibility study <input checked="" type="checkbox"/> Awareness, demonstration, training, and capacity building <input type="checkbox"/> Organisational measure <input checked="" type="checkbox"/> Behavioural measure <input checked="" type="checkbox"/> Monitoring, data collection, analysis, and studies
<b>Action Owner(s)</b>	<ul style="list-style-type: none"> <li>Ministry of Energy</li> <li>Samarkand City Department of Architecture and Construction</li> <li>Samarkand City Government Management of Housing and Communal Services</li> </ul>	
<b>Other Stakeholders</b>	<ul style="list-style-type: none"> <li>Ministry of Finance</li> <li>Ministry of Innovative Development</li> <li>Ministry of Construction, Housing and Communal Services</li> <li>Green Building Council of Uzbekistan (NGO)</li> <li>Private sector constructors and installers (including those who instal micro-scale renewables such as solar panels on buildings)</li> </ul>	
<b>Location</b>	<p>Action applies across the whole of Samarkand City, but pilot should take place in ideally medium or low-income suburb with a mix of residents and businesses where such incentives are least common- also where district heating is not common as this Action applies to individual dwellings rather than public apartment blocks (for which see Action B2). The best location is for the Regional/city government to select but likely candidates might include Bukharikishlak, Urtashikh or Ravanak.</p>	
<b>Priority Environmental Challenge(s) Addressed</b>	<p><b>Climate Change and Resilience:</b></p> <ul style="list-style-type: none"> <li>Increasing greenhouse gas emissions</li> <li>Lack of clarity on local government role in emissions reduction</li> </ul> <p><b>Buildings:</b></p> <ul style="list-style-type: none"> <li>Poor energy efficiency in residential and commercial buildings</li> </ul>	
<b>Strategic Goal(s) Addressed</b>	<p><b>Climate Change and Resilience:</b></p> <ul style="list-style-type: none"> <li>Continue transition to renewable energy</li> </ul> <p><b>Buildings:</b></p> <ul style="list-style-type: none"> <li>Promote energy efficiency within buildings in Samarkand</li> </ul> <p><b>Energy:</b></p> <ul style="list-style-type: none"> <li>Use smart and renewable technologies to reduce energy consumption in Samarkand</li> </ul>	
<b>Link(s) to Existing Policies/Plans/Projects</b>	<input checked="" type="checkbox"/> Yes <ul style="list-style-type: none"> <li>Presidential Decree No. UP-220, Uzbekistan introduced tax incentives for renewable energy producers for a period of 3 years post installation</li> <li>Property and land tax exemptions for individuals and businesses installing solar panels</li> </ul>	

	<ul style="list-style-type: none"> <li>The mandatory installation of certified solar water heaters for hot water supply, as well as energy-saving lamps during the design, reconstruction and construction of all buildings and structures (except for individual housing construction) (PQ-3379, 2017)</li> <li>Presidential Decree No. UP-5577, a mandatory requirement that all new housing must be equipped with energy-efficient and energy-saving equipment and receive an energy audit passport or a certificate according to the international standards BREEAM (Building Research Establishment Environmental Assessment Method) and LEED (Leadership in Energy and Environmental Design).</li> </ul> <input type="checkbox"/> No			
<b>Link(s) to Other GCAP Actions</b>	<input checked="" type="checkbox"/> Yes <ul style="list-style-type: none"> <li><b>Action B1:</b> Invest in energy efficiency in buildings through thermal performance retrofit, and building design standards</li> <li><b>Action B2:</b> Invest in decarbonisation of district heating systems</li> </ul> <input type="checkbox"/> No			
<b>Cross-Cutting Themes</b>	<b>Climate and Disaster Risk</b>	<b>Smart Maturity</b>	<b>Gender and Social Inclusion</b>	<b>Heritage and Tourism</b>
	<input checked="" type="checkbox"/> Directly targeted <input type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> Significant scope for meeting reduction targets in greenhouse gas emissions through investment in and implementation of this Action.	<input type="checkbox"/> Directly targeted <input checked="" type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> Smart controls for renewable energy infrastructure may be beneficial. They will enable future demand-side management once the industry is mature.	<input type="checkbox"/> Directly targeted <input checked="" type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> Will reduce the need for coal-burning stoves or wood fires, which adversely affect health and wellbeing. Also likely to, in the longer term, lead to income savings for poorer households and small businesses.	<input type="checkbox"/> Directly targeted <input type="checkbox"/> Some elements <input checked="" type="checkbox"/> No direct links <u>Reason:</u> There are no direct links between this Action and heritage and tourism.
<b>Implementation Process and Timeline</b>	<b>Step</b>		<b>Duration</b>	
	<b>1. Review existing measures</b>			
	a) <b>Review existing fiscal instruments and incentives</b>		1 month	
	b) <b>Undertake city-wide feasibility assessment</b>		9 months	
	<b>2. Develop an Incentive Scheme</b>		6 months	
<b>3. Pilot New Incentives/fiscal Instruments</b>		3 years		
a) <b>Implement a pilot delivery in a specific location</b>				
b) <b>Consider infrastructure for inclusion in the pilot</b>				
<b>4. Rollout of wider scheme</b>		Ongoing		
<b>Indicative Project Costs</b>	<b>CapEx [€]</b>		<b>OpEx over 5 years [€]</b>	<b>Feasibility / Advisory Costs [€]</b>
	169,070,000 <ul style="list-style-type: none"> <li>Consideration of infrastructure to be included in the pilot scheme: 2,208,000</li> <li>500 businesses included in the pilot scheme: 55,000</li> <li>Rollout of wider scheme: 102,094,000</li> <li>Remaining 11,463 businesses included in the full rollout: 6,328,000</li> <li>Main contractor preliminaries (15%): 16,603,000</li> </ul>		1,691,000	115,000 <ul style="list-style-type: none"> <li>Review existing measures: 100,000</li> <li>Contingency (15%): 15,000</li> </ul>

	<ul style="list-style-type: none"> <li>Main contractor overheads and profits (5%): 6,364,000</li> <li>Fees (10%): 13,365,000</li> <li>Contingency (15%): 22,053,000</li> </ul>		
<b>Potential Financing Instruments and Sources</b>	<b>Instrument (Own-Source, Grant, Debt, Equity, Other)</b>	<b>Source (Municipal Government, State-Owned Enterprise, National Government, Private Sector, International Development Partner, Other)</b>	
	<b>Grant</b>	National Government	
	<b>Loan</b>	Private Sector	
	<b>Loan</b>	International Development Partner	
<b>Revenue Opportunities</b>	<input checked="" type="checkbox"/> Yes Implementation of the Action is likely in the long-term to lead to reductions in expenditure on fossil fuels, mainly for individuals but also for governments <input type="checkbox"/> No		
<b>Impact Measures (Quantitative and Qualitative)</b>	<b>Environmental Impacts</b>	State indicators	8 – Annual CO <sub>2</sub> equivalent emissions per capita 8.1 – Annual CO <sub>2</sub> emissions per unit of GDP
		Pressure indicators	15 – Share of population with access to quality heating / cooling 16 – Share of renewable in total energy consumption 18.1 – Electricity consumption in residential building 19 - Fossil fuels consumption for heating and cooling 19.1 – Fossil fuels consumption for heating and cooling in residential buildings
	<b>Socio-economic Impacts</b>	Jobs created	3,206
		Social inclusion benefits	Poorer families still use coal or wood burning stoves. Affordable/ public funded retrofitting schemes/incentives should be designed to benefit lower income households.
		Other socio-economic benefits	Action allows for potential reduced energy bills for families and businesses.
	<b>Climate Impacts</b>	Estimated carbon emissions reduction	182,170 tCO <sub>2</sub> e annually
		Climate resilience benefits	This Action will contribute to climate resilience by making households and businesses less reliant on fossil fuels.
	<b>Nature &amp; Biodiversity Impacts</b>	Natural capital benefits	Reduced air pollution from wood/coal burning used in poorer households will

			have significant natural capital benefits.
	<b>Other Indicators/Co-benefits</b>	Operational cost, water, and/or energy savings, revenue generation, etc.	This Action will result in cost savings to individuals and businesses through reduced energy bills, and to government through a lesser need to subsidise fossil fuel use.
<b>Potential Project Risks and Mitigation Options</b>	<b>Area</b>	<b>Risks</b>	<b>Mitigation Options</b>
	<b>Social</b>	<p>Financial incentives need to be affordable for poorer residents and smaller businesses.</p> <p>Lack of knowledge/ understanding among residents or businesses of Action technologies.</p>	<p>Design financial incentives specifically, using lessons learnt from the pilot rollout, to be accessible to all residents and businesses across a range of income levels.</p> <p>Appropriate engagement, awareness-raising, and guidance to support installation of renewable energy systems and support householders and businesses to make informed choices for retrofitting.</p>
	<b>Environmental</b>	<p>Renewable energy technology increases seismic vulnerability (e.g. heavy hot-water tanks on roofs).</p> <p>Focus on renewable energy causes householders or businesses to ignore/resist separate energy efficiency measures.</p> <p>Difficulties in integrating renewable energy generation into the electrical grid.</p>	<p>Ensure seismic safety/compliance of all technologies proposed for retrofit.</p> <p>Appropriate communication to householders and other relevant stakeholders of the differences between renewable energy generation and energy efficiency measures and the importance of tackling both together.</p> <p>Assess existing energy grid infrastructure capacity in areas identified for rollout of incentives/financial instruments to encourage household power generation. If insufficient, consider appropriate investment in infrastructure (see Action E1) or delivery of localised grid/storage.</p>
	<b>Economic</b>	<p>Poorly designed or inappropriate financial incentives are offered that do not significantly improve uptake of renewable technologies.</p> <p>System of incentives open to fraud or abuse.</p>	<p>Ensure incentives/financial instruments are designed to be as simple as possible for non-specialists and apply lessons learned through the pilot rollout to maximise uptake in terms of financial return for the householders.</p> <p>Implement and test through the pilot strict auditing/verification processes, including developing reporting tools (ideally, digital tools) to monitor compliance.</p>
	<b>Other</b>	Lack of skilled workforce, materials or capacity for renewables installation.	Monitor market for renewables materials and capacity for installation through the pilot rollout- as and when any issues arise, liaise with stakeholders who may be able to assist (private sector, IFIs, government).

Action E3: Invest in energy efficient street lighting		Estimated Total Cost: €22,454,000
Description	<p>Presidential Decree No. PP 2812 aims to speed reform of the energy sector, including improving energy efficiency, and is supported by Uzbekistan’s Law on ‘Efficient Usage of Energy’. In line with these requirements, Samarkand will replace existing energy inefficient street lighting across the area served by Samarkand Electric Joint Stock Company (JSC) with energy efficient street lighting which will reduce carbon emissions from energy consumption.</p> <p>Introducing energy-efficient street lighting is a relatively low-cost way to meet national targets and the requirements of legislation. The city will replace approximately 28,000 existing inefficient halogen lamps in Samarkand with LED lamps with smart control and monitoring systems. LED lamps use around fifteen times less electricity than halogen lamps. LED lamps will also have longer lifespans, hence reducing future maintenance costs. LED lamps could be dimmed depending on time or visibility which results in energy consumption savings while still ensuring a high level of safety for pedestrians through night-time illumination. LED lamps can also be designed to reduce light pollution at night.</p> <p>The Action is likely to reduce the impact of light pollution on insect and bird populations. As such, there would be a functional relationship with (and positive benefits demonstrable within) Action EB3, which proposes the development of metrics to track the impacts of urban development (including positive impacts) on biodiversity.</p> <p>In certain locations where new lighting is being considered and did not previously exist, for example new areas of residential development, solar powered LED lamps can be considered. These require little to no supporting electrical infrastructure such as cabling and trenching works, which can reduce the time needed for installation. However, it is assumed that in the vast majority of cases, the LED lights would be like-for-like replacement of existing grid-connected lights.</p> <p>This action will consist of four elements:</p> <ol style="list-style-type: none"> <li>1. A <b>project team will be set up</b>, led by Samarkand Electric Networks JSC and with the involvement of the regional branch of the Ministry of Energy. Samarkand City Government can also help support implementation.</li> <li>2. A <b>feasibility study</b> will be conducted initially to identify areas where existing lights are oldest and/or most in need of replacement, and where LED lights would have the highest potential impact. These areas will be prioritised in the initial phase of street lighting replacement.</li> <li>3. Finally, to minimise disruption to nearby residents and businesses, and to allow for appropriate testing, <b>lamp replacement will then be rolled out in phases</b> across the city.</li> <li>4. The final phase will be <b>monitoring and evaluation</b> of Action implementation.</li> </ol>	
Sector	<input checked="" type="checkbox"/> Energy	
Action Type	<input checked="" type="checkbox"/> Investment (‘Hard’) <input type="checkbox"/> Policy (‘Soft’)	
Implementation Timeframe	2025-2027	
Status	<input checked="" type="checkbox"/> New <input type="checkbox"/> Planned <input type="checkbox"/> Ongoing	
GCAP Action Classification	<input checked="" type="checkbox"/> Capital Investment <input type="checkbox"/> Other Investment	If ‘Other Investment,’ what type? <input type="checkbox"/> Standards, guidelines, and regulations <input type="checkbox"/> Strategies, plans, and programmes <input type="checkbox"/> Investment-related feasibility study <input type="checkbox"/> Awareness, demonstration, training, and capacity building <input type="checkbox"/> Organisational measure <input type="checkbox"/> Behavioural measure <input type="checkbox"/> Monitoring, data collection, analysis, and studies

<b>Action Owner(s)</b>	<ul style="list-style-type: none"> <li>Samarkand Electric Networks JSC</li> <li>Ministry of Innovative Development</li> </ul>			
<b>Other Stakeholders</b>	<ul style="list-style-type: none"> <li>Ministry of Energy</li> <li>Samarkand Regional Department of Investment and Foreign Trade</li> <li>Samarkand City Government</li> </ul>			
<b>Location</b>	Across entire metropolitan area served by Samarkand Electric Company JSC; specific locations within that area to be determined by more detailed study of feasibility.			
<b>Priority Environmental Challenge(s) Addressed</b>	<b>Climate Change and Resilience:</b> <ul style="list-style-type: none"> <li>Increasing greenhouse gas emissions</li> </ul> <b>Energy:</b> <ul style="list-style-type: none"> <li>Increasing energy demand</li> </ul>			
<b>Strategic Goal(s) Addressed</b>	<b>Energy:</b> <ul style="list-style-type: none"> <li>Use smart and renewable technologies to reduce energy consumption in Samarkand</li> <li>Modernise Samarkand's energy infrastructure</li> </ul>			
<b>Link(s) to Existing Policies/Plans/Projects</b>	<input checked="" type="checkbox"/> Yes <ul style="list-style-type: none"> <li>Presidential Decree on measures to improve the management of the fuel and energy industry (UP-5646 of 2019)</li> <li>Law on Electric Energy No. ZRU-225</li> <li>Green Economy Transition Strategy for 2019-2030</li> <li>Uzbekistan's Law on 'Efficient Usage of Energy' (1997)</li> <li>EBRD: A Low-Carbon Road Map for the Power Sector in the Republic of Uzbekistan</li> <li>President's Decree No. PP 2812 which aims to speed reform of the energy sector including improving energy efficiency</li> </ul> <input type="checkbox"/> No			
<b>Link(s) to Other GCAP Actions</b>	<input checked="" type="checkbox"/> Yes <ul style="list-style-type: none"> <li><b>Action C1:</b> Establish a team for environmental data collection to gather and monitor data on buildings, industry, energy and DRR (Disaster Risk Reduction)</li> <li><b>Action B1:</b> Invest in energy efficiency in buildings through thermal performance retrofit and building design standards</li> <li><b>Action E1:</b> Invest in electricity network infrastructure upgrades for performance improvement</li> <li><b>Action EB3:</b> Develop biodiversity metrics to drive habitat improvement for species over time</li> <li><b>Action I1:</b> Invest in energy efficiency in industrial enterprises in Samarkand</li> </ul> <input type="checkbox"/> No			
<b>Cross-Cutting Themes</b>	<b>Climate and Disaster Risk</b>	<b>Smart Maturity</b>	<b>Gender and Social Inclusion</b>	<b>Heritage and Tourism</b>
	<input checked="" type="checkbox"/> Directly targeted <input type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> This Action will directly reduce electricity consumption of streetlighting and the consequent carbon emissions from generating electricity.	<input checked="" type="checkbox"/> Directly targeted <input type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> This Action has potential to improve smart maturity through measures such as automated remote dimming control.	<input type="checkbox"/> Directly targeted <input checked="" type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> This Action has the potential to result in improved lighting and visibility, which improves night-time safety for vulnerable people, including women and children.	<input type="checkbox"/> Directly targeted <input type="checkbox"/> Some elements <input checked="" type="checkbox"/> No direct links <u>Reason:</u> No direct links between this Action and heritage and tourism.
<b>Implementation Process and Timeline</b>	<b>Step</b>		<b>Duration</b>	
	1. Establish project team within Samarkand Electric Networks JSC		2 months	
	2. Determine/review financing mechanisms		2 months	
	3. Feasibility study to identify locations with highest impact from intervention		3 months	

	<b>4. Implementation, monitoring, and evaluation</b>		2 years
<b>Indicative Project Costs</b>	<b>CapEx [€]</b>	<b>OpEx over 5 years [€]</b>	<b>Feasibility / Advisory Costs [€]</b>
	21,385,000 <ul style="list-style-type: none"> <li>Replacement of 28,000 existing lighting lamps: 14,000,000</li> <li>Main contractor preliminaries (15%): 2,100,000</li> <li>Main contractor overheads and profits (5%): 805,000</li> <li>Fees (10%): 1,691,000</li> <li>Contingency (15%): 2,789,000</li> </ul>	1,069,000	n/a
<b>Potential Financing Instruments and Sources</b>	<b>Instrument (Own-Source, Grant, Debt, Equity, Other)</b>	<b>Source (Municipal Government, State-Owned Enterprise, National Government, Private Sector, International Development Partner, Other)</b>	
	<b>Own Source</b>	Municipal Government	
	<b>Loan</b>	Private Sector	
	<b>Grant</b>	National Government	
	<b>Loan</b>	International Development Partner	
	<b>PPP</b>	Municipal Government/Private sector	
<b>Revenue Opportunities</b>	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		
<b>Impact Measures (Quantitative and Qualitative)</b>	<b>Environmental Impacts</b>	State indicators	8 – Annual CO <sub>2</sub> equivalent emissions per capita 8.1 – Annual CO <sub>2</sub> emissions per unit of GDP
		Pressure indicators	N/A
	<b>Socio-economic Impacts</b>	Jobs created	60
		Social inclusion benefits	Street lighting enhances public safety in areas with limited lighting conditions. While this is already the case for the existing system of street lighting, the Action represents an opportunity to improve lighting levels (and hence public safety) where there are identified opportunities to do so.
		Other socio-economic benefits	N/A
	<b>Climate Impacts</b>	Estimated carbon emissions reduction	4,460 tCO <sub>2</sub> e annually
		Climate resilience benefits	N/A
	<b>Nature &amp; Biodiversity Impacts</b>	Natural capital benefits	N/A
	<b>Other Indicators/Co-benefits</b>	Operational cost, water, and/or energy savings,	Longer lifespan (i.e. average of 17 years) of LED lighting allows for reduced energy and maintenance costs. It is

		revenue generation, etc.	estimated the Action would result annually in cost savings of 1.29m EUR and energy savings of 7.3 GWh for the Regional Government.
<b>Potential Project Risks and Mitigation Options</b>	<b>Area</b>	<b>Risks</b>	<b>Mitigation Options</b>
	<b>Social</b>	N/A	N/A
	<b>Environmental</b>	Risk of toxicity from disposal of existing street lighting due to chemicals contained and the city's current capacity to manage hazardous/industrial waste.	Any hazardous or toxic waste generated as a result of the project to be disposed of safely; this topic to be covered in feasibility study.
	<b>Economic</b>	Higher initial costs for LED lights compared to traditional lighting.	When considering costs over the whole life of the product, LED streetlighting is cheaper in comparison with traditional lighting due to low maintenance costs. If solar powered LED street lighting is used, for example in new residential developments, where little electrical infrastructure is needed (i.e. cabling, and trenching), further lifecycle cost savings can be made.
	<b>Other</b>	Technological failure	Ensure LEDs used are high-quality, durable and minimise maintenance requirements; ensure proper training procedures for installation engineers

# Environment and Biodiversity Actions

<b>Action EB1: Invest in air quality monitoring stations to track and improve air quality and enable the development of an Air Quality Action Plan</b>	<b>Estimated Total Cost: €422,000</b>
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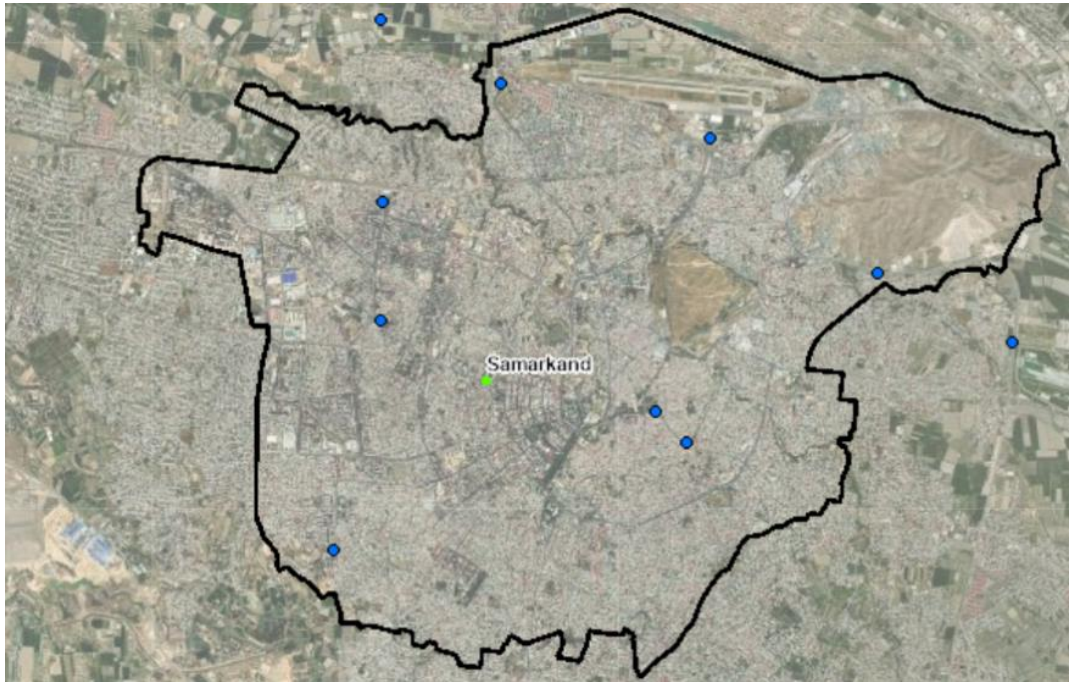
**Description**

Air pollution is relatively well covered in Uzbekistan’s existing policies and regulations. However, there is no Air Quality Action Plan (AQAP) for Samarkand city or Region that would set regional and/or local targets to help the Regional Government implement and measure progress against national requirements.

Before developing an AQAP (which is not a direct part of this action), the first step is to fully understand the existing air quality baseline. The purpose of this Action is to achieve this understanding.

Based on information provided to GCAP developers, Samarkand has an existing network of nine air quality monitoring stations within its city boundary and a further two stations just outside, as shown in Figure 1.

However, the existing number/extent of air quality monitoring stations is not considered adequate to derive accurate measurements of air pollution associated with Samarkand’s three largest emissions sources: industrial operations, road transport and power generation.



**Figure 2. Location of existing air quality monitoring stations in Samarkand City**

To address the existing shortfall, the city must invest in expanding the existing network of air quality monitoring stations to ensure clearer and more consistent measurements at hotspots of high pollutant concentrations (e.g. along main roads, in industrial zones, and in neighbourhoods that rely on coal or wood-burning for energy). This Action provides for ten new monitoring stations.

The new stations will require the use of passive sampling techniques (diffusion tubes) that are changed monthly and represent a cost-effective method of monitoring the concentrations of specific gaseous pollutants of concern at multiple locations. The passive sampling approach will complement the existing automatic monitoring stations and will require minimal operator training. Subject to operational requirements (for example, electrical supply, ambient temperature and humidity), they may need to be further complemented in due course by a number of new low-cost automatic monitoring units. Passive sampling techniques are recommended due to their significantly lower cost than alternatives. Additionally, physical limitations, such as power supply and the need for a secure location/mounting structure may limit the viability of automatic equipment in some locations. Finally, specialist training and service providers are required for automatic equipment, whereas passive equipment requires minimal technical skills apart from basic sample handling procedures.

	<p>The passive sampling tubes will be installed adjacent to the pollution hotspots mentioned above and with regard to the prevailing wind directions. They will also need to be installed in a number of 'background' locations away from any specific source of air pollution- this will allow for a standard 'background' measurement of air quality to be developed as a benchmark for the measurements in pollution hotspots.</p> <p>The installation of the new equipment and the collection and analysis of the data it collects will be the responsibility of the newly established environmental data collection team (Action C1). It can then be used to inform the baseline for a comprehensive Air Quality Action Plan. The environmental data collection team will determine the specific installation locations and define the exact amount of new equipment to be purchased.</p>	
<b>Sector</b>	<input checked="" type="checkbox"/> Environment and Biodiversity	
<b>Action Type</b>	<input checked="" type="checkbox"/> Investment ('Hard') <input type="checkbox"/> Policy ('Soft')	
<b>Implementation Timeframe</b>	2025 – 2026	
<b>Status</b>	<input checked="" type="checkbox"/> New <input type="checkbox"/> Planned <input type="checkbox"/> Ongoing	
<b>GCAP Action Classification</b>	<input type="checkbox"/> Capital Investment <input checked="" type="checkbox"/> Other Investment <table border="0" style="margin-left: 20px;"> <tr> <td style="vertical-align: top;">           If 'Other Investment,' what type?  <input type="checkbox"/> Standards, guidelines, and regulations  <input type="checkbox"/> Strategies, plans, and programmes  <input type="checkbox"/> Investment-related feasibility study  <input type="checkbox"/> Awareness, demonstration, training, and capacity building  <input type="checkbox"/> Organisational measure  <input type="checkbox"/> Behavioural measure  <input checked="" type="checkbox"/> Monitoring, data collection, analysis, and studies         </td> </tr> </table>	If 'Other Investment,' what type? <input type="checkbox"/> Standards, guidelines, and regulations <input type="checkbox"/> Strategies, plans, and programmes <input type="checkbox"/> Investment-related feasibility study <input type="checkbox"/> Awareness, demonstration, training, and capacity building <input type="checkbox"/> Organisational measure <input type="checkbox"/> Behavioural measure <input checked="" type="checkbox"/> Monitoring, data collection, analysis, and studies
If 'Other Investment,' what type? <input type="checkbox"/> Standards, guidelines, and regulations <input type="checkbox"/> Strategies, plans, and programmes <input type="checkbox"/> Investment-related feasibility study <input type="checkbox"/> Awareness, demonstration, training, and capacity building <input type="checkbox"/> Organisational measure <input type="checkbox"/> Behavioural measure <input checked="" type="checkbox"/> Monitoring, data collection, analysis, and studies		
<b>Action Owner(s)</b>	<ul style="list-style-type: none"> <li>Uzhydromet</li> <li>Samarkand Regional branch of Ministry of Environmental Protection and Climate Change</li> <li>Samarkand City Mayor's office</li> </ul>	
<b>Other Stakeholders</b>	<ul style="list-style-type: none"> <li>Samarkand Regional Transport department</li> <li>Samarkand Regional Chamber of Commerce and Industry</li> <li>NGOs and academics (e.g. Samarkand State University) with an interest in air quality, environment and ecology</li> </ul>	
<b>Location</b>	<p>The exact locations across the city will be determined by the environmental data team, once established. The locations should complement rather than duplicate the existing air quality monitoring network and should include: the junctions of major roads; close to and downwind of major industrial sources; within neighbourhoods that regularly burn coal or wood for energy; and in 'background' locations away from major known pollution sources, to provide a benchmark for measurements elsewhere. On this basis, Figure 1 indicates there is specific potential at major intersections within the city centre (for example, at the Amir Temur roundabout), in residential areas to the south including Ulugbek and Urtashikh; and in suburbs north of the city centre along the Dakhbed Yuli Street corridor south of the airport.</p>	
<b>Priority Environmental Challenge(s) Addressed</b>	<b>Environment and Biodiversity:</b> <ul style="list-style-type: none"> <li>Lack of clear, consistent air quality data</li> <li>Elevated values of PM2.5 and PM10</li> </ul>	
<b>Strategic Goal(s) Addressed</b>	<b>Environment and Biodiversity:</b> <ul style="list-style-type: none"> <li>Improve air and water quality in Samarkand</li> </ul>	
<b>Link(s) to Existing Policies/Plans/ Projects</b>	<input checked="" type="checkbox"/> Yes <ul style="list-style-type: none"> <li>Uzhydromet</li> <li>The Government Resolution No. 737 (2019) on Improvement of Environmental Monitoring System in Uzbekistan</li> <li>Law on Ambient Air Protection (1996)</li> <li>Concept of Environmental Protection by 2030</li> </ul>	

	<ul style="list-style-type: none"> <li>National Air Quality Monitoring Initiative (launched by Uzhydromet, March 2024)<sup>63</sup></li> <li>UNDP Uzbekistan Sectoral Adaptation Plan for Buildings, Goal 36</li> </ul> <input type="checkbox"/> No			
Link(s) to Other GCAP Actions	<input checked="" type="checkbox"/> Yes <ul style="list-style-type: none"> <li><b>Action C1:</b> Establish a team for environmental data collection to gather and monitor data on buildings, industry, energy and DRR (Disaster Risk Reduction)</li> <li><b>Action C3:</b> Develop a digital reporting platform to engage citizens on environmental and climate issues and policy</li> <li><b>Action I2:</b> Invest in emissions reduction technologies to drive reductions in industrial emissions and air pollution</li> <li><b>Action T1:</b> Extend and integrate public transport network, including trams and e-buses, to reduce reliance on cars and cut air pollution</li> </ul> <input type="checkbox"/> No			
Cross-Cutting Themes	Climate and Disaster Risk	Smart Maturity	Gender and Social Inclusion	Heritage and Tourism
	<input type="checkbox"/> Directly targeted <input type="checkbox"/> Some elements <input checked="" type="checkbox"/> No direct links <u>Reason:</u> None of the gases measured for the purposes of improving local air quality are classified as greenhouse gases for the purposes of mitigating emissions that contribute to climate change.	<input checked="" type="checkbox"/> Directly targeted <input type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> The proposed air quality monitoring stations consist of 'smart' sensors generating digital data that can also be used to collect other relevant data (e.g. ambient temperature, pressure, etc).	<input type="checkbox"/> Directly targeted <input checked="" type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> Air pollution poses a serious health hazard, particular for people with pre-existing respiratory illnesses, the elderly, and children. By helping to understand the scale of air pollution, this Action may contribute towards addressing an issue that disproportionately impacts vulnerable individuals.	<input checked="" type="checkbox"/> Directly targeted <input type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> Poor air quality is among the most serious risks to Samarkand's heritage assets as pollution, including SO <sub>2</sub> , NO <sub>x</sub> and smoke can damage the appearance of buildings. Additionally, poor air quality will negatively affect tourist numbers.
Implementation Process and Timeline	Step		Duration	
	1. Determine priority locations for additional monitoring stations and establish the number of stations required		2-4 months	
	2. Request for Proposal (RFP) and procurement of equipment		4-6 months	
	3. Installation of new equipment		2 months	
	4. Data collection and maintenance works		Ongoing	
Indicative Project Costs	CapEx [€]		OpEx over 5 years [€]	Feasibility / Advisory Costs [€]
	211,000 <ul style="list-style-type: none"> <li>Expand the existing air quality monitoring network: 138,000</li> <li>Main contractor preliminaries (15%): 21,000</li> <li>Main contractor overheads and profits (5%): 8,000</li> <li>Fees (10%): 17,000</li> <li>Contingency (15%): 27,000</li> </ul>		211,000	n/a

<sup>63</sup> Daryo, (2024). Uzbekistan Launches Air Pollution Monitoring Initiative, available at <https://daryo.uz/en/2024/03/26/uzbekistan-launches-air-pollution-monitoring-initiative>

<b>Potential Financing Instruments and Sources</b>	<b>Instrument (Own-Source, Grant, Debt, Equity, Other)</b>		<b>Source (Municipal Government, State-Owned Enterprise, National Government, Private Sector, International Development Partner, Other)</b>	
	<b>Own source</b>		Municipal Government	
	<b>Loan</b>		Private Sector	
	<b>Loan</b>		International Development Partner	
<b>Revenue Opportunities</b>	<input type="checkbox"/> Yes [if yes, explain which ones] <input checked="" type="checkbox"/> No			
<b>Impact Measures (Quantitative and Qualitative)</b>	<b>Environmental Impacts</b>		State indicators	1 – Average annual concentration of PM2.5 1.1 – Average annual concentration of PM10 1.2 – Average daily concentration of SO2 1.3 – Average annual concentration of NOx
			Pressure indicators	N/A
	<b>Socio-economic Impacts</b>		Jobs created	There is potential for limited / temporary job creation from installation and maintenance of the monitoring stations; 5 jobs are assumed to be created.
			Social inclusion benefits	N/A
			Other socio-economic benefits	Improvements to the lives of poorer residents, who are likely to be disproportionately impacted by low air quality.  Cost savings achieved from reduced healthcare costs for respiratory diseases.
	<b>Climate Impacts</b>		Estimated carbon emissions reduction	No direct carbon emissions reduction associated with this Action.
			Climate resilience benefits	N/A
	<b>Nature &amp; Biodiversity Impacts</b>		Natural capital benefits	This Action is consistent with Priority Investment Area 4.5 in the Natural Capital Valuation for Samarkand (see GCAP Appendix B)
	<b>Other Indicators/Co-benefits</b>		Operational cost, water, and/or energy savings, revenue generation, etc.	N/A
	<b>Potential Project Risks and Mitigation Options</b>	<b>Area</b>	<b>Risks</b>	<b>Mitigation Options</b>
<b>Social</b>		N/A	N/A	
<b>Environmental</b>		Environmental data gathered could be incorrect or could be interpreted incorrectly.	Regular maintenance and servicing of monitoring stations to ensure correct operation; ensure appropriate data protocols, standards and/or quality applied to data gathering and presentation of outputs.	

	<b>Economic</b>	Relatively high levels of OPEX relative to CAPEX due to need for regular maintenance/servicing.	Communicate risk to potential funding partners and explore jointly options for cost savings if necessary (for example, phased deployment).
	<b>Other (Technical)</b>	Some proposed monitoring methods may be subject to operational constraints, such as power supply.	Confirm operational viability/requirements of the equipment prior to purchase.

<p><b>Action EB2: Develop financial, legal and other incentives for polluters to minimise pollution and improve city liveability and resilience</b></p>	<p><b>Estimated Total Cost: €460,000</b></p>
<p><b>Description</b></p>	<p>While Uzbekistan has a number of laws and regulations aiming to limit the environmental impact of large and small industrial areas, the baseline data collected for Samarkand suggests that the enforcement of these regulations remains inadequate. For example, a recent study found such high levels of dust emitted by a cement production facility in the Region (around 100 kilometres south of Samarkand city boundary) that the results were reported to the State Committee on Ecology and Environmental Protection. Some of the reported issues with industrial pollution in Samarkand include high levels of carbon emissions, air pollutants, but also heavy metal contamination of soil and water associated with inadequate disposal of hazardous waste and wastewater.</p> <p>Pollution in Samarkand is becoming a particularly pertinent issue in light of industrial growth in the region over the last five years. In the first half of 2023, industrial growth amounted to 3.2% compared to the previous year, and 8.4% compared to the same period in 2019. Large industrial areas, where most of the heavy industry tends to be concentrated (such as production of cement, asbestos plants, mineral fertiliser producers, etc.) and are mostly located outside of the city boundaries. However, there are three smaller industrial zones close to residential areas within Samarkand city boundary housing lighter industry, including construction materials, pharmaceuticals and agricultural products.</p> <p>To tackle industrial pollution, the Regional Government will work closely with the State Committee on Ecology and Environmental Protection, the City Government and representatives of industrial enterprises to develop a set of incentives and penalty schemes to curb industrial pollution in Samarkand. These will include a combination of economic incentives (such as grants, low interest loans, green procurement requirements) and a penalty scheme that could address industrial non-compliance with planning and environmental regulations (such as fines). The latter would also help raise revenue that could further fund environmental protection and restoration efforts (such as tree planting).</p> <p>This Action will be implemented through the following steps:</p> <ol style="list-style-type: none"> <li><b>Determine the baseline of compliance with existing environmental regulations and identify key industries that are non-compliant:</b></li> </ol> <p>This will involve joint working with the newly established Environmental Data Collection team (see Action C1) to determine an evidence-based baseline of compliance with existing environmental regulations, including any data available on past breaches, fines, complaints and/or disputes relating to air, soil or water pollution.</p> <ol style="list-style-type: none"> <li><b>Identify appropriate incentives and determine the feasibility of a penalty scheme:</b></li> </ol> <p>Inclusive consultation between relevant government entities and industry representatives will identify and analyse key challenges and barriers for developing feasible incentives and a penalty scheme.</p> <ol style="list-style-type: none"> <li><b>Design a system for enforcing incentives and penalties:</b></li> </ol> <p>Once the baseline has been determined, the next step will be to design a system of incentives and fines, based on considerations such as severity of the non-compliance, the quantitative and qualitative impact on the environment and the public, and the need to deter future violations. The system will also set out procedures for identifying non-compliance, issuance of penalties, collection of payments, and so on.</p> <ol style="list-style-type: none"> <li><b>Implement, monitor, and evaluate the incentives and penalties:</b></li> </ol> <p>Once the right measures have been identified and implemented, the system and the mechanisms within it need regular and consistent review to identify any issues, including unintended consequences, and to make any necessary adjustments.</p>
<p><b>Sector</b></p>	<p><input checked="" type="checkbox"/> Environment and Biodiversity</p>

	<input checked="" type="checkbox"/> Industries	
<b>Action Type</b>	<input type="checkbox"/> Investment ('Hard')	<input checked="" type="checkbox"/> Policy ('Soft')
<b>Implementation Timeframe</b>	2025-2027	
<b>Status</b>	<input checked="" type="checkbox"/> New <input type="checkbox"/> Planned <input type="checkbox"/> Ongoing	
<b>GCAP Action Classification</b>	<input type="checkbox"/> Capital Investment <input checked="" type="checkbox"/> Other Investment	If 'Other Investment,' what type? <input checked="" type="checkbox"/> Standards, guidelines, and regulations <input type="checkbox"/> Strategies, plans, and programmes <input type="checkbox"/> Investment-related feasibility study <input type="checkbox"/> Awareness, demonstration, training, and capacity building <input type="checkbox"/> Organisational measure <input checked="" type="checkbox"/> Behavioural measure <input checked="" type="checkbox"/> Monitoring, data collection, analysis, and studies
<b>Action Owner(s)</b>	<ul style="list-style-type: none"> <li>State Committee on Ecology and Environmental Protection</li> <li>Samarkand Regional Government</li> </ul>	
<b>Other Stakeholders</b>	<ul style="list-style-type: none"> <li>Private sector industrial firms</li> <li>State-Owned Enterprises</li> <li>Chamber of Commerce and Industry</li> <li>Samarkand City Government</li> <li>Environmental NGOs (such as Save Samarkand, Zarafshan and Ezgulik)</li> </ul>	
<b>Location</b>	Large industrial areas within Samarkand urban area and Region; these could include in such locations as Kimyogarlal, Charhin and Jomboy Small industrial zones within urban boundary; these are mainly concentrated in the outer western suburbs, for example in Bukharikishlak	
<b>Priority Environmental Challenge(s) Addressed</b>	<b>Climate Change and Resilience:</b> <ul style="list-style-type: none"> <li>Increasing greenhouse gas emissions</li> </ul> <b>Environment and Biodiversity:</b> <ul style="list-style-type: none"> <li>Elevated values of PM2.5 and PM10</li> <li>Pollution of important surface water sources</li> </ul> <b>Industries:</b> <ul style="list-style-type: none"> <li>Potentially hazardous industrial wastewater is discharged</li> <li>Industrial sector generates high level of Greenhouse gas (GHG) and dust emissions</li> </ul>	
<b>Strategic Goal(s) Addressed</b>	<b>Environment and Biodiversity:</b> <ul style="list-style-type: none"> <li>Improve air and water quality in Samarkand</li> </ul> <b>Industries:</b> <ul style="list-style-type: none"> <li>Reduce the environmental impact of industries</li> </ul>	
<b>Link(s) to Existing Policies/Plans/Projects</b>	<input checked="" type="checkbox"/> Yes <ul style="list-style-type: none"> <li>Concept of Environmental Protection to 2030 (Presidential Decree UP-5863)</li> <li>Government Resolution No. 737 (2019) on Improvement of the Environmental Monitoring System in Uzbekistan</li> <li>1996 Law on Ambient Air Protection</li> <li>Presidential and Ministerial Decrees aimed at protecting waterbodies (Decree No. PP-3286, Decree No. 164, and notably, Decrees No. 302 and No. 303)</li> <li>Environmental monitoring (including soil quality) - Government Resolution No. 737 On Improvement of the Environmental Monitoring System</li> <li>Law No. ZRU-57 on the industrial safety of hazardous production facilities</li> <li>Order No. 105 from the State Committee on Environmental Protection validating the regulation of emissions and pollutants by industrial enterprises</li> </ul> <input type="checkbox"/> No	
<b>Link(s) to Other GCAP Actions</b>	<input checked="" type="checkbox"/> Yes	

	<ul style="list-style-type: none"> <li>• <b>Action C1:</b> Establish a team for environmental data collection to gather and monitor data on buildings, industry, energy and DRR (Disaster Risk Reduction)</li> <li>• <b>Action C3:</b> Develop a digital reporting platform to engage citizens on environmental and climate issues and policy</li> <li>• <b>Action I2:</b> Invest in emissions reduction technologies to drive reductions in industrial emissions and air pollution</li> <li>• <b>Action I3:</b> Mitigate industrial water pollution by strengthening enforcement of regulations on industrial wastewater discharge</li> <li>• <b>Action SW3:</b> Monitor and mitigate illegal waste dumping to improve city liveability and public health</li> </ul> <input type="checkbox"/> No			
<p><b>Cross-Cutting Themes</b></p>	<p><b>Climate and Disaster Risk</b></p>	<p><b>Smart Maturity</b></p>	<p><b>Gender and Social Inclusion</b></p>	<p><b>Heritage and Tourism</b></p>
	<input type="checkbox"/> Directly targeted <input type="checkbox"/> Some elements <input checked="" type="checkbox"/> No direct links <u>Reason:</u> None that are directly relevant to this Action.	<input type="checkbox"/> Directly targeted <input checked="" type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> The development and ongoing monitoring of this Action will require good quality data to be captured and reviewed- if this data is digitised, sharing, monitoring and review becomes easier, with the benefits for smart maturity.	<input type="checkbox"/> Directly targeted <input checked="" type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> By reducing the environmental footprint of highly polluting industries in Samarkand, this Action is expected to improve air, water and soil quality. Those most affected by such pollution are the most vulnerable segments of the population (children, elderly, people with respiratory illnesses, etc.).	<input type="checkbox"/> Directly targeted <input checked="" type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> Indirectly, by improving environmental outcomes and reducing the level of pollution in the city and region, this Action will increase local attractiveness for tourism.
<p><b>Implementation Process and Timeline</b></p>	<p><b>Step</b></p>		<p><b>Duration</b></p>	
	<p><b>1. Determine the baseline of current compliance with existing environmental regulations and identify key industries that are non-compliant</b></p>		<p>6 months</p>	
	<p><b>2. Identify appropriate incentives and determine the feasibility of a penalty scheme</b></p>		<p>6-12 months</p>	
	<p><b>3. Design a system for enforcing incentives and penalties</b></p>		<p>6 months</p>	
	<p><b>4. Implement, monitor, and evaluate incentives and penalties</b></p>		<p>Ongoing</p>	
<p><b>Indicative Project Costs</b></p>	<p><b>CapEx [€]</b></p>	<p><b>OpEx over 5 years [€]</b></p>	<p><b>Feasibility / Advisory Costs [€]</b></p>	
	<p>n/a</p>	<p>n/a</p>	<p>460,000</p> <ul style="list-style-type: none"> <li>• Identify appropriate incentives and determine the feasibility of a penalty scheme: 100,000</li> <li>• Determine baseline of compliance with existing environmental regulations and identify key non-compliant industries: 100,000</li> <li>• Determine the scope and system for enforcing incentives and penalties: 100,000</li> <li>• Implement, monitor and evaluate incentives and penalties: 100,000</li> <li>• Contingency (15%): 60,000</li> </ul>	

<b>Potential Financing Instruments and Sources</b>	<b>Instrument (Own-Source, Grant, Debt, Equity, Other)</b>	<b>Source (Municipal Government, State-Owned Enterprise, National Government, Private Sector, International Development Partner, Other)</b>	
	<b>Own source</b>	Municipal Government	
	<b>Loan</b>	Private Sector	
	<b>Grant</b>	National Government	
<b>Revenue Opportunities</b>	<input checked="" type="checkbox"/> Yes There is potential for revenue generation both through the collection of fines, and through low-interest loans that could serve as financial incentives. <input type="checkbox"/> No		
<b>Impact Measures (Quantitative and Qualitative)</b>	<b>Environmental Impacts</b>	State indicators	1 – Average annual concentration of PM2.5 1.1 – Average annual concentration of PM10 1.2 – Average daily concentration of SO2 1.3 – Average annual concentration of NOx 2 – Biochemical Oxygen Demand (BOD) in rivers and lakes 2.1 – Ammonium (NH4) concentration in rivers and lakes 4 – Contaminated sites 4.1 – Concentration of mercury in soil 4.2 – Concentration of cadmium in soil 4.3 – Concentration of zinc in soil 4.4 – Concentration of mineral oil in soil (using infrared spectroscopy) 8.1 - Annual CO <sub>2</sub> emissions per unit of GDP
		Pressure indicators	23 – Share of industrial waste recycled 24 – Percentage of treated industrial wastewater
	<b>Socio-economic Impacts</b>	Jobs created	0 – The Action is not expected to directly result in additional job creation.
		Social inclusion benefits	This Action will particularly benefit the most vulnerable sections of the population who are more likely to live close to industrial polluters and contaminated soil, water and air.
		Other socio-economic benefits	This Action will bring substantial socio-economic benefits through direct improvements in public health outcomes and cost savings for publicly funded healthcare.
	<b>Climate Impacts</b>	Estimated carbon emissions reduction	No direct carbon emissions reduction associated with this Action.
		Climate resilience benefits	N/A

	<b>Nature &amp; Biodiversity Impacts</b>		Natural capital benefits	This Action will contribute to the preservation and enhancement of natural capital assets across Samarkand Region, including water bodies, air, and soil ecosystems. This Action is also consistent with Priority Investment Area 1.5 in the Natural Capital Valuation for Samarkand (see GCAP Appendix B)
	<b>Other Indicators/Co-benefits</b>		Operational cost, water, and/or energy savings, revenue generation, etc.	There is a potential for revenue generation for the city depending on the system design for Action implementation.
<b>Potential Project Risks and Mitigation Options</b>	<b>Area</b>	<b>Risks</b>	<b>Mitigation Options</b>	
	<b>Social</b>	Industrial job losses due to financial burden on industries as a result of the new system of pollution fines/penalties.	Implementing new requirements gradually and providing clear timelines can give industries time to adjust. Designing the system to help reward non-polluters (e.g. through tax breaks) could help ease the potential financial burden for the sector.	
	<b>Environmental</b>	There are currently difficulties with obtaining reliable data on the environmental performance of the industrial sector. Without a proper baseline, it may be challenging to create an objective, comprehensive incentives /penalties scheme.	The newly established environmental data collection team will be able to take the lead and use the data at their disposal to mitigate this risk.	
	<b>Economic</b>	If the penalties and fines are not seen as being severe enough, industries may be more likely to take the risk of non-compliance. If incentives are not attractive enough, they may not be effective either.	Both incentives and penalties will be determined through stakeholder consultation including industry representatives. There is a potential to introduce a graded penalties / incentives scheme, which would increase in severity / award level depending on performance, to ensure full compliance.	
	<b>Other</b>	There may be objections to implementing penalties, and / or they may require a legal change that may be hard to affect.	Ensuring support from a broad range of stakeholders, including national regulatory bodies, will be essential to creating an appropriate political climate for the implementation of this Action.	

Action EB3: Develop biodiversity metrics to drive habitat improvement for species over time	Estimated Total Cost: €105,000
Description	<p>Samarkand Region is relatively rich in biodiversity. For example, the Zarafshan State Nature Reserve, which extends along the Zarafshan River close to Samarkand city, supports over 300 plant species, 206 bird species, 24 species of mammals, 10 species of reptiles, and 18 species of fish. In addition, the reserve represents the only stretch of the Zarafshan River valley where <i>tugai</i> forest habitat has been preserved, which comprises a form of periodically flooded riparian woodland associated with river floodplains in arid climates.</p> <p>There is an informed understanding of the current biodiversity baseline at Regional level, but many data gaps remain outside the nature reserves and protected areas, particularly in urban and peri-urban areas. No biodiversity data is currently collected or analysed at the city level (including basic indicators such as abundance of species). The population of Samarkand grew by 11% between 2014 and 2022 (faster than any other large city in Uzbekistan), resulting in significant pressure on open spaces within and around the city, further fuelled by the growing demand for agricultural production and space for industrial development. This gap in understanding or urban biodiversity may result in urban planning decisions that will have a negative impact on biodiversity.</p> <p>To address this issue, the city and Regional governments of Samarkand will work with the State Committee on Ecology and Environmental Protection to develop a set of quantitative metrics to track changes in the state of biodiversity across the urban area (i.e. in relation to species, function, ecosystem, genetics, or combination of these). The newly established environmental data collection team (see Action C1) will lead the process of data collection that will feed into the assessment, and the metrics will inform science-based targets to improve the state of urban biodiversity in Samarkand by 2030.</p> <p>Once implemented, the additional data provided by this Action will provide a firm basis for enabling, derisking and justifying development and infrastructure investments that are not yet possible (or carry high financial risk) in Samarkand due to a lack of basic data; these include investments such as: protected areas or reserves for animals and plants in locations where they are most needed, for example due to vulnerability of rare species in the face of rapid local development; development and maintenance of wildlife and green corridors to protect and enhance existing habitats; wetland restoration and creation in the right places to maximise environmental benefit, and which would also carry climate resilience benefits; and other nature-based solutions to rewild in appropriate locations, such as the network of rivers and streams.</p> <p>The Action consists of four main stages:</p> <ol style="list-style-type: none"> <li><b>1. Benchmarking urban biodiversity metrics used elsewhere:</b> <p>Urban biodiversity metrics have been successfully applied in cities around the world, including the Singapore Index on City Biodiversity<sup>64</sup>, and the IUCN's Urban Nature Index<sup>65</sup>. The first step will be to review possible metrics, and determine which ones would be most suitable for Samarkand, considering issues such as resource constraints, availability of data, etc. Given the proximity of the Zarafshan State Nature Reserve, features associated with the reserve are likely to inform the metrics adopted.</p> </li> <li><b>2. Adopt the most appropriate metrics and collect baseline data:</b> <p>Once appropriate metrics and related indicators have been selected, the next step is to collect baseline data to apply the metrics to the current state of biodiversity in urban and peri-urban areas, as well as identifying key pressures (e.g. urban expansion, polluting industries) to inform the process of target setting.</p> </li> <li><b>3. Assess key pressure drivers and set targets for biodiversity enhancement:</b></li> </ol>

<sup>64</sup> Convention on Biological Diversity (CBD), (2021). 2021 Singapore Index on Cities' Biodiversity, at: <https://www.cbd.int/article/2021-singapore-index>

<sup>65</sup> International Union for the Conservation of Nature (IUCN) Urban Alliance, (2024). IUCN Urban Nature Indexes, at: [https://iucnurbanalliance.org/tools\\_and\\_resources/resource-1/](https://iucnurbanalliance.org/tools_and_resources/resource-1/)

	<p>Once key pressure drivers have been identified, the next step will be to determine appropriate measures to reduce those pressures and set science-based targets for biodiversity enhancement.</p> <p><b>4. Review, monitor, and update metrics as needed:</b></p> <p>A periodic review of the metrics and data collected will be undertaken to ensure that they remain relevant for the city's context and that appropriate data is being collected and monitored.</p>	
<b>Sector</b>	<input checked="" type="checkbox"/> Environment and Biodiversity <input checked="" type="checkbox"/> Land Use	
<b>Action Type</b>	<input type="checkbox"/> Investment ('Hard')	<input checked="" type="checkbox"/> Policy ('Soft')
<b>Implementation Timeframe</b>	2025 - 2027	
<b>Status</b>	<input checked="" type="checkbox"/> New <input type="checkbox"/> Planned <input type="checkbox"/> Ongoing	
<b>GCAP Action Classification</b>	<input type="checkbox"/> Capital Investment <input checked="" type="checkbox"/> Other Investment	<p>If 'Other Investment,' what type?</p> <input type="checkbox"/> Standards, guidelines, and regulations <input type="checkbox"/> Strategies, plans, and programmes <input type="checkbox"/> Investment-related feasibility study <input type="checkbox"/> Awareness, demonstration, training, and capacity building <input type="checkbox"/> Organisational measure <input type="checkbox"/> Behavioural measure <input checked="" type="checkbox"/> Monitoring, data collection, analysis, and studies
<b>Action Owner(s)</b>	<ul style="list-style-type: none"> <li>Samarkand Regional Department for Ecology and Environmental Protection</li> <li>State Committee on Ecology and Environmental Protection</li> <li>Samarkand City Government</li> </ul>	
<b>Other Stakeholders</b>	<ul style="list-style-type: none"> <li>National University of Uzbekistan</li> <li>Uzbekistan Society for the Protection of Birds</li> <li>Samarkand State University</li> <li>NGOs (such as Zarafshan and Save Samarkand)</li> <li>Regional Environmental Centre for Central Asia (CAREC)</li> <li>United Nations Development Programme (UNDP)</li> </ul>	
<b>Location</b>	Samarkand Regional Government, Kuksaroy Square, 1, Samarkand	
<b>Priority Environmental Challenge(s) Addressed</b>	<ul style="list-style-type: none"> <li>Environment and Biodiversity:</li> <li>Tensions between urban growth and biodiversity conservation</li> </ul>	
<b>Strategic Goal(s) Addressed</b>	<ul style="list-style-type: none"> <li>Environment and Biodiversity:</li> <li>Protect and enhance biodiversity in Samarkand</li> </ul>	
<b>Link(s) to Existing Policies/Plans/Projects</b>	<input checked="" type="checkbox"/> Yes <ul style="list-style-type: none"> <li>National Strategy for Biodiversity Conservation for the Period of 2019-2028</li> <li>The Concept of Environmental Protection of the Republic of Uzbekistan to 2030</li> <li>Law On Protected Natural Territories (2004)</li> <li>Law On Protection and Use of Flora (1997)</li> <li>Law On Protection and Management of Wild Fauna (2016)</li> <li>Law On Especially Protected Natural Territories (1993)</li> </ul> <input type="checkbox"/> No	
<b>Link(s) to Other GCAP Actions</b>	<input checked="" type="checkbox"/> Yes <ul style="list-style-type: none"> <li><b>Action C1:</b> Establish a team for environmental data collection to gather and monitor data on buildings, industry, energy and DRR (Disaster Risk Reduction)</li> <li><b>Action C3:</b> Develop a digital reporting platform to engage citizens on environmental and climate issues and policy</li> </ul>	

	<ul style="list-style-type: none"> <li><b>Action UD1:</b> Expand existing programme of street tree planting with native, drought-tolerant species</li> </ul> <input type="checkbox"/> No												
<b>Cross-Cutting Themes</b>	<b>Climate and Disaster Risk</b> <input type="checkbox"/> Directly targeted <input type="checkbox"/> Some elements <input checked="" type="checkbox"/> No direct links <u>Reason:</u> There are no direct links between this Action and climate and disaster risk.	<b>Smart Maturity</b> <input type="checkbox"/> Directly targeted <input checked="" type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> Data gathered through this Action is likely to be of most use where it is digital- this will enable easy sharing and storage and contribute to smart maturity.	<b>Gender and Social Inclusion</b> <input type="checkbox"/> Directly targeted <input type="checkbox"/> Some elements <input checked="" type="checkbox"/> No direct links <u>Reason:</u> There are no direct links between this Action and gender and social inclusion in Samarkand.	<b>Heritage and Tourism</b> <input type="checkbox"/> Directly targeted <input checked="" type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> Through efforts to conserve and enhance natural ecosystems and biodiversity, this Action will contribute to the protection of vital natural assets that may benefit tourism, particularly eco-tourism.									
	<table border="1"> <thead> <tr> <th>Step</th> <th>Duration</th> </tr> </thead> <tbody> <tr> <td>1. Review of existing urban biodiversity metrics used by cities elsewhere to determine those most appropriate for Samarkand</td> <td>8 months</td> </tr> <tr> <td>2. Adopt the most appropriate metrics and collect baseline data</td> <td>12 months</td> </tr> <tr> <td>3. Assess key pressure drivers and set targets for biodiversity enhancement</td> <td>6 months</td> </tr> <tr> <td>4. Review, monitor, and update metrics and impacts of Action as needed</td> <td>Ongoing</td> </tr> </tbody> </table>				Step	Duration	1. Review of existing urban biodiversity metrics used by cities elsewhere to determine those most appropriate for Samarkand	8 months	2. Adopt the most appropriate metrics and collect baseline data	12 months	3. Assess key pressure drivers and set targets for biodiversity enhancement	6 months	4. Review, monitor, and update metrics and impacts of Action as needed
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<b>Indicative Project Costs</b>	<b>CapEx [€]</b> n/a	<b>OpEx over 5 years [€]</b> n/a	<b>Feasibility / Advisory Costs [€]</b> 105,000 <ul style="list-style-type: none"> <li>Develop biodiversity metrics - benchmarking, evaluation, baseline data collection, strategies and monitoring: 91,000</li> <li>Contingency (15%): 14,000</li> </ul>										
	<b>Potential Financing Instruments and Sources</b>		<b>Instrument (Own-Source, Grant, Debt, Equity, Other)</b> <b>Grant</b> <b>Loan</b> <b>Loan</b>	<b>Source (Municipal Government, State-Owned Enterprise, National Government, Private Sector, International Development Partner, Other)</b> National Government State-Owned Enterprise International Development Partner									
<b>Revenue Opportunities</b>	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No												
<b>Impact Measures (Quantitative and Qualitative)</b>	<b>Environmental Impacts</b>		State indicators	6 – Open green space area ratio per 100 000 inhabitants 6.1 – Share of green space within urban limits 7 – Abundance of bird species (all species) 7.1 – Abundance of other species									

		Pressure indicators	N/A
	<b>Socio-economic Impacts</b>	Jobs created	1
		Social inclusion benefits	N/A
		Other socio-economic benefits	Biodiversity underpins life-sustaining processes such as the production and consumption of food, fuels etc. Though supporting nature and biodiversity recovery, this Action will provide impetus for wider socio-economic benefits associated with natural capital.
	<b>Climate Impacts</b>	Estimated carbon emissions reduction	No direct carbon emissions reduction associated with this Action.
		Climate resilience benefits	Restoration of certain habitats that may become part of the actions identified in the metrics (e.g. wetlands) may also support climate resilience objectives (e.g. flood risk reduction).
	<b>Nature &amp; Biodiversity Impacts</b>	Natural capital benefits	This Action is expected to strengthen the natural capital assets of Samarkand by reducing existing pressures on biodiversity and ecosystem services. This Action is also consistent with Priority Investment Areas 3.1, 3.4 and 3.6 in the Natural Capital Valuation for Samarkand (see GCAP Appendix B)
<b>Other Indicators/Co-benefits</b>	Operational cost, water, and/or energy savings, revenue generation, etc.	Over the long run, there is a potential for this Action to contribute to potential for tourism (including eco-tourism) and therefore contribute to revenue generation.	
<b>Potential Project Risks and Mitigation Options</b>	<b>Area</b>	<b>Risks</b>	<b>Mitigation Options</b>
	<b>Social</b>	Displacement of or disruption to local communities and/or socio-economic activities through metrics indicating additional protections or protected areas for nature are required.	While the Action itself will not directly result in the creation of new protected areas, this is a possible or even likely indirect output; if so, the existing socio-economic importance of land uses in any areas earmarked for protection should be taken into account and carefully balanced against the importance of local species and habitats.
	<b>Environmental</b>	Incorrect data gathered, applied or monitored resulting in negative impacts	Ensure appropriate level of confidence in baseline data; consider carefully, including through consultation with local experts,

		and/or unintended consequences.	accuracy of metrics and targets; monitor outputs of Action carefully.
	<b>Economic</b>	Lack of resources to develop, interpret and implement comprehensive biodiversity metrics.	During the review of metrics, prioritise those that offer the best benefit to cost ratio, and those that contain indicators for which some of the data may already be available.
	<b>Other</b>	The availability of quality data will be central to successful establishment of the biodiversity baseline in Samarkand, however, the lack of relevant local capacity or expertise (e.g. in ecology) may impede the collection of appropriate data.	Partner with local universities and specialist environmental NGOs to build capacity and knowledge on environmental topics.

# Industries Actions

<p><b>Action I1: Invest in energy efficiency in industrial enterprises in Samarkand</b></p>	<p><b>Estimated Total Cost: €95,173,000</b></p>
<p><b>Description</b></p>	<p>The industry sector is the second highest contributor -after households- to total final energy consumption nationally in Uzbekistan, at 23%. Major industries in Samarkand are also assumed to be responsible for the second highest total energy consumption locally. In order for the city to achieve its ambitions to reduce industrial energy usage, there is a need to implement robust measures to improve energy efficiency in the industrial sector.</p> <p>At present, there appear to be no effective policies or fiscal incentives, such as grants or rebates, encouraging energy efficiency for industrial processes at either national government or Samarkand Region level. Such incentives could target energy efficiency in terms of gas heating of industrial premises and their use of electricity, whether for industrial processing or heating. Therefore, this Action aims to establish a workable framework for supporting energy efficiency investment across industrial enterprises in Samarkand. This will result in significant annual energy savings and emission reductions.</p> <p>Key industries in Samarkand urban area which would benefit from this Action include fertiliser production, cement and asbestos, carpet and textile, and food and grain-processing plants. It is anticipated that within the GCAP timeframe, this action could be applied to five large state-owned enterprises and thirty-five SME businesses. These forty businesses will be selected on the basis of need among those occupying the 75 industrial sites across the wider Samarkand urban area (defined as the tumans of Samarkand [including Samarkand city], Jomboy, Postdarg’om, Toyloq, and Akdarya).<sup>66</sup></p> <p>The technologies within the scope of the Action are the following, which were identified (among others) in a 2022 report for EBRD on potential for sustainable technology within industry in Uzbekistan<sup>67</sup>: Electric commercial vans, electric lift equipment, EV charging stations<sup>68</sup>, CO<sub>2</sub> recovery systems, smart climate monitoring systems for warehouses, smart building management systems, photovoltaic systems<sup>69</sup>, cogeneration machines, absorption heating and cooling systems and solar heaters. For each technology, the report provides an indicative cost of installation and indicates the manufacturing sectors to which it is most applicable.</p> <p>This Action will entail the following activities:</p> <ol style="list-style-type: none"> <li><b>1. Identify premises and technologies most appropriate for Action application</b> <ol style="list-style-type: none"> <li>a) Undertake a review of relevant manufacturing premises, both large state-owned enterprises and SMEs across the industrial sector in Samarkand. The review should have full regard to the 2022 EBRD report mentioned above and, in the context of its findings, be designed to identify opportunities for quick wins in terms of energy efficient technologies within the scope of the action as listed above.</li> <li>b) The review will require consultation with private and public sector industrial managers as well as baselining energy efficiency in manufacturing sectors in Samarkand relative to best practice elsewhere. Opportunities for co-financing of potential interventions through private bank and public-private investments should also be explored at this stage.</li> </ol> </li> <li><b>2. Select specific premises and technologies suitable for pilot rollout:</b></li> </ol>

<sup>66</sup> The number of industrial sites in the wider Samarkand urban area is derived from GIS analysis of the World Bank dataset of industrial buildings in Samarkand province by tuman at <https://datacatalog.worldbank.org/search/dataset/0064288/Central-Asia-exposure-dataset---Non-residential-buildings--education--healthcare--industrial--commercial->

<sup>67</sup> Civitta and Rhythm Plus for EBRD, (2022). Sustainable Technology Market Review in Uzbekistan- Market Assessment (not available online).

<sup>68</sup> These EV charging stations would be provided within commercial premises only and are not to be confused with the separate network of EV charging stations accessible for public use envisaged through Action T4.

<sup>69</sup> These photovoltaic systems would be provided within industrial premises only and are not to be confused with the separate fiscal incentives for households and businesses to adopt renewable energy technology envisaged through Action E2.

	<p>a) Based on outcomes of the Stage 1 review, select specific premises and technologies offering most promise for energy efficiency measures. Those selected should be those with the greatest likelihood of being able to deliver rapid, measurable emissions reductions and energy savings, based on the evidence from Stage 1.</p> <p>b) Deliver a pilot rollout of the technologies selected to the premises selected for the pilot. Ideally, a wide range of industrial sectors and technologies should be included within the pilot to maximise the potential for lessons to be learnt. Appropriate financing mechanisms should be in place if co-financing is determined to be required.</p> <p><b>3. Full rollout of energy efficient technologies to industry:</b></p> <p>a) Applying lessons learned from the pilot stage, rollout of appropriate technologies to all relevant large and SME industries; monitor take-up and any opportunities for further improvements/ refinements to the Action.</p> <p>b) Accompany rollout with appropriately targeted training for industrial managers and employees on use, maintenance and care of the technologies selected.</p> <p>c) Ensure financing of full rollout from appropriate/relevant sources as determined through stages 1 and 4).</p>	
<b>Sector</b>	<input checked="" type="checkbox"/> Industries <input checked="" type="checkbox"/> Energy	
<b>Action Type</b>	<input checked="" type="checkbox"/> Investment ('Hard')	<input type="checkbox"/> Policy ('Soft')
<b>Implementation Timeframe</b>	2025 – 2028	
<b>Status</b>	<input checked="" type="checkbox"/> New <input type="checkbox"/> Planned <input type="checkbox"/> Ongoing	
<b>GCAP Action Classification</b>	<input checked="" type="checkbox"/> Capital Investment <input type="checkbox"/> Other Investment	If 'Other Investment,' what type? <input type="checkbox"/> Standards, guidelines, and regulations <input type="checkbox"/> Strategies, plans, and programmes <input type="checkbox"/> Investment-related feasibility study <input type="checkbox"/> Awareness, demonstration, training, and capacity building <input type="checkbox"/> Organisational measure <input type="checkbox"/> Behavioural measure <input type="checkbox"/> Monitoring, data collection, analysis, and studies
<b>Action Owner(s)</b>	<ul style="list-style-type: none"> <li>• Samarkand Regional Department for Investments and Industry</li> <li>• Ministry of Investments, Industry and Foreign Trade</li> </ul>	
<b>Other Stakeholders</b>	<ul style="list-style-type: none"> <li>• Ministry of Energy</li> <li>• Ministry of Innovative Development</li> <li>• Samarkand City Mayor's Department</li> <li>• State-owned and private sector industrial firms</li> <li>• Energy SOEs (i.e. Samarkand Electric Company JSC, Hududgaz/Shahargaz)</li> </ul>	
<b>Location</b>	All industrial enterprises; as highly polluting industries have now been moved out of the City boundary into the wider urban area; this is why the geography of the Action, as noted in the Action description above, should be the whole of the Samarkand urban area. Among the largest of the seventy-five industrial areas across the urban area include in Kimyogarlal, Charhin and Jomboy. The smaller industrial zones remaining within the City boundary are mainly concentrated in the outer western suburbs, for example in Bukharikishlak.	
<b>Priority Environmental Challenge(s) Addressed</b>	<p><b>Industries:</b></p> <ul style="list-style-type: none"> <li>• High levels of energy consumption and energy inefficiency</li> <li>• Industrial sector generates high level of GHG and dust emissions</li> </ul> <p><b>Energy:</b></p> <ul style="list-style-type: none"> <li>• Increasing energy demand</li> </ul>	

<b>Strategic Goal(s) Addressed</b>	<b>Buildings:</b> <ul style="list-style-type: none"> <li>Promote energy efficiency within buildings in Samarkand</li> </ul> <b>Industries:</b> <ul style="list-style-type: none"> <li>Reduce the environmental impact of industries</li> </ul>			
<b>Link(s) to Existing Policies/Plans/Projects</b>	<input checked="" type="checkbox"/> Yes <ul style="list-style-type: none"> <li>World Bank pilot project on energy efficiency in selected industrial enterprises in Uzbekistan</li> <li>UNDP Clean Development Mechanism</li> <li>Republic of Uzbekistan, (2020). Concept Note for Ensuring Electricity Supply in Uzbekistan 2020-2030</li> <li>Presidential Decree 57 On Measures to Accelerate the Introduction of Renewable Energy Sources and Energy-Saving Technologies</li> <li>Uzbekistan’s Law on ‘Efficient Usage of Energy’ (1997)</li> <li>President’s Decree No. PP 2812 which aims to speed reform of the energy sector including improving energy efficiency</li> </ul> <input type="checkbox"/> No			
<b>Link(s) to Other GCAP Actions</b>	<input checked="" type="checkbox"/> Yes <ul style="list-style-type: none"> <li><b>Action B1:</b> Invest in energy efficiency in buildings through thermal performance retrofit and building design standards</li> <li><b>Action E2:</b> Introduce fiscal incentives for households and businesses to adopt renewable energy technology</li> <li><b>Action E3:</b> Invest in energy efficient street lighting</li> <li><b>Action T4:</b> Support the transition to electric vehicles by investing in charging infrastructure</li> </ul> <input type="checkbox"/> No			
<b>Cross-Cutting Themes</b>	<b>Climate and Disaster Risk</b>	<b>Smart Maturity</b>	<b>Gender and Social Inclusion</b>	<b>Heritage and Tourism</b>
	<input checked="" type="checkbox"/> Directly targeted <input type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> By improving the energy efficiency of industrial enterprises, energy demand and GHG emissions will reduce, with positive climate impacts.	<input type="checkbox"/> Directly targeted <input checked="" type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> There is strong potential for the measurements and monitoring of energy efficiency upgrades and implementation to be captured digitally; additionally, two of the technologies within the scope of this Action are smart climate monitoring systems for warehouses and smart building management systems.	<input type="checkbox"/> Directly targeted <input checked="" type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> Low-income communities often live near industrial areas, so they may benefit from any air quality improvements resulting from this Action.	<input type="checkbox"/> Directly targeted <input checked="" type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> Air pollution from industries negatively affects heritage assets and local attractiveness to tourism, thus air quality improvements resulting from this Action will have a positive impact.
<b>Implementation Process and Timeline</b>	<b>Step</b>		<b>Duration</b>	
	1. <b>Review of existing energy performance, including energy efficiency incentives, for industry: Undertake a review of existing energy performance, consultation with private and public sector industrial managers</b>		6 months	
	2. <b>Design and implement financial incentive schemes: Select and design appropriate financial incentives, deliver a pilot rollout to specific premises</b>		1 year	
	3. <b>Rollout of industrial energy efficiency incentives: Rollout to all relevant stakeholders (including monitoring),</b>		2 years	

	<b>accompany rollout with training, allow for piloting of investment opportunities</b>		
<b>Indicative Project Costs</b>	<b>CapEx [€]</b>	<b>OpEx over 5 years [€]</b>	<b>Feasibility / Advisory Costs [€]</b>
	95,000,000 <ul style="list-style-type: none"> <li>Invest in energy efficient technologies for five large SOE industrial sites: 25,000,000</li> <li>Invest in energy efficient technologies for 35 SME industrial sites: 70,000,000</li> </ul>	Savings	172,500 <ul style="list-style-type: none"> <li>Identify premises and technologies most appropriate for Action application: 50,000</li> <li>Select specific premises and technologies suitable for pilot rollout: 50,000</li> <li>Full rollout of energy efficient technologies to industry: 50,000</li> <li>Contingency (15%): 22,500</li> </ul>
<b>Potential Financing Instruments and Sources</b>	<b>Instrument (Own-Source, Grant, Debt, Equity, Other)</b>	<b>Source (Municipal Government, State-Owned Enterprise, National Government, Private Sector, International Development Partner, Other)</b>	
	<b>PPP</b>	Regional Government/Private Sector	
	<b>Grant</b>	National Government	
	<b>Loan</b>	International Development Partner	
<b>Revenue Opportunities</b>	<input checked="" type="checkbox"/> Yes Net revenue increases in public-sector industrial premises (i.e. the energy savings offset the cost of the incentives) will generate revenue for the government through energy cost savings. <input type="checkbox"/> No		
<b>Impact Measures (Quantitative and Qualitative)</b>	<b>Environmental Impacts</b>	State indicators	8 – Annual CO <sub>2</sub> equivalent emissions per capita 8.1 – Annual CO <sub>2</sub> emissions per unit of GDP
		Pressure indicators	19 – Fossil fuels consumption for heating and cooling 20 – Electricity consumption in industries, per unit of industrial GDP 21 – Heat productivity of industries 22.1 – Fossil fuel use productivity of industries
	<b>Socio-economic Impacts</b>	Jobs created	1,996
		Social inclusion benefits	Energy efficient industries should pollute less, thus improving air quality and health outcomes for the poorest and most vulnerable residents.
		Other socio-economic benefits	Energy efficient industries should in

			theory be more competitive, thus able to expand, including creating new jobs
	<b>Climate Impacts</b>	Estimated carbon emissions reduction	184,770 tCO <sub>2</sub> e annually
		Climate resilience benefits	Improved energy efficiency will reduce GHG emissions by using less electricity and gas. It should also make industry more resilient to power outages which may occur during extreme heat.
	<b>Nature &amp; Biodiversity Impacts</b>	Natural capital benefits	N/A
<b>Other Indicators/Co-benefits</b>	Operational cost, water, and/or energy savings, revenue generation, etc.	<p>This Action will result annually in estimated energy savings of 728 GWh and cost savings of 1.3m EUR.</p> <p>The operational cost savings for both state-owned and private sector industries will therefore enable enhanced revenue generation for the Government.</p>	
<b>Potential Project Risks and Mitigation Options</b>	<b>Area</b>	<b>Risks</b>	<b>Mitigation Options</b>
	<b>Social</b>	N/A	N/A
	<b>Environmental</b>	Installation of energy efficient machinery may result in improper disposal of obsolete equipment, resulting in environmental pollution/hazardous waste.	As part of the training and education element of the Action, ensure training on correct procedures for upgrading equipment, including disposal of old machinery.
		Energy efficiency improvements may be offset by greater energy use as a result of cost savings, thus no net environmental benefit.	This risk can be mitigated through overall decarbonisation of the electricity grid at the same time as progressing energy efficiency incentives- which will mean no net environmental loss if more energy is consumed.
	<b>Economic</b>	Cost of programme.	Aim to design incentive mechanisms that are effective but cost-effective in terms of government budget incurred.
Market imbalances (e.g. if some industrial sectors are favoured for incentives over others).		Ensure incentives are designed and applied equitably across a range of industrial sectors.	
<b>Other</b>	N/A	N/A	

Action I2: Invest in emissions reduction technologies to drive reductions in industrial emissions and air pollution	Estimated Total Cost: €18,128,000
Description	<p>Larger industrial areas in Samarkand that generate the most pollution are generally located outside of the city boundary and comprise of heavy industry, such as cement producers, asbestos plants, mineral fertiliser producers and grain processors. These industrial areas are significant contributors to poor air quality in Samarkand. The air pollutants of concern are particulate matter (PM10 and PM2.5 size fractions), oxides of nitrogen (NOX) and oxides of sulphur (SOx), plus Greenhouse gas (GHG) emissions. Additionally, there is a lack of good quality data on industrial emissions and their impact on local air quality in Samarkand. Some large enterprises are already investing in technology that helps reduce emissions under the United Nations Development Programme (UNDP) Clean Development Mechanism initiative.</p>
	<p>This Action aims to reduce industrial emissions and improve local air quality by further investing in/incentivising industrial emissions reduction technologies and air pollution scrubbers.</p> <p>This will involve a combination of technologies and strategies, as follows:</p> <p><b>1. Assess baseline conditions through air quality monitoring:</b></p> <p>Baseline information on industrial emissions and local air quality in Samarkand is limited. The priority pollutants to tackle for air quality improvement plans are particulate matter (measured as PM10 and PM2.5 size fractions), and the acid gases NOx and SOx. The first step will be to design and implement a local air quality monitoring programme, which will be achieved through Action EB1. Ongoing monitoring will allow progress to be tracked against baseline conditions or policy goals.</p> <p>In addition, regulatory compliance with emission limit values could be established through emissions monitoring at source. For example, installing automated stack monitors with telemetry data sent directly to the State Committee on Ecology and Environmental Protection.</p> <p><b>2. Introduce emissions reduction technologies:</b></p> <p>In the next stage, a range of different types of emissions reduction technologies and strategies will be procured and installed by industrial stakeholders, with financing from the Regional Government, based on a review of the needs of each individual industrial premises. This will enable progressive transition towards lower emission rates and/or lower magnitude impacts on local air quality, to be achieved through the following:</p> <ol style="list-style-type: none"> <li>i. <b>Industrial Catalytic Converters</b> – use redox reaction to reduce emissions of oxides of nitrogen and widely used for combustion source exhaust, such as generators, gas turbines, engines.</li> <li>ii. <b>Cyclones</b> – A low-cost method of removing particulate matter from dry air, especially for high volume flow rates.</li> <li>iii. <b>Baghouse Filters</b> – A reliable method for mechanically removing fine particulate matter from dry air that can achieve high removal efficiency rates.</li> <li>iv. <b>Scrubbers (Wet)</b> – use liquid solutions to capture and remove pollutants such as acid gases (sulphur dioxide, hydrogen chloride).</li> <li>v. <b>Electrostatic Precipitators (ESP)</b> – capture particulate matter emissions and best suited to plant such as coal-fired power, metal processing, and waste incinerators.</li> <li>vi. <b>Regenerative Thermal Oxidizers (RTO)</b> – convert volatile organic compounds (VOCs) and hazardous air pollutants (HAPs) into CO<sub>2</sub> and H<sub>2</sub>O by using heat.</li> <li>vii. <b>Biofilters</b> – use microorganisms to biologically degrade VOCs, odorous components, and other pollutants.</li> </ol> <p>Advantages and disadvantages, feasibility, and suitability for the specific industrial premises should be considered while selecting emissions reduction technologies and strategies and then progressing with one or more preferred options.</p> <p><b>3. Operate and maintain emissions reduction technologies:</b></p>

	Operation and maintenance of emissions reductions technologies will include capacity building, comprising necessary training programmes, workshops, educational materials, and guidance documents to help industries understand their obligations, improve emissions reduction practices, and facilitate knowledge sharing.	
<b>Sector</b>	<input checked="" type="checkbox"/> Industries <input checked="" type="checkbox"/> Energy	
<b>Action Type</b>	<input checked="" type="checkbox"/> Investment ('Hard')	<input type="checkbox"/> Policy ('Soft')
<b>Implementation Timeframe</b>	2025 – 2030	
<b>Status</b>	<input type="checkbox"/> New <input type="checkbox"/> Planned <input checked="" type="checkbox"/> Ongoing	
<b>GCAP Action Classification</b>	<input checked="" type="checkbox"/> Capital Investment <input type="checkbox"/> Other Investment	If 'Other Investment,' what type? <input type="checkbox"/> Standards, guidelines, and regulations <input type="checkbox"/> Strategies, plans, and programmes <input type="checkbox"/> Investment-related feasibility study <input type="checkbox"/> Awareness, demonstration, training, and capacity building <input type="checkbox"/> Organisational measure <input type="checkbox"/> Behavioural measure <input type="checkbox"/> Monitoring, data collection, analysis, and studies
<b>Action Owner(s)</b>	<ul style="list-style-type: none"> <li>Samarkand Regional Department of Investment and Trade</li> <li>Ministry of Investments, Industry and Foreign Trade</li> </ul>	
<b>Other Stakeholders</b>	<ul style="list-style-type: none"> <li>State Committee on Environmental Protection</li> <li>State-owned enterprises (SOEs)</li> <li>Private sector industrial firms</li> </ul>	
<b>Location</b>	Heavy industrial premises outside the city boundary but within the wider urban area. These are particularly concentrated in locations including Kimyogarlal, Charhin and Jomboy.	
<b>Priority Environmental Challenge(s) Addressed</b>	<p><b>Climate Change and Resilience:</b></p> <ul style="list-style-type: none"> <li>Increasing greenhouse gas emissions</li> <li>Lack of clarity on local government role in emissions reduction</li> </ul> <p><b>Environment and Biodiversity:</b></p> <ul style="list-style-type: none"> <li>Lack of clear, consistent air quality data</li> <li>Elevated values of PM2.5 and PM10</li> </ul> <p><b>Industries:</b></p> <ul style="list-style-type: none"> <li>Sector generates high level of GHG and dust emissions</li> </ul>	
<b>Strategic Goal(s) Addressed</b>	<p><b>Environment and Biodiversity:</b></p> <ul style="list-style-type: none"> <li>Improve air and water quality in Samarkand</li> </ul> <p><b>Industries:</b></p> <ul style="list-style-type: none"> <li>Reduce the environmental impacts of industries</li> </ul>	
<b>Link(s) to Existing Policies/Plans/Projects</b>	<input checked="" type="checkbox"/> Yes <ul style="list-style-type: none"> <li>Concept of Environmental Protection to 2030</li> <li>Presidential Decree No. UP-5863 validating the Concept of environmental protection in the Republic of Uzbekistan until 2030</li> <li>Government Resolution No. 737 (2019) on Improvement of the Environmental Monitoring System in Uzbekistan</li> <li>1996 Law on Ambient Air Protection</li> <li>Establishment of Free Economic Zones (FEZs) by Presidential Decree DP-4853</li> <li>Establishment of Small Industrial Zones (SIZs)</li> <li>Order No. 105 from the State Committee on Environmental Protection validating the regulation of emissions and pollutants by industrial enterprises</li> <li>UNDP Clean Development Mechanism</li> </ul> <input type="checkbox"/> No	

<p><b>Link(s) to Other GCAP Actions</b></p>	<input checked="" type="checkbox"/> Yes <ul style="list-style-type: none"> <li><b>Action C1:</b> Establish a team in environmental data collection to gather and monitor data- particularly on buildings, industry, energy and Disaster Risk Reduction (DRR)</li> <li><b>Action EB1:</b> Invest in air quality monitoring stations to track and improve air quality and enable the development of an Air Quality Action Plan</li> <li><b>Action EB2:</b> Develop financial, legal and other incentives for polluters to minimise pollution and improve city liveability and resilience</li> <li><b>Action CR2:</b> Undertake a regional/city level GHG inventory to determine local climate mitigation opportunities</li> </ul> <input type="checkbox"/> No			
<p><b>Cross-Cutting Themes</b></p>	<p><b>Climate and Disaster Risk</b></p>	<p><b>Smart Maturity</b></p>	<p><b>Gender and Social Inclusion</b></p>	<p><b>Heritage and Tourism</b></p>
	<input checked="" type="checkbox"/> Directly targeted <input type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> Introducing emissions reduction technologies in industrial premises will reduce GHG emissions and directly contribute to climate change and associated risk mitigation.	<input type="checkbox"/> Directly targeted <input checked="" type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> Digital data on industrial emissions and air quality could be monitored by the State Committee on Ecology and Environmental Protection via telemetry.	<input type="checkbox"/> Directly targeted <input checked="" type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> Emissions reduction technologies will reduce air pollution; this will improve health outcomes for low-income communities that tend to live nearer industrial areas.	<input type="checkbox"/> Directly targeted <input checked="" type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> Introducing emissions reduction technologies will mitigate air pollution, protecting heritage sites from damage.
<p><b>Implementation Process and Timeline</b></p>	<p><b>Step</b></p>			<p><b>Duration</b></p>
	<p><b>1. Assess baseline conditions through air quality monitoring</b></p>			<p>2 years</p>
	<p><b>2. Introduce emissions reduction technologies</b></p>			<p>4 years</p>
	<p><b>3. Operate and maintain emissions reductions technologies</b></p>			<p>3 years, then ongoing</p>
<p><b>Indicative Project Costs</b></p>	<p><b>CapEx [€]</b></p>		<p><b>OpEx over 5 years [€]</b></p>	<p><b>Feasibility / Advisory Costs [€]</b></p>
	<p>17,660,000</p> <ul style="list-style-type: none"> <li>Introduce emissions reduction technologies: 15,356,000</li> <li>Contingency (15%): 2,303,000</li> </ul>		<p>353,000</p>	<p>115,000</p> <ul style="list-style-type: none"> <li>Training programmes, workshops, educational materials, and guidance documents: 100,000</li> <li>Contingency (15%): 15,000</li> </ul>
<p><b>Potential Financing Instruments and Sources</b></p>	<p><b>Instrument (Own-Source, Grant, Debt, Equity, Other)</b></p>		<p><b>Source (Municipal Government, State-Owned Enterprise, National Government, Private Sector, International Development Partner, Other)</b></p>	
	<p><b>Grant</b></p>		<p>National Government</p>	
	<p><b>Loan</b></p>		<p>Private sector</p>	
	<p><b>Loan</b></p>		<p>International Development Partner</p>	
<p><b>Revenue Opportunities</b></p>	<input checked="" type="checkbox"/> Yes Revenue for industrial enterprises if system of Emissions Reduction Credits were to be developed linked to the original Action. <input type="checkbox"/> No			
<p><b>Impact Measures (Quantitative and Qualitative)</b></p>	<p><b>Environmental Impacts</b></p>	<p>State indicators</p>	<p>1 – Average annual concentration of PM2.5                  1.1 – Average annual concentration of PM10</p>	

			<p>1.2 – Average daily concentration of SO2</p> <p>1.3 – Average annual concentration of NOx</p> <p>8 – Annual CO<sub>2</sub> equivalent emissions per capita</p> <p>8.1 – Annual CO<sub>2</sub> emissions per unit of GDP</p>
		Pressure indicators	<p>15.3 – Share of city enterprises with ISO50001/EMAS certification or similar</p> <p>16 – Share of renewable in total energy consumption</p> <p>20 – Electricity consumption in industries, per unit of industrial GDP</p> <p>21 – Heat consumption in industries, per unit of industrial GDP</p> <p>22 – Heavy metals (Pb) emission intensity of manufacturing industries</p> <p>22.1 – Fossil fuel combustion in industrial processes, per unit of industrial GDP</p>
	<b>Socio-economic Impacts</b>	Jobs created	380
		Social inclusion benefits	The implementation of emissions reduction technologies will lead to a decrease in air pollution, improving health outcomes of low-income communities that tend to reside in close proximity to industrial areas.
		Other socio-economic benefits	The implementation of emissions reduction technologies will help mitigate air pollution, preserving heritage sites.
	<b>Climate Impacts</b>	Estimated carbon emissions reduction	No direct carbon emissions reduction associated with this Action.
		Climate resilience benefits	Implementing emissions reduction technologies in industrial facilities will result in a reduction of GHG emissions, directly contributing to climate change.
	<b>Nature &amp; Biodiversity Impacts</b>	Natural capital benefits	Emissions reduction technologies will reduce air pollution and minimise impacts on ecosystems, preserving biodiversity.
	<b>Other Indicators/Co-benefits</b>	Operational cost, water, and/or energy savings, revenue generation, etc.	Reduced liability for pollution fines among industrial enterprises. Revenue can be generated by selling Emissions Reduction Credits.
	<b>Potential Project Risks and Mitigation Options</b>	<b>Area</b>	<b>Risks</b>
<b>Social</b>		Opposition from industrial stakeholders to implement	Foster stakeholder engagement, transparent communication, and participatory decision-making to address concerns and facilitate emissions reduction technology implementation.

		emissions reduction technology.	
	<b>Environmental</b>	Unintended environmental consequences.  Use of RTOs can themselves generate NOx emissions.	Conduct environmental impact assessments if necessary to identify potential risks and develop mitigation plan.  Apply cost-benefit analysis and/or environmental impact assessment to determine locations or cases where use of RTOs has net environmental benefits, and use them only in such instances.
	<b>Economic</b>	N/A	N/A
	<b>Other</b>	Organisational capacity limitations in terms of operations and maintenance.  Regulatory or political barriers.	Provide technical assistance and capacity building support to help industries implement emissions reduction technologies.  Ensure early commitment from all necessary levels of government and emphasise from the start the long-term nature of the investment, as well as the benefits.

Action 13: Mitigate industrial water pollution by strengthening enforcement of regulations on industrial wastewater discharge	Estimated Total Cost: €105,000
Description	<p>Industries in Samarkand region include manufacturing and production of machinery, vehicles, textiles, consumer goods, chemicals, beverages, food production and other consumer products. Wastewater produced by these industries is generally discharged to the municipal wastewater system and treated alongside domestic wastewater, as permitted by the 1993 Law on Water and Water Use, provided that the wastewater does not contain pollutants above specific levels. If that is the case, wastewater treatment must be managed by the enterprise discharging it. However, the extent of compliance with and enforcement of the 1993 Law is unclear and the number of enterprises that have wastewater treatment facilities is unknown. As industrial contamination has been reported in local water bodies, there appears to be more to do to mitigate industrial wastewater pollution. This Action seeks therefore to review and strengthen the enforcement of regulations on the discharge of industrial wastewater.</p> <p>The Action involves several steps to help protect the environment and ensure compliance:</p> <ol style="list-style-type: none"> <li><b>1. Review existing regulations:</b> <p>The first step will involve review and assessment of existing laws, regulations, and guidelines governing industrial wastewater discharge and how they are being implemented or enforced in Samarkand. Any ambiguities or shortcomings in the existing legislation and how it is being enforced or implemented should also be identified as part of this step.</p> <p>Further, a working group should be established consisting of key stakeholders such as the regional branches of the Ministry of Water, Ministry of Investments, Industry and Foreign Trade, State Committee on Environmental Protection, UzSuvta'minot, Uzhydromet and other relevant parties should be established. The working group should develop an integrated approach to the mitigation of pollution arising from industrial wastewater discharge. This would facilitate data, resource, and expertise sharing and enhance the effectiveness of enforcement of regulations.</p> </li> <li><b>2. Establish permitting procedure:</b> <p>As a next step, a permitting procedure for industrial wastewater discharge will be established as appropriate. This will include defining criteria for issuing permits, such as discharge limits, reporting requirements for submitting wastewater quality data, and monitoring criteria, such as pollutant concentrations, flow rate, pH, suspended solids, and others. A process for applying for a permit and determination of applications should be established, and a system of regular environmental inspections of industrial enterprises to verify compliance. This could involve site visits, wastewater effluent sampling, and audits of monitoring records. Further, an enforcement mechanism should be established to address non-compliance, such as fines, penalties or permit revocation.</p> </li> <li><b>3. Water quality data collection:</b> <p>There is a lack of good quality data on industrial wastewater treatment in Samarkand and water quality in receiving water bodies. A consistent water quality monitoring programme should be established in affected locations to collect baseline data, followed by regular water quality monitoring. This would enable the identification of pollution hotspots, enabling prioritisation of enforcement actions. Further, regular monitoring would enable environmental specialists to track progress over time and continue to evaluate the effectiveness of industrial wastewater discharge regulations. All data gathered, whether as part of baseline or ongoing monitoring, should be shared with the newly established environmental data team (see Action C1).</p> </li> <li><b>4. Stakeholder Outreach:</b> <p>To raise awareness of wastewater discharge regulations and best practice, the Action should also entail engagement with industrial stakeholders, including both state-owned enterprises, private sector industrial firms, and industrial joint ventures. This could include workshops, seminars, outreach events, educational materials, and guidance documents to help industries better understand their obligations, improve wastewater treatment practices, and foster collaboration between industrial enterprises and regulatory bodies.</p> </li> </ol>

<b>Sector</b>	<input checked="" type="checkbox"/> Industries <input checked="" type="checkbox"/> Water	
<b>Action Type</b>	<input type="checkbox"/> Investment ('Hard')	<input checked="" type="checkbox"/> Policy ('Soft')
<b>Implementation Timeframe</b>	2025 – 2029	
<b>Status</b>	<input type="checkbox"/> New <input type="checkbox"/> Planned <input checked="" type="checkbox"/> Ongoing	
<b>GCAP Action Classification</b>	<input type="checkbox"/> Capital Investment <input checked="" type="checkbox"/> Other Investment	If 'Other Investment,' what type? <input checked="" type="checkbox"/> Standards, guidelines, and regulations <input type="checkbox"/> Strategies, plans, and programmes <input type="checkbox"/> Investment-related feasibility study <input checked="" type="checkbox"/> Awareness, demonstration, training, and capacity building <input type="checkbox"/> Organisational measure <input type="checkbox"/> Behavioural measure <input checked="" type="checkbox"/> Monitoring, data collection, analysis, and studies
<b>Action Owner(s)</b>	<ul style="list-style-type: none"> <li>Ministry of Investments, Industry and Foreign Trade</li> <li>State Committee on Environmental Protection</li> <li>UzSuvta'minot JSC (Joint Stock Company)</li> </ul>	
<b>Other Stakeholders</b>	<ul style="list-style-type: none"> <li>Samarkand Suvta'minot</li> <li>Private sector industrial enterprises</li> <li>Samarkand Regional Department of Investments and Industry</li> <li>Zarafshan Basin Water Management Organization</li> <li>Ministry of Water Resources</li> </ul>	
<b>Location</b>	Along Zarafshan River and its tributaries; also all industrial enterprises within city boundary and across the wider urban area (the latter is where most heavy and polluting industry is concentrated). Large industrial areas outside the boundary include in Kimyogarlal, Charhin and Jomboy, and small industrial zones within the urban boundary are mainly concentrated in the outer western suburbs, for example in Bukharikishlak.	
<b>Priority Environmental Challenge(s) Addressed</b>	<b>Environment and Biodiversity:</b> <ul style="list-style-type: none"> <li>Pollution of important surface water sources</li> </ul> <b>Industries:</b> <ul style="list-style-type: none"> <li>Potentially hazardous industrial wastewater is discharged</li> </ul> <b>Water:</b> <ul style="list-style-type: none"> <li>Inadequate wastewater treatment</li> </ul>	
<b>Strategic Goal(s) Addressed</b>	<b>Environment and Biodiversity:</b> <ul style="list-style-type: none"> <li>Improve air and water quality in Samarkand</li> <li>Protect and enhance biodiversity in Samarkand</li> </ul> <b>Industries:</b> <ul style="list-style-type: none"> <li>Reduce the environmental impacts of industries</li> </ul>	
<b>Link(s) to Existing Policies/Plans/Projects</b>	<input checked="" type="checkbox"/> Yes <ul style="list-style-type: none"> <li>1993 Law on Water and Water Use (Article 74)</li> <li>Presidential and Ministerial Decrees aimed at protecting waterbodies (Decree No. PP-3286, Decree No. 164, and notably, Decrees No. 302 and No. 303)</li> <li>Uzbekistan Water Pollution Index</li> <li>National Strategy for Biodiversity Conservation for the Period of 2019-2028</li> <li>Concept of Environmental Protection of the Republic of Uzbekistan to 2030</li> <li>Law No. ZRU-57 on the industrial safety of hazardous production facilities</li> <li>Order No. 105 from the State Committee on Environmental Protection validating the regulation of emissions and pollutants by industrial enterprises</li> </ul> <input type="checkbox"/> No	
<b>Link(s) to Other GCAP Actions</b>	<input checked="" type="checkbox"/> Yes	

	<ul style="list-style-type: none"> <li>• <b>Action C1:</b> Establish a team for environmental data collection to gather and monitor data on buildings, industry, energy and DRR (Disaster Risk Reduction)</li> <li>• <b>Action C3:</b> Develop a digital reporting platform to engage citizens on environmental and climate issues and policy</li> <li>• <b>Action EB2:</b> Develop financial, legal and other incentives for polluters to minimise pollution and improve city liveability and resilience</li> <li>• <b>Action W2:</b> Develop Integrated Water Resource Management Plan, including drought management actions</li> </ul> <input type="checkbox"/> No			
<b>Cross-Cutting Themes</b>	<b>Climate and Disaster Risk</b>	<b>Smart Maturity</b>	<b>Gender and Social Inclusion</b>	<b>Heritage and Tourism</b>
	<input type="checkbox"/> Directly targeted <input type="checkbox"/> Some elements <input checked="" type="checkbox"/> No direct links <u>Reason:</u> There are no direct links between this Action and the management of climate and disaster risk.	<input type="checkbox"/> Directly targeted <input checked="" type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> There is significant potential for the data gathered and monitored as part of this Action to be digital, including digital sensing and mapping of pollution hotspots using GIS, with data shared through Actions C1 and C3.	<input type="checkbox"/> Directly targeted <input checked="" type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> Industrial wastewater discharge regulation will reduce pollution in receiving watercourses. Minimising pollution will improve health outcomes of low-income communities that tend to live nearer industrial areas.	<input type="checkbox"/> Directly targeted <input checked="" type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> Industrial wastewater discharge regulation will reduce pollution in receiving watercourses. This will promote tourism and recreational activities near water bodies.
<b>Implementation Process and Timeline</b>	<b>Step</b>		<b>Duration</b>	
	<b>1. Review existing regulations</b> a) <b>Review and assess existing laws regulations and guidelines, identifying any ambiguities or shortcomings</b> b) <b>Establish working group of key stakeholders</b>		1 year 6 months 6 months	
	<b>2. Establish permitting procedure</b> a) <b>Define criteria for issuing permits</b> b) <b>Create process for permit application submission and review</b> c) <b>Introduce procedure for conducting inspections</b> d) <b>Establish regulation enforcement mechanism</b>		2.5 years 4 months 1 year 8 months 6 months	
	<b>3. Water quality data collection</b> a) <b>Establish water quality monitoring programme</b>		6 months 6 months	
	<b>4. Stakeholder Outreach</b>		4 months	
<b>Indicative Project Costs</b>	<b>CapEx [€]</b>	<b>OpEx over 5 years [€]</b>	<b>Feasibility / Advisory Costs [€]</b>	
	n/a	n/a	105,000  <ul style="list-style-type: none"> <li>• Review existing regulations, establish permitting procedure, engage with stakeholders and monitor water quality: 91,000</li> <li>• Contingency (15%): 14,000</li> </ul>	
<b>Potential Financing Instruments and Sources</b>	<b>Instrument (Own-Source, Grant, Debt, Equity, Other)</b>		<b>Source (Municipal Government, State-Owned Enterprise, National Government, Private Sector, International Development Partner, Other)</b>	

	<b>Own Source</b>	Municipal Government		
	<b>Grant</b>	National Government		
	<b>Loan</b>	International Development Partner		
<b>Revenue Opportunities</b>	<input checked="" type="checkbox"/> Yes Industrial wastewater discharge permit application fees. Fines collected due to non-compliance with wastewater discharge regulations. <input type="checkbox"/> No			
<b>Impact Measures (Quantitative and Qualitative)</b>	<b>Environmental Impacts</b>	State indicators	2 – Biochemical Oxygen Demand (BOD) in rivers and lakes 2.1 – Ammonium (NH4) concentration in rivers and lakes 2.2 – Bathing waters meeting minimum standards	
		Pressure indicators	24 – Percentage of treated industrial wastewater 26.2 – Percentage of treated wastewater from energy generation activities	
		<b>Socio-economic Impacts</b>	Jobs created	1
			Social inclusion benefits	Implementing regulations on industrial wastewater discharge will decrease pollution in receiving water bodies. Reduction in pollution will enhance the health prospects of low-income communities that tend to reside closer to industrial zones.
	Other socio-economic benefits		Enforcing regulations on industrial wastewater discharge will mitigate pollution in watercourses, fostering tourism and recreational opportunities near water bodies.	
	<b>Climate Impacts</b>	Estimated carbon emissions reduction	No direct carbon emissions reduction associated with this Action.	
		Climate resilience benefits	Permitting for industrial wastewater discharge could integrate climate resilience by considering flood protection measures and backup systems to ensure continuous wastewater treatment during severe weather conditions.	
	<b>Nature &amp; Biodiversity Impacts</b>	Natural capital benefits	Industrial wastewater discharge regulation will reduce pollution in receiving watercourses. This will improve water quality, preserve biodiversity and protect aquatic habitats. This Action is also consistent with Priority Investment Area 1.5 in the Natural Capital Valuation for	

			Samarkand (see GCAP Appendix B)
	<b>Other Indicators/Co-benefits</b>	Operational cost, water, and/or energy savings, revenue generation, etc.	Revenue from industrial wastewater discharge permit application fees and fines collected due to non-compliance with wastewater discharge regulations.
<b>Potential Project Risks and Mitigation Options</b>	<b>Area</b>	<b>Risks</b>	<b>Mitigation Options</b>
	<b>Social</b>	Opposition from industrial stakeholders to regulating industrial wastewater discharge.	Foster stakeholder engagement, ensure transparent communication and participatory decision-making to address concerns and improve wastewater treatment practices. Work with central government to promote harmonised approach to industrial wastewater to ensure system is consistent across the country.
	<b>Environmental</b>	Unintended environmental consequences (for example, increased pollution through unregulated discharges).	Conduct impact assessments, consult with stakeholders and conduct regulatory reviews to identify opportunities to improve environmental outcomes. Monitor water pollution hotspots carefully to ensure no unregulated or unauthorised discharges.
	<b>Economic</b>	High cost of compliance.	Offer financial incentives, subsidies, or tax breaks to offset compliance costs.
	<b>Other</b>	Lack of enforcement capacity or data, including on water quality, to track progress.  Technological limitations associated with pollution control in industrial wastewater discharge	Invest in capacity-building, training, recruitment and technology upgrades to improve enforcement capability. Improve water quality data collection and analysis.  Provide technical assistance, financial incentives, and capacity building support to help industries adopt to wastewater discharge regulations.

## Solid Waste Actions

Action SW1: Invest in a waste-sorting facility and supporting infrastructure to improve recycling and reduce landfill	Estimated Total Cost: €31,621,000
<p><b>Description</b></p>	<p>There are two forms of waste collection in Samarkand<sup>70</sup>, door-to-door collection (used for traditional housing) and Waste Collection Points (WCPs). Informal waste pickers live and work at some WCPs, hand-sorting waste ahead of collection by Maroqand Obod (MO), selling recyclables to third parties.</p> <p>Estimates suggest that, as such, only 5% of all waste sent to landfill is recyclable, because many recyclables have been removed by waste pickers before that stage. However, across Uzbekistan as a whole, including Samarkand, statistics show that, consistent with other countries at the same level of development, at least 40%-60% of household waste that could be processed by the city is recyclable.<sup>71</sup> This shows a need for at-source separation of recyclables from other waste in Samarkand and an important new role for MO in processing the recyclables thus captured.</p> <p>This Action focuses on investing in the development of waste-sorting facilities and infrastructure to improve recycling and reduce landfill. The need for the Action has been recognised by Maroqand Obod and the main capital investment will be a dry Materials Recovery Facility (MRF) for the processing and sorting of recyclable waste. This will have significant environmental benefit by reducing the volume of waste sent to landfill (which generates methane emissions), and increasing the amount of waste recycled, thus saving primary resources as materials are reused.</p> <p>The MRF will complement source-segregated collection by functioning as a "clean" MRF, i.e. separating the different fractions of a mixed source-segregated waste collection (which would comprise dry mixed recyclables rather than all mixed waste- the latter is referred to as a "dirty" MRF, which is not proposed). As neither Uzbekistan nor Samarkand has specific national or regional recycling targets, the installed capacity of the MRF (40 kilotons per annum, kTpa) was estimated based on the population served and the quantity of waste generated.</p> <p>Samarkand Regional Government has stated that incineration remains for them an important management strategy for residual waste. This is certainly the case for e.g. hazardous and medical waste, and potentially also for non-recyclable household waste; this can significantly reduce pressure on landfill space, subject to minimising the environmental impacts of incineration. Incineration also offers opportunities for electricity and heat generation. As such, investment in an MRF should not be considered an alternative to incineration, rather complementary to it- recyclables can be processed by the MRF and non-recyclables be incinerated or sent to landfill. For this reason, consideration of the impacts of the MRF on other options for residual waste management has been included within the Feasibility Stage below.</p> <p>The MRF would be designed, built and operated as follows:</p> <p><b>1. Feasibility Stage:</b></p> <p>A feasibility study will be carried out to understand more clearly:</p> <ol style="list-style-type: none"> <li>a) The economic benefits and costs of MRF development with regard to design, build and operations costs versus current market demand for recycled materials and potential revenue streams.</li> <li>b) Consideration of the relevant impacts of the MRF on other options for residual waste management, such as incineration/energy from waste or mechanical-biological treatment</li> <li>c) Suitable, available and viable site(s) for MRF development, and any cost implications of each one.</li> </ol>

<sup>70</sup> Per person per day in Samarkand, 0.8kg of solid waste is produced (approximately 292kg per capita per year). In total, 777 tons of waste are sent to landfill every day; of this, 73% is household waste, 24% construction and demolition waste, 2% institutional and 1% other.

<sup>71</sup> Uzstat, (2023). Responsible Consumption and Production: Ensure Sustainable Consumption and Production Patterns, available at: <https://nsdg.stat.uz/en/goal/15>

	<p><b>d)</b> Further details on the sources and composition of the waste stream in Samarkand.<sup>72</sup></p> <p><b>e)</b> Environmental and social impacts (i.e. on existing informal waste-pickers) of MRF development and operation, and likely/appropriate mitigation strategies.</p> <p><b>f)</b> Requirements for securing funding for capital and operational expenditures.</p> <p><b>2. Design stage:</b></p> <p>Preliminary design options will be developed based on the outcomes of the feasibility study; a consistent assessment is then performed, with standard criteria, to select a preferred option to be taken into detailed design. At this point, the construction and operations process can also begin to be tailored to the preferred design.</p> <p><b>3. Construction stage:</b></p> <p>The MRF will be constructed in line with the agreed construction management stages and plan.</p> <p><b>4. Commissioning stage:</b></p> <p>Once construction is complete, the MRF will enter its commissioning phase, during which equipment, such as waste sorters, balers and conveyor belts, is ordered, installed and tested. Another main element of the commissioning stage is hiring and training operations staff, some or many of whom could be currently employed as informal waste pickers.</p> <p>Next, awareness raising among the general population will be needed of the new requirement for at-source separation of waste and what types of waste go into which stream- with the potential for incentives for compliance, for example a system of fines. Separate (ideally colour-coded) recycling sacks will need to be ordered and distributed. Maroqand Obod will need to integrate journeys to and from the MRF and/or new collection schedules into their existing waste collection operations. Existing waste collection vehicles may need to be adapted to maintain separation of waste streams.</p> <p><b>5. Operations stage:</b></p> <p>Once equipment has been installed and staff trained, the operations stage can begin, both of the MRF itself and the alterations needed to the existing waste collection system. Monitoring and reporting processes will need to be introduced and implemented.</p>	
<b>Sector</b>	<input checked="" type="checkbox"/> Solid Waste	
<b>Action Type</b>	<input checked="" type="checkbox"/> Investment ('Hard')	<input checked="" type="checkbox"/> Policy ('Soft')
<b>Implementation Timeframe</b>	2025 – 2030	
<b>Status</b>	<input type="checkbox"/> New <input type="checkbox"/> Planned <input checked="" type="checkbox"/> Ongoing	
<b>GCAP Action Classification</b>	<input checked="" type="checkbox"/> Capital Investment <input type="checkbox"/> Other Investment	<input type="checkbox"/> Standards, guidelines, and regulations <input type="checkbox"/> Strategies, plans, and programmes <input type="checkbox"/> Investment-related feasibility study <input type="checkbox"/> Awareness, demonstration, training, and capacity building <input type="checkbox"/> Organisational measure <input type="checkbox"/> Behavioural measure <input type="checkbox"/> Monitoring, data collection, analysis, and studies
<b>Action Owner(s)</b>	<ul style="list-style-type: none"> <li>SUE Maroqand Obod (MO)</li> </ul>	

<sup>72</sup> This is required in the feasibility study to fill existing information gaps. For example, waste sent to landfill is understood to be from both municipal solid waste (MSW) and non-MSW sources. However, it is not clear from the data whether the reported 24% of inputs which are construction and demolition waste (CDW) are from household construction works or, more likely, from larger scale construction works; and similarly the 73% of household waste may well include a proportion of waste from commercial activities (e.g. local shops and restaurants).

	<ul style="list-style-type: none"> <li>Samarkand City Government Mayor's office</li> <li>Samarkand Regional Government</li> </ul>			
<b>Other Stakeholders</b>	<ul style="list-style-type: none"> <li>Range of private sector waste collecting firms contracted by industry</li> <li>Agence Française de Développement (AFD)</li> <li>Ministry of Environmental Protection and Climate Change (MEPCC)</li> </ul>			
<b>Location</b>	<ul style="list-style-type: none"> <li>Location of MRF to be determined through analysis. Location of recently completed sanitary landfill, which is on open land to the south of the south-western urban ring road and Bukharikishlak, suggests that MRF is likely to be constructed in close proximity</li> <li>Remainder of Action applies to entire urban area served by Maroqand Obod</li> </ul>			
<b>Priority Environmental Challenge(s) Addressed</b>	<p><b>Solid Waste:</b></p> <ul style="list-style-type: none"> <li>Lack of at source separation of recyclables</li> <li>Lack of adequate recycling facilities</li> <li>Lack of proper industrial/construction waste disposal</li> </ul> <p><b>Climate Change and Resilience:</b></p> <ul style="list-style-type: none"> <li>Increasing greenhouse gas emissions</li> </ul>			
<b>Strategic Goal(s) Addressed</b>	<p><b>Solid Waste:</b></p> <ul style="list-style-type: none"> <li>Introduce comprehensive system of waste recycling in Samarkand</li> </ul>			
<b>Link(s) to Existing Policies/Plans/Projects</b>	<input checked="" type="checkbox"/> Yes <ul style="list-style-type: none"> <li>Republic of Uzbekistan, (2020). Presidential Decree: On Measures to Further Improve the System for Managing Activities in the Field of Handling Household and Construction Waste</li> <li>(National) Solid Waste Management Strategy 2019-2028</li> <li>Law No. 361-II on Waste (2002)</li> <li>In 2020, the three R's campaign (Reduce, Reuse, Recycle) was introduced in schools, kindergartens and mahallas to incentivise children and citizens to reduce waste generated and promote recycling</li> <li>The AFD/EU investment enables the construction of new Waste Collection Points for households</li> <li>AFD/EU investment in new sanitary landfill site meeting international standards</li> <li>AFD/EU investment in new waste collection vehicles</li> <li>Waste separation carried out by MO during collections</li> </ul> <input type="checkbox"/> No			
<b>Link(s) to Other GCAP Actions</b>	<input checked="" type="checkbox"/> Yes <ul style="list-style-type: none"> <li><b>Action SW2:</b> Investment in landfill biogas and digestion facilities to generate renewable energy and reduce landfill</li> <li><b>Action SW3:</b> Monitor and mitigate illegal waste dumping to improve city liveability and public health</li> </ul> <input type="checkbox"/> No			
<b>Cross-Cutting Themes</b>	<b>Climate and Disaster Risk</b>	<b>Smart Maturity</b>	<b>Gender and Social Inclusion</b>	<b>Heritage and Tourism</b>
	<input checked="" type="checkbox"/> Directly targeted <input type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> Investment in the development of waste-sorting facilities and infrastructure to improve recycling and reduce landfill directly reduces carbon emissions related to waste disposal, where landfill is a more carbon intensive	<input type="checkbox"/> Directly targeted <input checked="" type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> It is likely that digital technologies, including in weighing, scanning and sorting machinery, will be a feature of the MRF.	<input type="checkbox"/> Directly targeted <input checked="" type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> This Action may result in opportunities for informal waste workers to be recruited into Maroqand Obod as a result of the new, formalised jobs generated by this Action.	<input type="checkbox"/> Directly targeted <input type="checkbox"/> Some elements <input checked="" type="checkbox"/> No direct links <u>Reason:</u> There are no direct links between this action and heritage and tourism in Samarkand.

	process than recycling.			
Implementation Process and Timeline	<b>Step</b>		<b>Duration</b>	
	1. Feasibility stage: economic costs and benefits of MRF, site selection, environmental impact assessment, securing funding		• 1 year	
	2. Design stage; options appraisal, preferred option selection		9 months	
	3. Construction stage		3 years	
	4. Commissioning stage: ordering, installing and testing equipment, hiring and training staff, public awareness raising of recycling regime, new equipment and operational requirements for existing waste collection system		18 months	
	5. Operations stage		Ongoing	
Indicative Project Costs	<b>CapEx [€]</b>		<b>OpEx over 5 years [€]</b>	<b>Feasibility / Advisory Costs [€]</b>
	17,872,000 <ul style="list-style-type: none"> <li>Development of waste-sorting facilities and infrastructure: 11,700,000</li> <li>Main contractor preliminaries (15%): 1,755,000</li> <li>Main contractor overheads and profits (5%): 673,000</li> <li>Fees (10%): 1,413,000</li> <li>Contingency (15%): 2,331,000</li> </ul>		13,404,000	345,000 <ul style="list-style-type: none"> <li>Feasibility stage: 100,000</li> <li>Design stage: 100,000</li> <li>Commissioning stage: 100,000</li> <li>Contingency (15%): 45,000</li> </ul>
Potential Financing Instruments and Sources	<b>Instrument</b>		<b>Source (Municipal Government, State-Owned Enterprise, National Government, Private Sector, International Development Partner, Other)</b>	
	Own-Source		Municipal Government	
	Loan		Private Sector	
	Loan		International Development Partner	
	PPP		Maroqand Obod and Private Sector	
Revenue Opportunities	<input checked="" type="checkbox"/> Yes Samarkand City local authority tax on waste collection. (e.g. household collection to be free, commercial and industrial waste collection requiring Waste Management Plans) <input type="checkbox"/> No			
Impact Measures (Quantitative and Qualitative)	<b>Environmental Impacts</b>		State indicators	4 – Contaminated sites 4.1 – Concentration of mercury in soil 4.2 – Concentration of cadmium in soil 4.3 – Concentration of zinc in soil 4.4 – Concentration of mineral oil in soil (using infrared spectroscopy)
			Pressure indicators	29 – Total municipal solid waste generation per capita 30 – Waste collection service coverage rate 30.1 – Proportion of dry recyclables 30.2 – Proportion of organic waste 31 – Municipal solid waste treated in sorting, processing and treatment plants

			31.1 – Municipal solid waste disposed in open dumps 31.2 – Municipal solid waste disposed in EU – compliant/ equivalent sanitary landfills 32 – Remaining life of current landfill(s)
<b>Socio-economic Impacts</b>	Jobs created		524
	Social inclusion benefits		Potential for informal waste collectors to be offered formalised recycling roles within Maroqand Obod as a result of jobs generated.
	Other socio-economic benefits		N/A
<b>Climate Impacts</b>	Estimated carbon emissions reduction		18,000 tCO <sub>2</sub> e annually
	Climate resilience benefits		Introducing more formalised recycling system and a supporting media awareness campaign will raise awareness of the role of recycling in climate change mitigation through reduced use of resources.
<b>Nature &amp; Biodiversity Impacts</b>	Natural capital benefits		Reducing amount of waste going to landfill reduces harm to natural capital assets (e.g. soil) in proximity landfill sites.
<b>Other Indicators/Co-benefits</b>	Operational cost, water, and/or energy savings, revenue generation, etc.		Based on its capacity of 40,000 tonnes per annum and on the composition of recyclables in the municipal solid waste stream in Uzbekistan, the MRF has potential to save an estimated 276.7 GWh of energy annually by recycling materials that would otherwise be produced from scratch. However, it is important to note that these energy savings are global- they do not apply to Samarkand or Uzbekistan alone.  While there will be significantly increased revenue from the sale of recyclables by Maroqand Obod, this is not possible to quantify at present as the market for recyclables in Uzbekistan is not sufficiently developed and the price per tonne of recycled material is volatile over time. However, indicative prices in the EU for recycled material as of 2022 were as follows: 65 EUR/tonne for glass, 206 EUR/tonne for paper and

			cardboard and 454 EUR/tonne for plastic. <sup>73</sup>
Potential Project Risks and Mitigation Options	Area	Risks	Mitigation Options
	<b>Social</b>	Operational impact of new facility on neighbouring communities (dust, odour, noise, traffic movements etc).  Health risks of dust/bacteria on recyclables.  Risk of informal waste pickers continuing to operate	Site selection for new MRF takes into account impact on local residents; a site is selected with minimal impact.  Engage with any local communities that may nevertheless be affected and communicate project benefits; discuss options for mitigation of impacts (e.g. routing construction traffic away from residential roads, sensitive timing of noisy operations).  MRF employees provided with appropriate personal protective equipment and training to minimise or eliminate health risks from material being processed.  Ensure better economic incentives for informal waste pickers, in terms of working conditions and pay, within the formal system than outside it. Effective monitoring of number of informal waste pickers trained/integrated into MO operations versus those still operating outside it, and adjust incentives accordingly.
	<b>Environmental</b>	Risk of air, water and soil pollution from operations.	Design pollution mitigation features into new facility, in line with recognised international standards for MRF development (for example, EU standards).
	<b>Economic</b>	High initial costs.  Value of recyclables sold.	Funding sources to be reviewed, including options for grants, public-private partnerships or long-term loans. Explore opportunities for cost savings and/or viability of intervention- noting additional potential for municipal revenue generation from sale of valuable recyclables.  Seek diverse opportunities and contracts for sale of recyclables to spread market risk and to cover fluctuations in market value.
	<b>Other</b>	Construction phase impacts on nearby residents and/or businesses.	Minimise construction site impact on public – safe passage for pedestrians and traffic, restricted construction hours, construction noise, dust, and vibration restrictions.

<sup>73</sup> Eurostat, (2024). Recycling- Secondary Material Price Indicator. Available at: [https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Recycling\\_%E2%80%93\\_secondary\\_material\\_price\\_indicator](https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Recycling_%E2%80%93_secondary_material_price_indicator)

Action SW2: Pilot investment in landfill biogas and digestion facilities to generate renewable energy and reduce landfill		Estimated Total Cost: €423,000	
<b>Description</b>	<p>One of the dominant types of waste in Samarkand is putrescibles (organic waste), which makes up 41% of total weight.<sup>74</sup> As a result, landfills can emit up to 400 kgCO<sub>2e</sub> per tonne of organic waste.<sup>75</sup> Biogas production starts slowly and increases as waste decomposes. Within 1-2 years after placement, the rate of gas production per metric ton of waste starts to increase, typically peaking 5-7 years after the waste is placed. This Action identifies a pilot investment that can be implemented to capture landfill biogas and incorporate organic waste treatment technology into Samarkand's current waste management processes.</p> <p>A pilot study was run some years ago by the Regional and/or city government, but it was found not to be feasible (details of how or why were not provided). However, this Action is proposed on the basis that the context is likely to have changed significantly enough since the original pilot study (increased rate of economic growth, increased urban population/waste generation, increased investment in the solid waste sector, and increased focus on climate change in national policy) for a new pilot to be worthwhile.</p> <p>A new sanitary landfill in Samarkand that could in theory collect biogas from organic waste (but is not yet equipped to do so) has just been completed. This biogas could be captured and used as fuel for heating or for generating electricity. This Action is a pilot investment only. Therefore, it covers only the first step of the process, which is to:</p> <ul style="list-style-type: none"> <li>design an implementation approach, including assessment of any environmental risks of the process, and perform initial pilot testing of physical feasibility of large-scale gas capture by capturing a small amount initially and testing its composition.</li> </ul> <p>If the initial pilot investment is successful, then the next stages of the process (not costed or scoped within this Action) would be as follows:</p> <ul style="list-style-type: none"> <li>Procurement and assembly required which will likely include: <ul style="list-style-type: none"> <li>-Installation of vertical pipes and wells to collect biogas</li> <li>-Installation of systems to manage, treat and safety dispose of leachate and condensation gathered</li> <li>-Installation of system to remove contaminants including water vapour and hydrogen sulphide (H<sub>2</sub>S)</li> <li>-Installation of control system for management, monitoring and maintenance</li> </ul> </li> <li>Commissioning of appropriate grid-connected conversion technology (e.g. turbine, fuel cell) to convert residual biogas into electricity or heat</li> </ul> <p>If the capture and use of biogas is not feasible at scale for any reason, an alternative approach could be piloted instead, such as a Mechanical Biological Treatment (MBT) plant, anaerobic digestion or composting (subject to development of infrastructure enabling source separation of biowaste). However, in the current context, whereby a large new landfill has recently been completed but such alternative technologies would have to be built from scratch, it is logical for the landfill option to be prioritised for the Action.</p> <p>In the longer-term, subject to the results of future feasibility testing, there could be the potential to use digesters fed by separated biowaste rather than sending it to landfill, which would have the added benefit of reducing overall volume of waste sent to landfill. In this context, when estimating future total landfill gas yield, a range of scenarios for future residual waste management would need to be considered.</p>		
	<b>Sector</b>	<input checked="" type="checkbox"/> Solid Waste	
	<b>Action Type</b>	<input checked="" type="checkbox"/> Investment ('Hard') <input type="checkbox"/> Policy ('Soft')	
	<b>Implementation Timeframe</b>	2025 – 2026	

<sup>74</sup> Samarkand Waste Characterisation Report (AFD, 2015). Not available online.

<sup>75</sup> The exact kgCO<sub>2e</sub> of biogas emitted per tonne of organic waste in any specific landfill can be estimated through more detailed analysis, as it depends on several factors, including the composition of the waste, the age of the landfill, moisture content, temperature, and management practices.

<b>Status</b>	<input type="checkbox"/> New <input type="checkbox"/> Planned <input checked="" type="checkbox"/> Ongoing			
<b>GCAP Action Classification</b>	<input checked="" type="checkbox"/> Capital Investment <input type="checkbox"/> Other Investment	If 'Other Investment,' what type? <input type="checkbox"/> Standards, guidelines, and regulations <input type="checkbox"/> Strategies, plans, and programmes <input type="checkbox"/> Investment-related feasibility study <input type="checkbox"/> Awareness, demonstration, training, and capacity building <input type="checkbox"/> Organisational measure <input type="checkbox"/> Behavioural measure <input type="checkbox"/> Monitoring, data collection, analysis, and studies		
<b>Action Owner(s)</b>	<ul style="list-style-type: none"> <li>• Maroqand Obod SUE</li> <li>• Samarkand City Government Mayor's Office</li> </ul>			
<b>Other Stakeholders</b>	<ul style="list-style-type: none"> <li>• Agence Française de Développement</li> <li>• Ministry of Environmental Protection and Climate Change</li> </ul>			
<b>Location</b>	New Samarkand Municipal landfill site (on open land to the south of the south-western urban ring road and Bukharikishlak)			
<b>Priority Environmental Challenge(s) Addressed</b>	<b>Climate Change and Resilience:</b> <ul style="list-style-type: none"> <li>• Lack of clarity on local government role in emissions reduction</li> </ul> <b>Solid Waste:</b> <ul style="list-style-type: none"> <li>• Water, air, and soil pollution from landfills</li> </ul>			
<b>Strategic Goal(s) Addressed</b>	<b>Environment and Biodiversity:</b> <ul style="list-style-type: none"> <li>• Improve air and water quality in Samarkand</li> </ul> <b>Climate change and Resilience:</b> <ul style="list-style-type: none"> <li>• Continue transition to renewable energy</li> </ul>			
<b>Link(s) to Existing Policies/Plans/Projects</b>	<input checked="" type="checkbox"/> Yes <ul style="list-style-type: none"> <li>• AFD, (2023). Consultancy Services on Analysing Possibilities of Improvement of Solid Waste Management in Samarkand City and Region through the Involvement of Private Actors</li> <li>• AFD/EU investment in new sanitary landfill site meeting international standards</li> <li>• Proposals to fuel waste collection trucks with biogas (small-scale waste-to-energy)</li> <li>• Feasibility studies have been undertaken previously for small, mobile composting units. Maroqand Obod has plans for the introduction of composting once the proposed MRF will result in the separation of wet (biodegradable) waste from dry waste</li> </ul> <input type="checkbox"/> No			
<b>Link(s) to Other GCAP Actions</b>	<input checked="" type="checkbox"/> Yes <ul style="list-style-type: none"> <li>• <b>Action SW1:</b> Invest in a waste-sorting facility and supporting infrastructure to improve recycling and reduce landfill</li> </ul> <input type="checkbox"/> No			
<b>Cross-Cutting Themes</b>	<b>Climate and Disaster Risk</b>	<b>Smart Maturity</b>	<b>Gender and Social Inclusion</b>	<b>Heritage and Tourism</b>
	<input checked="" type="checkbox"/> Directly targeted <input type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> Capturing biogas directly removes/reduces methane (i.e. GHG) produced by the landfill from the atmosphere, thus	<input type="checkbox"/> Directly targeted <input checked="" type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> There is obvious potential for the monitoring and management data (for example, on gas flow) generated by the pilot study to be captured and shared digitally.	<input type="checkbox"/> Directly targeted <input type="checkbox"/> Some elements <input checked="" type="checkbox"/> No direct links <u>Reason:</u> There are no direct links between this Action and gender and social inclusion.	<input type="checkbox"/> Directly targeted <input type="checkbox"/> Some elements <input checked="" type="checkbox"/> No direct links <u>Reason:</u> There are no direct links between this Action and heritage and tourism.

	reducing climate change risk.			
<b>Implementation Process and Timeline</b>	<b>Step</b>		<b>Duration</b>	
	1. Design approach		1 year	
	2. Installation and commissioning of infrastructure (pipes, wells, leachate systems, contaminant systems, control system, conversion technology)		6 months	
	3. Pilot operation period		1 year	
	4. Gather data and review results		3 months	
<b>Indicative Project Costs</b>	<b>CapEx [€]</b>	<b>OpEx over 5 years [€]</b>	<b>Feasibility / Advisory Costs [€]</b>	
	n/a	10,000	413,000 <ul style="list-style-type: none"> <li>Pilot project: 359,000</li> <li>15% contingency: 54,000</li> </ul>	
<b>Potential Financing Instruments and Sources</b>	<b>Instrument (Own-Source, Grant, Debt, Equity, Other)</b>		<b>Source (Municipal Government, State-Owned Enterprise, National Government, Private Sector, International Development Partner, Other)</b>	
	<b>Own Source</b>		Municipal Government	
	<b>Equity</b>		Maroqand Obod	
	<b>Grant</b>		National Government	
<b>Revenue Opportunities</b>	<input checked="" type="checkbox"/> Yes 4. Sale of biogas <input type="checkbox"/> No			
<b>Impact Measures (Quantitative and Qualitative)</b>	<b>Environmental Impacts</b>		State indicators	N/A
			Pressure indicators	16 – Share of renewable in total energy consumption 30.2 – Proportion of organic waste 31.2 – Municipal solid waste disposed in EU – compliant/ equivalent sanitary landfills 32 – Remaining life of current landfill
	<b>Socio-economic Impacts</b>		Jobs created	7
			Social inclusion benefits	Eventual large-scale capture of biogas is likely to improve local air quality in the vicinity of the landfill- having significant positive effects on the poorest and most vulnerable sectors of the city population who live nearby.
			Other socio-economic benefits	Eventual large-scale biogas capture can help reduce odour in the vicinity of the landfill site, thus improving amenity for local residents, likely some of the poorest and most vulnerable in the city.
<b>Climate Impacts</b>		Estimated carbon emissions reduction	None in the pilot project, but if pilot demonstrates biogas capture is feasible for whole	

			landfill, then 44,000 tCO <sub>2</sub> e annually
		Climate resilience benefits	Biogas capture contributes to lower levels of methane emissions, which has overall climate change benefits.
	<b>Nature &amp; Biodiversity Impacts</b>	Natural capital benefits	Biogas capture entails reduction of leachate entering the local soil and water sources, and improves local air quality by reducing methane emissions, thus offering natural capital benefits in terms of air, water and soil quality.
	<b>Other Indicators/Co-benefits</b>	Operational cost, water, and/or energy savings, revenue generation, etc.	Revenue generated by sale of biogas; potential for operational cost savings if waste collection trucks can be adapted to run on biogas collected.
<b>Potential Project Risks and Mitigation Options</b>	<b>Area</b>	<b>Risks</b>	<b>Mitigation Options</b>
	<b>Social</b>	Public opposition due to concerns about safety.	Engage with the community to provide transparent, accessible information about the project and be clear on project benefits and safety measures that will be taken.
	<b>Environmental</b>	Mismanagement or leakage of leachate can lead to contamination of local soil and ground water sources.	Ensure an appropriate treatment for/safe disposal of landfill leachate. Periodic quality testing of leachate capture equipment, and monitoring of nearby water sources and soil quality, can provide early warnings of leakages.
	<b>Economic</b>	Uncertain return on investment- the price of gas fluctuates.	Seek long-term contracts for sale of biogas if possible. Diversify uses of biogas to hedge against demand fluctuations.
		High initial costs of installation.	Suggested approach of piloting study to determine feasibility ahead of large-scale rollout should help to mitigate this risk.
<b>Other</b>	Methane is a highly combustible gas, and mismanagement can lead to significant health and safety risks.	Develop robust safety processes and comprehensive training, including education of on-site workers and site managers to help prevent the likelihood of accidents.	
	Benefits/feasibility of initial pilot not clear due to ineffective or inadequate monitoring or evaluation.	Accurate, comprehensive KPIs developed from the start, coupled with effective and sustained monitoring across the lifetime of the pilot, with a clear final evaluation of performance across KPIs to give clear answer on feasibility of upscaling the pilot project.	

Action SW3: Monitor and mitigate illegal waste dumping to improve city liveability and public health	Estimated Total Cost: €1,409,000
Description	<p>Samarkand has a significant number of sites where waste is dumped illegally, which are classified for administrative purposes as ‘unofficial’ sites. There is an even greater number of sites classified as ‘other’ where waste is dumped more irregularly. UNECE data shows there are 86 “unofficial” and an estimated 2,502 “other” sites. “Unofficial” sites show evidence of dumped industrial waste, and thus land and soil contamination levels are likely high. “Other” sites have more limited information on waste contamination and volume.</p> <p>Within the area served by Maroqand Obod illegal waste dumping needs better monitoring, management and mitigation.</p> <p>Once implemented, the additional data provided by this Action will provide a firm basis for enabling, derisking and justifying development and infrastructure investments that are not yet possible (or carry high financial risk) in Samarkand due to a lack of basic data; these include investments such as: expansion of legal, controlled and properly managed waste disposal sites; new hazardous waste disposal infrastructure designed to manage the specific types of hazardous waste most commonly disposed of illegally; and effective large-scale remediation and re-landscaping of existing illegal dumping sites.</p> <p>To implement this Action, the following steps will be needed:</p> <p><b>1. Baseline survey of activity/scale of problem:</b></p> <p>The first step required is to design and execute a baseline survey of illegal dumping activity to determine the scale of the problem. This will initially focus only on the ‘unofficial’ rather than the ‘other’ sites. The scope of the baseline survey will depend on the extent of the information already available, i.e. any existing monitoring or enforcement activity carried out by Maroqand Obod patrol teams, ideally supported by camera drones (if no patrol team exists, one should be established for the baseline survey). The survey needs to give a robust picture of a) number of unofficial sites in regular use, b) approximate number of dumping incidents in each one per week, c) approximate volume of waste illegally dumped per week. The baseline survey does not yet need monitoring technology such as cameras- rather, it can be done through regular visual inspection by environmental enforcement officers (and if this is happening already, scaling up existing activity to cover all unofficial sites on a weekly basis). Enforcement officers may also engage with specific mahalla committees to contribute to monitoring efforts to increase the effectiveness/accuracy of the baseline survey. The results of the baseline survey should be captured digitally and sent to the environmental data team (see Action C1).</p> <p><b>2. Pilot monitoring and mitigation measures at ten most active sites:</b></p> <p>The results of the baseline survey can then inform a pilot of more sophisticated and formal monitoring of the ten most active sites, through use of hidden surveillance cameras at site entries and/or exits, and if necessary motion sensors and camera drones. Regular and rigorous data capture will record number of dumping incidents per week, but can now also capture licence plates of vehicles used for dumping, thus enabling appropriate fines for perpetrators using the existing system of fines for illegal dumping. Perpetrators could also be subject to mandatory training on proper disposal of waste and the level of fines could increase for repeat offenders. In future, the city may consider alternative behaviour change mechanisms such as, for example, integrating fines into utility bills or deduction of driving points; this could lead to more systemic change.</p> <p>Digital data can be processed by Maroqand Obod and then sent to the environmental data team. Another two teams would need to be established at Maroqand Obod, if they do not already exist: a) a surveillance team to monitor the footage from the surveillance cameras and the data from the motion sensors and b) a financial enforcement team to investigate, send out and collect fines. At the end of the pilot period, the total amount of waste estimated to have been dumped at the pilot sites can be cross-referenced with the total amount of waste estimated to have been dumped at the same sites during the baseline survey to determine the effectiveness of the pilot measures as a deterrent.</p> <p><b>3. Expand measures to all unofficial sites, incorporating lessons learned:</b></p>

	<p>Incorporating lessons learned from the pilot, the surveillance and motion capture technology will be installed at all 86 unofficial sites, and the capacity of the Maroqand Obod monitoring and enforcement team increased accordingly. Data will continue to be captured digitally and sent to the environmental data team. In the even longer term, successful elements of the monitoring and mitigation activity could be extended to the many more 'other' sites- in particular, given the sheer number of 'other' sites, formalising monitoring and mitigation on the part of mahalla committees (if not already taking place) will be particularly important. Here, Action C3 establishing a digital platform for citizen reporting of environmental issues such as illegal dumping could also be particularly important.</p> <p>In the longer term, but not covered by this Action, options to decontaminate/clean up and ideally permanently close as many of the 'unofficial' and 'other' sites as possible should be explored.</p>	
<b>Sector</b>	<input checked="" type="checkbox"/> Environment and Biodiversity <input checked="" type="checkbox"/> Land Use <input checked="" type="checkbox"/> Solid Waste	
<b>Action Type</b>	<input type="checkbox"/> Investment ('Hard')	<input checked="" type="checkbox"/> Policy ('Soft')
<b>Implementation Timeframe</b>	2025 – 2029, then ongoing	
<b>Status</b>	<input checked="" type="checkbox"/> New <input type="checkbox"/> Planned <input type="checkbox"/> Ongoing	
<b>GCAP Action Classification</b>	<input type="checkbox"/> Capital Investment <input checked="" type="checkbox"/> Other Investment	If 'Other investment,' what type? <input type="checkbox"/> Standards, guidelines, and regulations <input checked="" type="checkbox"/> Strategies, plans, and programmes <input type="checkbox"/> Investment-related feasibility study <input type="checkbox"/> Awareness, demonstration, training, and capacity building <input type="checkbox"/> Organisational measure <input checked="" type="checkbox"/> Behavioural measure <input checked="" type="checkbox"/> Monitoring, data collection, analysis, and studies
<b>Action Owner(s)</b>	<ul style="list-style-type: none"> <li>• Maroqand Obod SUE</li> <li>• Ministry of Environmental Protection and Climate Change</li> <li>• Samarkand City mayor's office</li> </ul>	
<b>Other Stakeholders</b>	<ul style="list-style-type: none"> <li>• Mahalla committees</li> <li>• Newly established Samarkand Regional Government environmental data team</li> </ul>	
<b>Location</b>	Known "unofficial" dumping sites in Samarkand City, as follows: <ul style="list-style-type: none"> <li>• Waste land along the Zarafshan River valley and its floodplain</li> <li>• South-west of the city (open land south of Sat-Tepo)</li> <li>• In the area west of the city (floodplain and open land in Kimyogarlal- Bukharikishlak corridor)</li> </ul>	
<b>Priority Environmental Challenge(s) Addressed</b>	<b>Environment and Biodiversity:</b> <ul style="list-style-type: none"> <li>• Pollution of important surface water sources</li> </ul> <b>Solid Waste:</b> <ul style="list-style-type: none"> <li>• Illegal waste dumping</li> <li>• Lack of proper industrial/construction waste disposal</li> <li>• Lack of proper hazardous waste disposal</li> </ul>	
<b>Strategic Goal(s) Addressed</b>	<b>Environment and Biodiversity:</b> <ul style="list-style-type: none"> <li>• Improve air and water quality in Samarkand</li> </ul> <b>Industries:</b> <ul style="list-style-type: none"> <li>• Reduce the environmental impact of industries</li> </ul> <b>Solid waste:</b> <ul style="list-style-type: none"> <li>• Introduce comprehensive system of waste recycling in Samarkand</li> </ul>	

<p><b>Link(s) to Existing Policies/Plans/Projects</b></p>	<input checked="" type="checkbox"/> Yes <ul style="list-style-type: none"> <li>• AFD (2023). Consultancy Services on Analysing Possibilities of Improvement of Solid Waste Management in Samarkand City and Region through the Involvement of Private Actors</li> <li>• Solid Waste Management Strategy 2019-2028</li> <li>• Ministry of the Environment regulatory framework, requiring Waste Management Plans to be developed by each enterprise</li> <li>• Republic of Uzbekistan (2020). Presidential Decree: On Measures to Further Improve the System for Managing Activities in the Field of Handling Household and Construction Waste</li> </ul> <input type="checkbox"/> No			
<p><b>Link(s) to Other GCAP Actions</b></p>	<input checked="" type="checkbox"/> Yes <ul style="list-style-type: none"> <li>• <b>Action C3:</b> Develop a digital reporting platform to engage citizens on environmental and climate issues and policy</li> <li>• <b>Action SW1:</b> Invest in a waste-sorting facility and supporting infrastructure to improve recycling and reduce landfill</li> </ul> <input type="checkbox"/> No			
<p><b>Cross-Cutting Themes</b></p>	<p><b>Climate and Disaster Risk</b></p>	<p><b>Smart Maturity</b></p>	<p><b>Gender and Social Inclusion</b></p>	<p><b>Heritage and Tourism</b></p>
	<input type="checkbox"/> Directly targeted <input checked="" type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> By mitigating illegal dumping of waste, it is likely that more waste will be gathered through the official collection system, where it will have a lower climate impact (for example, disposed of in EU-standard sanitary landfill)	<input checked="" type="checkbox"/> Directly targeted <input type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> This Action relies on significant digital and smart technologies; surveillance cameras, motion sensors, drones and citizen reporting of illegal dumping through a digital platform (linked to Action C3).	<input type="checkbox"/> Directly targeted <input checked="" type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> This Action is likely to reduce the negative environmental impacts of illegal dumping, including of hazardous or toxic waste, on local communities near illegal sites, likely to be the poorest and most excluded sections of the population.	<input type="checkbox"/> Directly targeted <input checked="" type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> Management and mitigation of illegal waste dumps will have obvious and positive impacts on local amenity for tourism and for heritage assets
<p><b>Implementation Process and Timeline</b></p>	<p><b>Step</b></p>			<p><b>Duration</b></p>
	<p>1. <b>Baseline survey of activity/scale of the problem (including time for survey design/development)</b></p>			<p>1 year</p>
	<p>2. <b>Pilot monitoring and mitigation measures at ten most active sites (including preparation time)</b></p>			<p>9 months</p>
	<p>3. <b>Expand pilot to all unofficial sites, incorporating lessons learned</b></p>			<p>2 years-ongoing</p>
<p><b>Indicative Project Costs</b></p>	<p><b>CapEx [€]</b></p>		<p><b>OpEx over 5 years [€]</b></p>	<p><b>Feasibility / Advisory Costs [€]</b></p>
	<p>1,104,000</p> <ul style="list-style-type: none"> <li>• Pilot monitoring and mitigation measures at ten most active sites: 100,000</li> <li>• Expand pilot to all unofficial sites, incorporating lessons learned: 860,000</li> <li>• Contingency (15%): 144,000</li> </ul>		<p>276,000</p>	<p>29,000</p> <ul style="list-style-type: none"> <li>• Baseline survey of activity/scale of problem: 25,000</li> <li>• Contingency (15%): 4,000</li> </ul>
<p><b>Potential Financing Instruments and Sources</b></p>	<p><b>Instrument (Own-Source, Grant, Debt, Equity, Other)</b></p>		<p><b>Source (Municipal Government, State-Owned Enterprise, National Government, Private Sector, International Development Partner, Other)</b></p>	
	<p><b>Own Source</b></p>		<p>Municipal Government</p>	

	<b>Grant</b>	National Government	
	<b>Loan</b>	International Development Partner	
<b>Revenue Opportunities</b>	<input checked="" type="checkbox"/> Yes Likely increase in revenue from increased fines/penalties for illegal dumping Potential increase in revenue from more recyclable material available for processing <input type="checkbox"/> No		
<b>Impact Measures (Quantitative and Qualitative)</b>	<b>Environmental Impacts</b>	State indicators	4 – Contaminated sites 4.1 – Concentration of mercury in soil 4.2 – Concentration of cadmium in soil 4.3 – Concentration of zinc in soil 4.4 – Concentration of mineral oil in soil (using infrared spectroscopy)
		Pressure indicators	23 – Share of industrial waste recycled 30 – Waste collection service coverage rate 30.1 – Proportion of dry recyclables 30.2 – Proportion of organic waste 31 – Municipal solid waste treated in sorting, processing and treatment plants 31.1 – Municipal solid waste disposed in open dumps 31.2 – Municipal solid waste disposed in EU – compliant/ equivalent sanitary landfills
	<b>Socio-economic Impacts</b>	Jobs created	50
		Social inclusion benefits	Local amenity and health outcomes likely to be improved through mitigation of illegal dumping.
		Other socio-economic benefits	Revenue generation opportunities from penalties and fines for illegal dumping.
	<b>Climate Impacts</b>	Estimated carbon emissions reduction	No direct carbon emissions reduction associated with this Action.
		Climate resilience benefits	No direct climate resilience benefits.
	<b>Nature &amp; Biodiversity Impacts</b>	Natural capital benefits	Reduces likelihood of leachate and gases contaminating soil, air and water sources or waterways and hence reduces impact of pollution on natural habitats.
	<b>Other Indicators/Co-benefits</b>	Operational cost, water, and/or energy savings,	N/A - already noted previously

		revenue generation, etc.	
Potential Project Risks and Mitigation Options	Area	Risks	Mitigation Options
	<b>Social</b>	Surveillance technology misused-privacy concerns (perceived or actual) arising from data capture.	Maroqand Obod surveillance/patrol teams to receive appropriate training in regulations/requirements relating to data capture and storage- use of surveillance technology to be limited only for specific purposes of crime prevention and not to be stored for longer than is necessary to achieve that goal.
	<b>Environmental</b>	Exposure to hazardous waste for Maroqand Obod patrols and/or community volunteers.	Appropriate protective equipment to be provided to/used by Maroqand Obod when patrolling/examining illegal dump sites to protect operatives from the effects of toxic of hazardous waste.
	<b>Economic</b>	Insufficient technical capacity or funding for Maroqand Obod to resource the programme.	Maximise use of cost-effective technologies such as surveillance cameras and drones. Seek to maximise community/voluntary contribution to the Action through effective partnership working with relevant mahalla committees.
	<b>Other</b>	<p>Fine/penalty collection rate low.</p> <p>Pilot of measures may find little impact on dumping behaviour.</p> <p>Malfunctioning or deliberately vandalised technology (surveillance cameras, drones, motion sensors).</p>	<p>Ensure that front-end patrols and surveillance are backed up effectively by end-stage actions, i.e. effective financial enforcement; ensure sufficient resources (time and budget) are provided for the deterrent stage as much as much as for the patrol/survey stage.</p> <p>Purpose of pilot is to learn by trial and error without significant outlay of resources upfront; ensure lessons are learnt from pilot, including that if little impact is made on dumping behaviour, the possible reasons for this and options for redesign/new approach.</p> <p>Seek to minimise vandalism of surveillance technology by keeping it hidden/unobtrusive; ensure access to maintenance/repair specialists in cases where technology malfunctions or has been vandalised.</p>

# Transport Actions

Action T1: Extend and integrate public transport network, including trams and e-buses, to reduce reliance on cars and cut air pollution	Estimated Cost over GCAP period: €118,181,000
<p><b>Description</b></p>	<p>There are opportunities to build on the successful and ongoing EBRD e-buses investment to further improve the quality and reliability of the public transport network across Samarkand. In order to see the benefits in reduced car use and uptake of public transport, there is a need to make the public transport network more integrated and user-friendly- with better ease of payment (smart/contactless), better access to buses, and an improved tram network. This includes measures to better integrate different transport modes through common ticketing. This action can itself be integrated with the improved pedestrian and cycle environment proposed through Action T3 and accessibility to the public realm green infrastructure improvements proposed through actions UD1 and UD2; it will also cut congestion and air pollution from private vehicles. It can be broken down as follows:</p> <p><b>1. Digital / smart transport:</b></p> <p>Rollout of contactless and top-up travel cards and readers across the city’s public transportation network to enable seamless travel and interchange between modes. This will require top-up machines to enable customers to buy travel cards and top them up with cash or card payments.</p> <p>All buses and trams should be fitted with contactless and travel card payment devices to reduce the need for ticket inspections and drive higher revenue capture. Public transport will also become more attractive for customers, and modal shift will occur from private vehicles, increasing public transport ridership and revenue. Samarkand railway station should also enable those arriving by train to have convenient wayfinding for onward tram and bus travel. This can be achieved by public maps in Uzbek, Russian and English, a travel information desk and travel card machines.</p> <p>Tram and bus stops should have digital dot matrix displays showing where services are going and how long the wait times are. This will require total digitisation of the system, including establishing a central data centre and control facility where operatives can monitor the system, communicating with vehicle operators to understand where and why issues are occurring and deal with any reported incidents of breakdowns, congestion delays, signalling issues or rider emergencies.</p> <p><b>2. Tram network:</b></p> <p>The existing Samarkand tram network is successful and popular, and the Samarkand Transport Masterplan recommended its extension. As such, up to eight kilometres of new tram lines should be created to achieve a 19 kilometre tram network, from the existing baseline of 11.4km. Based on EBRD estimates, this extension will require 10 to 15 additional tram cars and associated modernisation of supporting infrastructure (tracks and depots). Wherever possible, tram and bus stops should be co-located at convenient interchange locations, with associated public realm and pedestrian improvements through the implementation of multi-modal “mobility hubs.”</p> <p><b>3. Bus network:</b></p> <p>Samarkand has around 1,025 bus stops across its 65 bus routes, the majority of which require upgrading, with seating, bus shelters and level access for those using push chairs and wheelchairs. The city should plan to deliver improvements to at least 1,025 bus stops to improve passenger experience and comfort, providing shade and seating for waiting passengers, and improving accessibility for all pedestrians, wheelchair and push chair users. Infrastructure improvements like these will need to be particularly targeted at designated interchanges and mobility hubs.</p> <p>To date, plans have been made to purchase up to 350 e-buses and so far 100 buses have been ordered. More buses are likely to be provided through the existing EBRD e-bus investment, which is separate from this Action. However, it is mentioned here because the EBRD investment will complement this Action by unlocking capacity for upgrades and extensions to existing bus routes, including higher frequency services, rapid bus routes, and route extensions to new residential areas in the outskirts of the city where tram routes are impractical.</p>
	<p><b>Sector</b></p>

<b>Action Type</b>	<input checked="" type="checkbox"/> Investment ('Hard')	<input type="checkbox"/> Policy ('Soft')
<b>Implementation Timeframe</b>	2025 – 2030	
<b>Status</b>	<input type="checkbox"/> New <input type="checkbox"/> Planned <input checked="" type="checkbox"/> Ongoing	
<b>GCAP Action Classification</b>	<input checked="" type="checkbox"/> Capital Investment <input type="checkbox"/> Other Investment	If 'Other Investment,' what type? <input type="checkbox"/> Standards, guidelines, and regulations <input type="checkbox"/> Strategies, plans, and programmes <input type="checkbox"/> Investment-related feasibility study <input type="checkbox"/> Awareness, demonstration, training, and capacity building <input type="checkbox"/> Organisational measure <input type="checkbox"/> Behavioural measure <input type="checkbox"/> Monitoring, data collection, analysis, and studies
<b>Action Owner(s)</b>	<ul style="list-style-type: none"> <li>Samarkand Regional Transport Department</li> <li>Samarkand City Department of Architecture and Construction</li> </ul>	
<b>Other Stakeholders</b>	<ul style="list-style-type: none"> <li>Private bus and Damas operators</li> <li>EBRD (e-bus Project Leads)</li> <li>Uzbek Railways (rail and tram network operator)</li> <li>Samarkand Regional Road Maintenance</li> <li>Mahalla Committees in affected areas</li> <li>NGOs (such as Save Samarkand, Ezgulik)</li> <li>Samarkand State Architecture and Construction University</li> </ul>	
<b>Location</b>	<p><b>Bus network:</b> along main arterial roads within entire city boundary, and beyond into surrounding tumans, if justified by route planning exercises.</p> <p><b>Tram network:</b> Existing network reaches south and south-west from Samarkand Station but does not serve city centre. While route planning exercises will determine the precise locations for extension, there is significant potential for the network to link to the city centre from the station, for example along Mirzo Ulugbek Street to the Regional Government offices as an east-west branch from the existing Choy Fabrikasi station.</p> <p><b>Multi-modal interchanges:</b> The locations for these are entirely dependent on the detailed bus and tram route planning exercises, but logic indicates they should be at busy intersections and, where possible, along the Mirzo Ulugbek Street corridor if the tram is extended here.</p>	
<b>Priority Environmental Challenge(s) Addressed</b>	<p><b>Climate Change and Resilience:</b></p> <ul style="list-style-type: none"> <li>Increasing greenhouse gas emissions</li> <li>Lack of clarity on local government role in emissions reduction</li> </ul> <p><b>Environment and Biodiversity:</b></p> <ul style="list-style-type: none"> <li>Elevated values of PM2.5 and PM10</li> </ul> <p><b>Transport:</b></p> <ul style="list-style-type: none"> <li>Traffic congestion</li> <li>Poor air quality from vehicle emissions</li> <li>Inadequate public transport</li> </ul>	
<b>Strategic Goal(s) Addressed</b>	<p><b>Environment and Biodiversity:</b></p> <ul style="list-style-type: none"> <li>Improve air and water quality in Samarkand</li> </ul> <p><b>Transport:</b></p> <ul style="list-style-type: none"> <li>Decarbonise Samarkand's transport sector through low-emission vehicles</li> </ul>	
<b>Link(s) to Existing Policies/Plans/Projects</b>	<input checked="" type="checkbox"/> Yes <ul style="list-style-type: none"> <li>Samarkand Transport Masterplan</li> <li>Samarkand Tram System investments (2016 to date);</li> <li>Dedicated bus and tram lanes</li> <li>Law No. ZRU-706 on Transport (2021)</li> </ul>	

	<ul style="list-style-type: none"> <li>Presidential Decrees PQ-443 and PP-444, both December 2022, supporting the production and incentivisation of and supporting infrastructure for electric vehicles</li> </ul> <input type="checkbox"/> No															
<b>Link(s) to Other GCAP Actions</b>	<input checked="" type="checkbox"/> Yes <ul style="list-style-type: none"> <li><b>Action T2:</b> Design and implement interventions to reduce congestion on existing roads</li> <li><b>Action T3:</b> Invest in and promote cycling and walking infrastructure</li> <li><b>Action T4:</b> Support the transition to electric vehicles by investing in charging infrastructure</li> <li><b>Action UD1:</b> Expand existing programme of street tree planting with native, drought-tolerant species</li> <li><b>Action UD2:</b> Plan for and invest in new urban green space in Samarkand</li> </ul> <input type="checkbox"/> No															
<b>Cross-Cutting Themes</b>	<b>Climate and Disaster Risk</b>  <input checked="" type="checkbox"/> Directly targeted <input type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> Modal shift away from car uses towards public transport will reduce emissions from the transport sector.	<b>Smart Maturity</b>  <input checked="" type="checkbox"/> Directly targeted <input type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> Action entails significant investment in digital and smart technology, i.e. contactless and top-up travel cards and readers across the city's public transportation network.	<b>Gender and Social Inclusion</b>  <input type="checkbox"/> Directly targeted <input checked="" type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> A better integrated transport system will improve accessibility of public transport to poorer residents and improve access for women and disabled people by reducing barriers to pushchair and wheelchair use.	<b>Heritage and Tourism</b>  <input type="checkbox"/> Directly targeted <input checked="" type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> Action will significantly improve transport options and information for tourists to Samarkand visiting heritage assets. Action will also improve air quality (risk for both heritage assets and attractiveness to tourism).												
<b>Implementation Process and Timeline</b>	<table border="1"> <thead> <tr> <th>Step</th> <th>Duration</th> </tr> </thead> <tbody> <tr> <td> <b>1. Evidence gathering – a cross-organisation working group to be established to gather and review existing evidence in order to determine how best to implement and prioritise the transport infrastructure upgrades. Evidence will include existing plans and project, which should be supplemented by up-to-date surveys, energy demand/capacity analysis, traffic counts, passenger ridership counts and maintenance considerations.</b> </td> <td>6 months</td> </tr> <tr> <td> <b>2. Engagement – engaging with relevant governmental and operational stakeholders to communicate emerging solutions based on the evidence, and mitigate identified barriers to implementation locations- this can then allow the finalisation of maps and plans.</b> </td> <td>3 months</td> </tr> <tr> <td> <b>3. Approvals and funding – arranging for appropriate political approvals and funding sources in plan for the agreed transportation infrastructure works.</b> </td> <td>6 months</td> </tr> <tr> <td> <b>4. Inception – working in partnership with government and operational stakeholders to order new infrastructure (rolling stock, ticket machines, electric chargers and so on) and hiring construction contractors.</b> </td> <td>2 years</td> </tr> <tr> <td> <b>5. Implementation – construction of new tram track and stations, testing and</b> </td> <td>4 years</td> </tr> </tbody> </table>				Step	Duration	<b>1. Evidence gathering – a cross-organisation working group to be established to gather and review existing evidence in order to determine how best to implement and prioritise the transport infrastructure upgrades. Evidence will include existing plans and project, which should be supplemented by up-to-date surveys, energy demand/capacity analysis, traffic counts, passenger ridership counts and maintenance considerations.</b>	6 months	<b>2. Engagement – engaging with relevant governmental and operational stakeholders to communicate emerging solutions based on the evidence, and mitigate identified barriers to implementation locations- this can then allow the finalisation of maps and plans.</b>	3 months	<b>3. Approvals and funding – arranging for appropriate political approvals and funding sources in plan for the agreed transportation infrastructure works.</b>	6 months	<b>4. Inception – working in partnership with government and operational stakeholders to order new infrastructure (rolling stock, ticket machines, electric chargers and so on) and hiring construction contractors.</b>	2 years	<b>5. Implementation – construction of new tram track and stations, testing and</b>	4 years
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	<b>commissioning tram rolling stock sets, constructing bus stop infrastructure, testing and commissioning electric buses, constructing tram and bus depots, delivering centralised digital management centre.</b>		
	<b>6. Closeout – rollout of new public transport services, monitoring and mitigating issues with delivery and operational requirements, implementation of timetables and service patterns, recruiting and training drivers/operators, and marketing/promotion.</b>		6 months
Indicative Project Costs	<b>CapEx [€]</b> (GCAP Period) 93,056,000 (Lifetime of Action) 167,500,000	<b>OpEx over 5 years [€]</b> 25,125,000	<b>Feasibility / Advisory Costs [€]</b> n/a
	<ul style="list-style-type: none"> <li>• Digital/smart transport: 28,750,000</li> <li>• Tram network: 45,301,000</li> <li>• Bus network: 51,250,000</li> <li>• Main contractor preliminaries (15%): 12,000,000</li> <li>• Main contractor overheads and profits (5%): 2,300,000</li> <li>• Fees (10%): 9,660,000</li> <li>• Contingency (15%): 15,939,000</li> </ul>		
Potential Financing Instruments and Sources	<b>Instrument (Own-Source, Grant, Debt, Equity, Other)</b>	<b>Source (Municipal Government, State-Owned Enterprise, National Government, Private Sector, International Development Partner, Other)</b>	
	<b>Own source</b>	Municipal Government (through increased property taxes from land value uplift as transport system expands)	
	<b>Grant</b>	National Government	
	<b>Loan</b>	International Development Partner	
	<b>Loan</b>	Private Sector	
	<b>PPP</b>	Municipal Government and Private Sector	
Revenue Opportunities	<input checked="" type="checkbox"/> Yes Increased revenue from higher public transport ridership <input type="checkbox"/> No		
Impact Measures (Quantitative and Qualitative)	<b>Environmental Impacts</b>	State indicators	1 – Average annual concentration of PM2.5 1.1 – Average annual concentration of PM10 1.2 – Average daily concentration of SO2 1.3 – Average daily concentration of NOx 8 – Annual CO2 equivalent emissions per capita 8.1 – Annual CO2 emissions per unit of GDP
		Pressure indicators	11 – Transport modal share in commuting 11.1 – Transport modal share total 11.2 – Motorisation rate 11.3 – Average number of vehicles and cars per household 11.4 – Kilometres of road exclusively dedicated to public transport per 100,000 population 11.6 – Share of population having access to public transport within 15 min by foot

			12 – Average travel speed on primary thoroughfares during peak hour 12.1 – Travel speed of bus service on major thoroughfares daily average
	<b>Socio-economic Impacts</b>	Jobs created	2,314
		Social inclusion benefits	Improves accessibility to jobs, retail etc. for lower income residents unable to afford private vehicles. Improves access for residents with children and disabilities by improving wheelchair and pushchair access.
		Other socio-economic benefits	Significant improvements to human health resulting from reduced air pollution from lower car travel and electric buses/trams.
	<b>Climate Impacts</b>	Estimated carbon emissions reduction	5,270 tCO <sub>2</sub> e annually
		Climate resilience benefits	Larger public transport networks are generally more resilient to climate extremes or other disasters in the sense that there are more likely to be areas unaffected by specific incidents (e.g. power outages).
	<b>Nature &amp; Biodiversity Impacts</b>	Natural capital benefits	This Action has significant potential to improve air quality and local natural capital, through reducing carbon emissions from cars. Action is also consistent with Priority Investment Area 4.5 in Natural Capital Valuation for Samarkand (see GCAP Appendix B).
<b>Other Indicators/Co-benefits</b>	Operational cost, water, and/or energy savings, revenue generation, etc.	Higher revenue from public transportation users; improved reliability of rolling stock may lead to lower maintenance costs, higher economic output derived from ease of travel and reduced congestion.	
<b>Potential Project Risks and Mitigation Options</b>	<b>Area</b>	<b>Risks</b>	<b>Mitigation Options</b>
	<b>Social</b>	People not willing to abandon cars for public transport for reasons of status, cost or convenience.	Publicity campaign on investments proposed and delivered; awareness-raising of environmental and congestion-reducing benefits of public transport; consideration of incentive schemes for elder/younger users.
	<b>Environmental</b>	Negative amenity (e.g. tree removal and dust emissions) associated with construction works.  Resilience of system to climate and disaster risk.	Construction works should be managed/phased sensitively with the needs of minimising disruption and inconvenience to local businesses and residents in mind.  Resilience of system should be considered from the evidence gathering stage onwards, with the final design responding to and able to mitigate known risks.

	<b>Economic</b>	Cost of implementation/ financial feasibility. Delays in implementation.	Prioritise secure sources of funding from the start and be open with financial backers about the risks and costs- but also the long-term expected return.  Consider schedule early and often; regularly update with known issues and communicate delays as they occur for early warning.
	<b>Other</b>	Grid capacity  Cybersecurity risks.	Action design and delivery should take full account of and be progressed in tandem with electric grid capacity upgrades, e.g. through rollout of solar PV.  Ensure design of smart technology/infrastructure takes full account of known and potential threats to cybersecurity.

Action T2: Design and implement interventions to reduce congestion on existing roads		Estimated Cost over GCAP Period: €51,671,000
<b>Description</b>	<p>At the first Stakeholder Engagement Workshop, for prioritising environmental challenges, traffic congestion was the most frequently cited environmental problem facing Samarkand. Due to an increase in private cars, outdated road layouts, and poor uptake of public transportation, the city's air quality suffers and its emissions are rising.</p> <p>There are opportunities to improve congestion in Samarkand through new light-touch infrastructure. This includes increasing the speed and reliability of buses, improving traffic control at intersections through 'smart' traffic lights, and investigating the feasibility of a new approach to parking, which would integrate electric vehicle charging infrastructure (see Action T4).</p> <p>This Action seeks to deliver for the purposes of the five-year GCAP time period around 50 kilometres of new bus lanes across the city, though it is assessed that eventually, beyond the GCAP period, the city may need up to 95 kilometres of new bus lanes in total.</p> <p><b>1. Bus lanes:</b></p> <p>Fifty kilometres of new dedicated bus lanes along major transit routes will give buses priority over private cars, thus improving their speed and reliability and increasing the efficiency of bus movements by segregating them from congestion resulting from individual car traffic. The first step is to identify opportunities to reserve the right-hand lane of multi-lane roadways into dedicated bus lanes; their usage can be adjusted if necessary between peak and off-peak travel times. The network of bus lanes should support commuting patterns by linking the city core to residential areas and outlying transport hubs (for example, the train station). Opportunities should also be explored for bus priority measures, for example, traffic lights at junctions allowing buses to move first. Recommendations for the locations of these bus lanes appear in the Location section below.</p> <p><b>2. Redesigned intersections:</b></p> <p>Artificial intelligence (AI) can assist in smoothing the flow of traffic at seventy redesigned intersections by utilising a smart traffic system (STS) differing from standard pre-programmed traffic lights. STSs typically employ a network of sensors and cameras to measure traffic movements along primary routes, then sequence green and red signals as appropriate- for example, applying long green signals for roads with a backlog of vehicles causing congestion. The STS is connected to a cloud-based traffic management platform which uses algorithms for dynamic adjustments to traffic signals. STSs can also be used to provide priority crossings for pedestrians and cyclists at specific locations.</p> <p><b>3. Integrated parking strategy:</b></p> <p>To reduce congestion at peak hours in Samarkand city centre, an integrated parking strategy should be established. This would include a controlled parking zone in which street parking is paid for during the day, delivered alongside a park and ride facility in an area with good bus and tram links into the centre. A feasibility study should be progressed for this element of the action a) to establish the boundaries of the controlled parking zone and the parking fees that should apply within it, and b) to identify locations suitable for a new park and ride service; this will need to be an area of land large enough for a major car park, outside the city centre but potentially well-connected to it by bus services along a dedicated route. The new parking area would include electric vehicle charging infrastructure to align with Action T4.</p>	
<b>Sector</b>	<input checked="" type="checkbox"/> Transport	
<b>Action Type</b>	<input checked="" type="checkbox"/> Investment ('Hard') <input type="checkbox"/> Policy ('Soft')	
<b>Implementation Timeframe</b>	2025 – 2030	
<b>Status</b>	<input type="checkbox"/> New <input type="checkbox"/> Planned <input checked="" type="checkbox"/> Ongoing	

<b>GCAP Action Classification</b>	<input checked="" type="checkbox"/> Capital Investment <input type="checkbox"/> Other Investment	If 'Other Investment,' what type? <input type="checkbox"/> Standards, guidelines, and regulations <input type="checkbox"/> Strategies, plans, and programmes <input type="checkbox"/> Investment-related feasibility study <input type="checkbox"/> Awareness, demonstration, training, and capacity building <input type="checkbox"/> Organisational measure <input type="checkbox"/> Behavioural measure <input type="checkbox"/> Monitoring, data collection, analysis, and studies
<b>Action Owner(s)</b>	<ul style="list-style-type: none"> <li>• Samarkand Regional Transport Department</li> <li>• Samarkand City Transport Department</li> <li>• Samarkand City Department of Architecture and Construction</li> <li>• Samarkand Region Investment and Foreign Trade department</li> <li>• EBRD (E-bus project leads)</li> </ul>	
<b>Other Stakeholders</b>	<ul style="list-style-type: none"> <li>• Private bus and Damas operators</li> <li>• Tram network operator</li> <li>• Samarkand Regional Road Maintenance</li> <li>• Mahalla Committees</li> <li>• NGOs (such as Save Samarkand, Ezgulik)</li> <li>• Samarkand State Architecture and Construction University)</li> <li>• YPX Traffic Police, Tourist Police</li> </ul>	
<b>Location</b>	<p>Interventions across entire city boundary, and into surrounding urban areas, if feasibility study/route planning exercises justify it.</p> <p>For <b>new bus lanes</b>, the following locations are recommended in particular: <b>Dakhbed Yuli Street</b> between Registan Street and western edge of Airport; <b>Mirzo Ulugbek Street</b> between city centre and Spitamen Avenue; <b>Amir Temur Street</b> between city centre and Ruzibaev Ko'chasi; <b>Bustonsaroy Street</b> between Amir Temur roundabout and Ulitsa Avisenny; <b>Registan Street</b> between Panzhakent Road and Amir Temur Roundabout.</p> <p>For redesigned intersections, this will depend on detailed technical review of problem hotspots, but in terms of potential to improve existing congestion they are likely to be concentrated on the orbital and arterial road corridors to the west, north-west and south-west of the city centre; there is a particular concentration of major intersections in the Russian town forming the western city centre.</p> <p>In terms of <b>parking strategy</b>, the controlled parking zone should cover the entire city centre and potentially suitable locations for park and ride facilities along major arterial roads might include locations such as Shah-i-Zinda Street close to Afrisiyob Park, Sadriddin Ayniy Street near (but not at) the Ishratkhama Mausoleum; close to the University Campus in the south-west of the city; and close to the Spitamen Street and Mirzo Ulugbek Street interchange in the north-west of the city.</p>	
<b>Priority Environmental Challenge(s) Addressed</b>	<p><b>Climate Change and Resilience:</b></p> <ul style="list-style-type: none"> <li>• Increasing greenhouse gas emissions</li> </ul> <p><b>Environment and Biodiversity:</b></p> <ul style="list-style-type: none"> <li>• Elevated values of PM2.5 and PM10</li> </ul> <p><b>Transport:</b></p> <ul style="list-style-type: none"> <li>• Traffic congestion</li> <li>• Poor air quality from vehicle emissions</li> <li>• Inadequate public transport</li> </ul>	
<b>Strategic Goal(s) Addressed</b>	<p><b>Environment and Biodiversity:</b></p> <ul style="list-style-type: none"> <li>• Improve air and water quality in Samarkand</li> </ul> <p><b>Transport:</b></p> <ul style="list-style-type: none"> <li>• Decarbonise Samarkand's transport sector through low-emission vehicles</li> </ul>	
<b>Link(s) to Existing Policies/Plans/Projects</b>	<input checked="" type="checkbox"/> Yes <ul style="list-style-type: none"> <li>• Samarkand Transport Masterplan</li> <li>• Samarkand Tram System investments (2016 to date)</li> </ul>	

	<ul style="list-style-type: none"> <li>• Dedicated bus and tram lanes</li> <li>• Law No. ZRU-706 on Transport (2021)</li> <li>• EBRD e-buses investment project</li> <li>• Presidential Decree on measures for expansion of infrastructure of operation of electric vehicles, signed into law 19 December 2022</li> </ul> <input type="checkbox"/> No											
<p><b>Link(s) to Other GCAP Actions</b></p>	<input checked="" type="checkbox"/> Yes <ul style="list-style-type: none"> <li>• <b>Action T1:</b> Extend and integrate public transport network, including trams and e-buses, to reduce reliance on cars and cut air pollution</li> <li>• <b>Action T3:</b> Invest in and promote cycling and walking infrastructure</li> <li>• <b>Action T4:</b> Support the transition to electric vehicles by investing in charging infrastructure</li> </ul> <input type="checkbox"/> No											
<p><b>Cross-Cutting Themes</b></p>	<p><b>Climate and Disaster Risk</b></p> <input type="checkbox"/> Directly targeted <input checked="" type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> The Action will result in lowered GHG emissions, thereby supporting the mitigation of climate change and indirectly reducing climate and disaster risk.	<p><b>Smart Maturity</b></p> <input checked="" type="checkbox"/> Directly targeted <input type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> The implementation of STS as a traffic solution is a clear example of the use of smart technology/AI to improve the quality of the urban area. In the longer term, this Action could be a first step in an Intelligent Transport System (ITS) for the whole city.	<p><b>Gender and Social Inclusion</b></p> <input checked="" type="checkbox"/> Directly targeted <input type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> A safer pedestrian and cyclist experience, and more efficient public transport will assist low-income groups in particular who are less likely to travel by private car.	<p><b>Heritage and Tourism</b></p> <input checked="" type="checkbox"/> Directly targeted <input type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> A less congested and better managed road network will contribute significantly towards the tourist experience of the city and the context for its heritage assets.								
<p><b>Implementation Process and Timeline</b></p>	<table border="1"> <thead> <tr> <th>Step</th> <th>Duration</th> </tr> </thead> <tbody> <tr> <td> <b>1. Evidence gathering – a cross-organisation working group should be established, focussing on traffic and congestion issues, Representatives from relevant departments, alongside transport operators and the traffic police, need to collectively gather and review existing evidence to identify the most appropriate locations for dedicated bus lanes, ‘smart’ traffic lights.</b> </td> <td>1 year</td> </tr> <tr> <td> <b>2. Feasibility study– A feasibility study is required for the new approach to parking, given the potentially significant amount of land needed and financial investment required. The feasibility study needs to identify city centre locations where introducing parking charges might be justified and locations away from but accessible to the city centre that may be appropriate for the park and ride car park.</b> </td> <td>1 year (concurrent with the evidence gathering stage)</td> </tr> <tr> <td> <b>3. Engagement – engagement with relevant external stakeholders to communicate emerging solutions based on the evidence, and mitigations identified for specific issues; stakeholder feedback to be captured to inform revised plans; this will then allow the finalisation of designs, maps and plans. This</b> </td> <td>9 months</td> </tr> </tbody> </table>				Step	Duration	<b>1. Evidence gathering – a cross-organisation working group should be established, focussing on traffic and congestion issues, Representatives from relevant departments, alongside transport operators and the traffic police, need to collectively gather and review existing evidence to identify the most appropriate locations for dedicated bus lanes, ‘smart’ traffic lights.</b>	1 year	<b>2. Feasibility study– A feasibility study is required for the new approach to parking, given the potentially significant amount of land needed and financial investment required. The feasibility study needs to identify city centre locations where introducing parking charges might be justified and locations away from but accessible to the city centre that may be appropriate for the park and ride car park.</b>	1 year (concurrent with the evidence gathering stage)	<b>3. Engagement – engagement with relevant external stakeholders to communicate emerging solutions based on the evidence, and mitigations identified for specific issues; stakeholder feedback to be captured to inform revised plans; this will then allow the finalisation of designs, maps and plans. This</b>	9 months
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	<b>stage should also incorporate any political approvals required and finalisation of funding sources.</b>		
	<b>4. Inception – working in partnership with government and operators to hire construction contractors and carry out enabling works, as well as communicating the inevitable disruption to residents and drivers</b>		6 months
	<b>5. Implementation – development of new bus lanes and any supporting infrastructure required (e.g. new signage); installation of systems supporting smart traffic lights. Possible implementation of new approach to parking (or at least the first phase of the new approach), depending on results of feasibility study</b>		4 years
	<b>6. Closeout and minor amendments to implementation if necessary – testing the new infrastructure before it is opened to traffic; then, post-opening, monitoring and mitigating any issues with new infrastructure in initial months after construction works are complete.</b>		1 year
<b>Indicative Project Costs</b>	<b>CapEx [€]</b>	<b>OpEx over 5 years [€]</b>	<b>Feasibility / Advisory Costs [€]</b>
	(GCAP period) 47,378,000 (Lifetime of Action) 85,280,000  <ul style="list-style-type: none"> <li>Introduce dedicated bus lanes and redesigned junctions: 35,000,000</li> <li>Introduce Park and Ride: 20,830,000</li> <li>Main contractor preliminaries (15%): 8,375,000</li> <li>Main contractor overheads and profits (5%): 3,210,000</li> <li>Fees (10%): 6,741,000</li> <li>Contingency (15%): 11,123,000</li> </ul>	4,264,000	29,000  <ul style="list-style-type: none"> <li>Integrated parking strategy (feasibility): 25,000</li> <li>Contingency (15%): 4,000</li> </ul>
<b>Potential Financing Instruments and Sources</b>	<b>Instrument (Own-Source, Grant, Debt, Equity, Other)</b>	<b>Source (Municipal Government, State-Owned Enterprise, National Government, Private Sector, International Development Partner, Other)</b>	
	<b>Own Source</b>	Municipal Government	
	<b>Loan</b>	International Development Partner	
	<b>Grant</b>	National Government	
	<b>PPP</b>	Municipal Government/Private sector	
<b>Revenue Opportunities</b>	<input checked="" type="checkbox"/> Yes Revenue from paid city centre car parking, and increased revenues from higher levels of bus travel <input type="checkbox"/> No		
<b>Impact Measures (Quantitative and Qualitative)</b>	<b>Environmental Impacts</b>	State indicators	1 – Average annual concentration of PM2.5 1.1 – Average annual concentration of PM10 1.2 – Average daily concentration of SO2

			1.3 – Average daily concentration of NOx
		Pressure indicators	11 – Transport modal share in commuting 11.1 – Transport modal share total 11.2 – Motorisation rate 11.3 – Average number of vehicles and cars per household 11.4 – Kilometres of road exclusively dedicated to public transport per 100,000 population 11.6 – Share of population having access to public transport within 15 min by foot 12 – Average travel speed on primary thoroughfares during peak hour 12.1 – Travel speed of bus service on major thoroughfares daily average
	<b>Socio-economic Impacts</b>	Jobs created	1,012
		Social inclusion benefits	Improves accessibility to jobs, retail and other services for lower income residents unable to afford private vehicles.
		Other socio-economic benefits	Significant improvements to human health resulting from reduced air pollution from lower levels of congestion.  Improves transport efficiency, which may result in other societal benefits such as increased quality of life and increased economic productivity.
	<b>Climate Impacts</b>	Estimated carbon emissions reduction	No direct carbon emissions reduction associated with this Action.
		Climate resilience benefits	No direct climate resilience benefits, though indirectly through climate mitigation measures.
	<b>Nature &amp; Biodiversity Impacts</b>	Natural capital benefits	This Action will improve the environment with a likely reduction in the level of pollutants, including air, water and soil, and reduce noise pollution.
	<b>Other Indicators/Co-benefits</b>	Operational cost, water, and/or energy savings, revenue generation, etc.	Higher public transport revenue owing to faster bus services; revenue from city centre paid car parking and park and rides (if progressed through feasibility study).
	<b>Potential Project Risks and Mitigation Options</b>	<b>Area</b>	<b>Risks</b>
<b>Social</b>		Private car users feel that congestion solutions proposed	Publicity/awareness raising campaign on the benefits of the new infrastructure and the attractiveness of faster, more rapid and safer bus transport compared to congestion experienced in cars.

		favour buses and cyclists.	
	<b>Environmental</b>	Negative amenity (e.g. tree removal and dust emissions) associated with construction works.	Construction works should be managed and phased sensitively to minimise disruption and inconvenience to local businesses and residents.
	<b>Economic</b>	Cost of implementation / financial feasibility.  Delays in implementation.	Prioritise secure sources of funding from the start and be open with financial backers about the risks and costs- but also the long-term expected return. Park and ride sites to be progressed only if feasibility study shows them to be financially viable.  Consider schedule early and often; regularly update with known issues and communicate delays as they occur to key stakeholders for early warning.
	<b>Other</b>	Low take-up of bus travel or of park and ride.  Operational issues/bugs with digital/smart technology used for traffic lights.	Wide publicisation of bus improvements and park and ride development; engagement with mahalla committees to improve uptake.  Thorough testing and review prior to commissioning; ensure adequate training and support for managers and operators of new system.

Action T3: Invest in and promote cycling and walking infrastructure	Estimated Cost over GCAP Period: € 73,343,000
<p><b>Description</b></p>	<p>Pedestrians and cyclists are not well-served by existing movement infrastructure in Samarkand, despite 27.2% of journeys being on foot and 2.9% by bike. For example, it is legal to turn whilst pedestrians are in the middle of crossing at junctions, pavements often have obstructions or sudden changes of level, pedestrian crossings do not have tactile surfaces for visually impaired pedestrians, and the vast majority do not have dropped kerbs for wheelchair and pushchair users. Footpaths are often accompanied by uncovered stormwater drains hazardous to wheelchairs or people with pushchairs.</p> <p>The Action therefore supports the following infrastructure upgrades:</p> <ul style="list-style-type: none"> <li>-improving pedestrian crossing safety by modifying traffic lights to prevent vehicles turning whilst pedestrian lights are also green, (an estimated 50 sets of lights could be reprogrammed in this way);</li> <li>-allowing for pedestrians to request crossing via buttons, with implementation of drop kerbs and tactile surfaces (at an estimated 50 crossings)</li> <li>ensuring that pavements are upgraded in specific locations to enhance access to wheelchair users and parents walking with infants in pushchairs, and</li> <li>widening narrow pavements to ensure a minimum width of two metres.</li> <li>Signage and on-street mapping for cyclists and pedestrians to improve legibility and ease of use for both tourists and residents.</li> </ul> <p>New roads should always be built with pavements provided. Where pavements cannot be provided owing to the narrowness of existing streets, complete pedestrianisation should be considered (as has already taken place on Toshkent Street between Bibi-Khanym and Registan) to improve the pedestrian experience. This can allow for exclusions for certain service or emergency vehicles.</p> <p>One location suitable for partial pedestrianisation is University Boulevard, where the number of car lanes could be reduced from four to three or two. In cases of streets more limited in width, one-way could be introduced for cars, with cyclists and pedestrians able to travel in both directions in the remaining space. This could be achieved through “hard” segregation for streets with higher traffic speeds or “light” segregation for streets with lower speed limits.</p> <p>The Regional Government has confirmed that there is scope to upgrade or provide 38 kilometres of new pedestrian and cycle paths in this way. The paths would be located in the city centre, mostly, but not entirely, alongside existing roads. A feasibility study is needed initially to determine the specific locations where additional space for pedestrians and cyclists would offer the most benefit. There will be particular opportunities to integrate pedestrian improvements through this Action with the public transport improvements provided for through Action T1, with the new street tree planting provided for through Action UD1, and with the new green infrastructure provided for through Action UD2. Where possible and appropriate, co-location may also be appropriate with the Sustainable Urban Development System (SuDS) element of Action W1, including the potential for permeable paving.</p> <p>Alongside more space for cyclists, provision of secure cycle parking at homes and destinations is a key part of building user confidence and ultimately increasing cycle mode share through:</p> <ul style="list-style-type: none"> <li>Introducing secure cycle parking near public transport interchanges, including mobility hubs (see Action T1) as well as destination locations such as businesses, shops, leisure and tourist attractions. An estimated 100 new bike racks could be provided initially; and</li> <li>New developments should incorporate cycle storage to allow residents to store bicycles at home, and infrastructure such as “cycle hangers” should be introduced in existing residential areas; an estimated 50 such hangers could be introduced and then more later if demand exists.</li> </ul> <p>The introduction and use of cycle/e-scooter hire schemes could be considered at a later stage if demand is high enough, which would reduce the need for personal bicycle ownership; this would also be of benefit for visitors and tourists.</p>
<p><b>Sector</b></p>	<p><input checked="" type="checkbox"/> Transport</p>

<b>Action Type</b>	<input checked="" type="checkbox"/> Investment ('Hard') <input type="checkbox"/> Policy ('Soft')	
<b>Implementation Timeframe</b>	2025 – 2030	
<b>Status</b>	<input type="checkbox"/> New <input type="checkbox"/> Planned <input checked="" type="checkbox"/> Ongoing	
<b>GCAP Action Classification</b>	<input checked="" type="checkbox"/> Capital Investment <input type="checkbox"/> Other Investment	If 'Other Investment,' what type? <input type="checkbox"/> Standards, guidelines, and regulations <input type="checkbox"/> Strategies, plans, and programmes <input type="checkbox"/> Investment-related feasibility study <input type="checkbox"/> Awareness, demonstration, training, and capacity building <input type="checkbox"/> Organisational measure <input type="checkbox"/> Behavioural measure <input type="checkbox"/> Monitoring, data collection, analysis, and studies
<b>Action Owner(s)</b>	<ul style="list-style-type: none"> <li>Samarkand Regional Transport Department</li> <li>Samarkand Regional Department of Architecture and Construction</li> <li>Samarkand City Roads and Highways</li> </ul>	
<b>Other Stakeholders</b>	<ul style="list-style-type: none"> <li>Ministry of Tourism and Cultural Heritage</li> <li>Committee on Tourism at the Ministry of Ecology, Environmental Protection and Climate Change of the Republic of Uzbekistan</li> <li>Samarkand Region Investment and Foreign Trade department</li> <li>UNESCO (in protected areas and their buffers)</li> <li>NGOs (such as Save Samarkand, Ezgulik)</li> </ul>	
<b>Location</b>	<p>City centre locations, to be determined by initial feasibility study. Particularly promising route corridors for improvements are as follows: University Boulevard, Registan Street, Dakhbed Yuli Street, Bustonsaroy Street, Uzbekistan Street, Amir Temur Street, Mirzo Ulugbek Street and Imom Al-Bukhoriy Street.</p> <p>Depending on success of implementation, measures could be rolled out to outlying suburban areas beyond the GCAP period.</p>	
<b>Priority Environmental Challenge(s) Addressed</b>	<p><b>Climate Change and Resilience:</b></p> <ul style="list-style-type: none"> <li>Increasing greenhouse gas emissions</li> </ul> <p><b>Environment and Biodiversity:</b></p> <ul style="list-style-type: none"> <li>Elevated values of PM2.5 and PM10</li> </ul> <p><b>Land Use:</b></p> <ul style="list-style-type: none"> <li>Heritage risks</li> </ul> <p><b>Transport:</b></p> <ul style="list-style-type: none"> <li>Poor air quality from vehicle emissions</li> <li>Inadequate walking and cycling infrastructure</li> </ul>	
<b>Strategic Goal(s) Addressed</b>	<p><b>Environment and Biodiversity:</b></p> <ul style="list-style-type: none"> <li>Improve air and water quality in Samarkand</li> </ul> <p><b>Transport:</b></p> <ul style="list-style-type: none"> <li>Decarbonise Samarkand's transport sector through low-emission vehicles</li> <li>Improve pedestrian and cycling infrastructure in Samarkand</li> </ul>	
<b>Link(s) to Existing Policies/Plans/Projects</b>	<input checked="" type="checkbox"/> Yes <ul style="list-style-type: none"> <li>Samarkand Transport Masterplan</li> <li>Law of the Republic of Uzbekistan ZRU-900 adopted January 19, 2024, on traffic safety and requirements on governmental authorities to consider zones inappropriate for vehicle traffic</li> <li>Presidential Decree on Road Traffic Enforcement Cameras</li> <li>Presidential Decree 'On measures to ensure reliable safety of people on the roads and greatly reduce fatalities'</li> </ul> <input type="checkbox"/> No	

<p><b>Link(s) to Other GCAP Actions</b></p>	<input checked="" type="checkbox"/> Yes <ul style="list-style-type: none"> <li>• <b>Action T1:</b> Extend and integrate public transport network, including trams and e-buses, to reduce reliance on cars and cut air pollution</li> <li>• <b>Action T2:</b> Design and implement interventions to reduce congestion on existing roads</li> <li>• <b>Action UD1:</b> Expand existing programme of street tree planting with native, drought-tolerant species</li> <li>• <b>Action UD2:</b> Plan for and invest in new urban green space in Samarkand</li> <li>• <b>Action W1:</b> Invest in wastewater, sewerage and drainage infrastructure to deliver range of environmental benefits</li> </ul> <input type="checkbox"/> No			
<p><b>Cross-Cutting Themes</b></p>	<p><b>Climate and Disaster Risk</b></p>	<p><b>Smart Maturity</b></p>	<p><b>Gender and Social Inclusion</b></p>	<p><b>Heritage and Tourism</b></p>
	<input type="checkbox"/> Directly targeted <input checked="" type="checkbox"/> Some elements <input type="checkbox"/> No direct links <p><u>Reason:</u> When renovating public realm and highways, there are opportunities to simultaneously improve stormwater drainage using elements such as porous paving which could reduce the risk of flooding and increase resilience.</p>	<input type="checkbox"/> Directly targeted <input type="checkbox"/> Some elements <input checked="" type="checkbox"/> No direct links <p><u>Reason:</u> No direct links in this Action to smart maturity, though potential in future through e.g. bike-booking apps or apps that reward users for biking and walking such as Biko in Colombia.</p>	<input checked="" type="checkbox"/> Directly targeted <input type="checkbox"/> Some elements <input type="checkbox"/> No direct links <p><u>Reason:</u> A safer pedestrian and cyclist experience will be of great benefit to low-income groups less likely to travel by private car. Also the provision of pedestrian infrastructure such as crossings will increase safety for older people, people with disabilities, or those travelling with young children.</p>	<input checked="" type="checkbox"/> Directly targeted <input type="checkbox"/> Some elements <input type="checkbox"/> No direct links <p><u>Reason:</u> Pedestrianised areas in the city centre will significantly ameliorate the tourist experience in the city and prevent the degradation of historic areas and their settings by intensive car use.</p>
<p><b>Implementation Process and Timeline</b></p>	<p><b>Step</b></p>		<p><b>Duration</b></p>	
	<p><b>1. Feasibility study – a cross-organisation working group dedicated to pedestrian and cyclist safety to be established to gather and review evidence to determine locations and options for implementing new pedestrian and cyclist space and infrastructure. Evidence will include existing plans and projects, up-to-date traffic surveys/counts, engagement with transport operators, and maintenance considerations.</b></p>		<p>6 - 9 months</p>	
	<p><b>2. Engagement – engagement with relevant governmental and operational stakeholders to communicate emerging solutions based on the evidence, and mitigations identified for specific issues, to allow the finalisation of designs, maps and plans.</b></p>		<p>3 - 6 months</p>	
	<p><b>3. Preferred option- developing a preferred option for interventions by specific location and type.</b></p>		<p>3 - 6 months</p>	
	<p><b>4. Approvals and funding – arranging for appropriate political approvals and funding sources to enable the pedestrian and cycle infrastructure works.</b></p>		<p>3 - 6 months</p>	
	<p><b>5. Inception – Hiring of construction contractors.</b></p>		<p>3 - 6 months</p>	

	<p><b>6. Implementation – rollout of city centre pedestrian and cyclist only zones in specific locations, with potential for certain service vehicles and emergency service exemptions in cases where entire streets are pedestrianised. Deployment of pedestrian safety improvements, including crossings and dropped kerbs, at identified locations of concern.</b></p>	2 - 4 years								
	<p><b>7. Closeout – monitoring and mitigating issues with new pedestrian and cyclist safety improvements in first months after construction works are complete and signed off.</b></p>	3 - 6 months								
<b>Indicative Project Costs</b>	<p><b>CapEx [€]</b></p> <p>(GCAP Period) 57,705,000 (Lifetime of Action) 103,869,000</p> <ul style="list-style-type: none"> <li>• Modify traffic lights: 250,000</li> <li>• Pedestrian crossing improvements: 1,250,000</li> <li>• Pavement upgrades: 2,500,000</li> <li>• Widening narrow pavements: 2,500,000</li> <li>• Increased pedestrianisation around heritage assets: 30,000,000</li> <li>• 38km of new pedestrian and cycle paths: 19,000,000</li> <li>• New signage and on-street mapping: 10,000,000</li> <li>• Secure cycle parking: 2,500,000</li> <li>• Main contractor preliminaries (15%): 10,200,000</li> <li>• Main contractor overheads and profits (5%): 3,910,000</li> <li>• Fees (10%): 8,211,000</li> <li>• Contingency (15%): 13,548,000</li> </ul>	<p><b>OpEx over 5 years [€]</b></p> <p>15,580,000</p>	<p><b>Feasibility / Advisory Costs [€]</b></p> <p>58,000</p> <ul style="list-style-type: none"> <li>• Feasibility study of locations for improvement: 50,000</li> </ul>							
	<p><b>Potential Financing Instruments and Sources</b></p> <table border="1"> <thead> <tr> <th>Instrument (Own-Source, Grant, Debt, Equity, Other)</th> <th>Source (Municipal Government, State-Owned Enterprise, National Government, Private Sector, International Development Partner, Other)</th> </tr> </thead> <tbody> <tr> <td>Own Source</td> <td>Municipal Government</td> </tr> <tr> <td>Grant</td> <td>National Government</td> </tr> <tr> <td>Loan</td> <td>International Development Partner</td> </tr> </tbody> </table>	Instrument (Own-Source, Grant, Debt, Equity, Other)	Source (Municipal Government, State-Owned Enterprise, National Government, Private Sector, International Development Partner, Other)	Own Source	Municipal Government	Grant	National Government	Loan	International Development Partner	
Instrument (Own-Source, Grant, Debt, Equity, Other)	Source (Municipal Government, State-Owned Enterprise, National Government, Private Sector, International Development Partner, Other)									
Own Source	Municipal Government									
Grant	National Government									
Loan	International Development Partner									
<b>Revenue Opportunities</b>	<p><input checked="" type="checkbox"/> Yes Revenue from increased tourism spend as city centre tourism experience improves</p> <p><input type="checkbox"/> No</p>									
<b>Impact Measures (Quantitative and Qualitative)</b>	<b>Environmental Impacts</b>	State indicators	<p>1 - Average annual concentration of PM2.5</p> <p>1.1 - Average annual concentration of PM10</p> <p>1.2 - Average daily concentration of SO2</p> <p>1.3 - Average daily concentration of NOx</p>							
		Pressure indicators	<p>11 – Transport modal share in commuting</p> <p>11.1 - Transport modal share total</p>							

			11.2 - Motorisation rate 11.3 - Average number of vehicles and cars per household
	<b>Socio-economic Impacts</b>	Jobs created	1,436
		Social inclusion benefits	Improves accessibility to jobs, retail etc. for lower income residents unable to afford private vehicles.
		Other socio-economic benefits	Significant improvements to human health resulting from increased levels of physical activity and reduced levels of traffic collisions involving pedestrians and cyclists.
	<b>Climate Impacts</b>	Estimated carbon emissions reduction	No direct carbon emissions reduction associated with this Action.
		Climate resilience benefits	New/improved public realm could accommodate measures such as permeable paving to reduce surface water flooding and improve resilience to extreme rainfall events.
	<b>Nature &amp; Biodiversity Impacts</b>	Natural capital benefits	This Action has significant potential to improve air quality, local natural capital (including the preservation of green spaces and habitats) and noise pollution, through reducing infrastructure demand and carbon emissions from cars. Action is also consistent with Priority Investment Area 4.5 in Natural Capital Valuation for Samarkand (see GCAP Appendix B).
<b>Other Indicators/Co-benefits</b>	Operational cost, water, and/or energy savings, revenue generation, etc.	Increased tourist revenue as the pedestrian and cycling experience improves attractiveness of city to visitors.	
<b>Potential Project Risks and Mitigation Options</b>	<b>Area</b>	<b>Risks</b>	<b>Mitigation Options</b>
	<b>Social</b>	Private car users feel that increasing space for pedestrians and cyclists will come at the expense of car journeys and increase traffic congestion.	Awareness raising on the benefits of active travel compared with car intensive travel and the congestion it causes. Highlighting cost and journey time savings from travelling by public transport and active travel as well as environmental benefits.  Provide travel planning tools (digital and printed) accessible for all residents. Leverage temporary disruptions (such as construction) to encourage permanent behavioural change.
	<b>Environmental</b>	Negative amenity (e.g. tree removal and dust emissions) associated with construction works.	Construction works should be managed and phased sensitively to minimise disruption and inconvenience to local businesses and residents.  Also, opportunity to introduce nature positive solutions, such as planting, as part of pedestrianisation schemes to increase resilience to surface water flooding and heat island effects in urban areas.

	<b>Economic</b>	Cost of implementation / financial feasibility.	Prioritise secure sources of funding from the start and be open with financial backers about the risks and costs- but also the long-term expected return. This should include benefits to businesses of increased footfall and tourist spend – alongside improved air quality, reduced noise and dominance of traffic etc.
		Delays in implementation.	Consider schedule early and often; regularly update with known issues and communicate delays as they occur for early warning.
	<b>Other</b>	Maintenance challenges.	Ensure long-term maintenance costs of Action are accounted for in budgeting and funding stage of planning project. Explore opportunities for private sector sponsorship or business contributions to fund upkeep.

Action T4: Support the transition to electric vehicles by investing in charging infrastructure		Estimated Total Cost: € 1,756,000
<b>Description</b>	<p>Electric vehicle (EV) take up is increasing rapidly in Uzbekistan. In 2023, 7,139 EVs were imported into the country, mostly from Chinese manufacturers. Based on the proportion of the Uzbek population residing in Samarkand, around 1.55%, this suggests that potentially around 110 EVs joined the roads of Samarkand last year. National imports of EVs last year were more than 50 times the number of EV imports in 2020. There are two main factors that have helped to influence this growth in EV use – firstly, affordable consumer electricity prices and secondly the reducing cost of EVs.</p> <p>In Uzbekistan, the national government regulates and subsidises the electricity market through the National Electric Grid of Uzbekistan Joint Stock Company (JSC). Consumer prices are fixed below a certain level of usage, and hence broadly affordable. The energy market is, however, about to experience price reforms which are likely to subsidise low usage and increase prices for those which use above certain quotas. This may impact users of electric vehicle chargers in future since the power usage will be relatively high in comparison to other domestic uses. However, the unit cost of EVs has fallen, and EVs are excluded from import tariffs, customs duty, excise duty and transport fees until 2030.</p> <p>EBRD's e-bus project in Samarkand<sup>76</sup> is ongoing and will provide electric vehicle charging for the city's bus fleet. However, this project is separate from this Action, which is targeted at private car users. So far, there has been little strategic electric vehicle charging infrastructure (EVCI) planning and provision in Samarkand, meaning EV users are reliant on home charging. In 2022, a national drive to improve the level of charging ports was signed into law.</p> <p>Based on reasonable comparator cities such as Warsaw and Riga, Samarkand should aim to provide an additional fifty publicly accessible electric vehicle charging ports to reach a decent international standard of provision, with the number to be increased over time. This equates to 1 charger per 11,000 residents, compared to a rate of 1 per 12,000 residents in Warsaw and 1 per 7,200 residents in Riga.</p> <p>To reach EBRD's 'green' benchmark on the relevant indicator of alternative fuel sources for cars (3%) Samarkand would need to accommodate 1,073 EVs. This is calculated via an estimate of the number of private cars in Samarkand (35,750) based on national Uzbek car ownership rates per capita (65 per 1,000), multiplied by 3%. This proposal would therefore provide approximately one public charging port per 20 EVs if Samarkand were to expand its electric vehicle fleet share to 3%.</p> <p>The charging ports should be located in publicly accessible, clearly signed locations on the city's main road network. Each will be accompanied by two designated parking spaces reserved for electric vehicle charging, as most ports are designed to charge two cars. These should operate 24/7 to enable overnight charging, which is popular due to its convenience. Charging ports should be placed at key employment destinations, within residential areas. Major roads may benefit from rapid chargers to support drivers on long journeys. On-street EVCI should be delivered on carriageway or planted margins rather than on pavements to avoid obstructions and street clutter for pedestrians. There is potential to add the charging ports to existing streetlighting, as has already been implemented in comparable cities across Europe; this would have the additional benefit of linking the Action to Action E3.</p> <p>The city should also mandate the provision of new electric vehicle charging ports in car parks for new developments, at a ratio of at least 20 per 100 net additional residential units for all developments of over 10 net additional units. Developments unable to accommodate parking and ECVI for any reason should commute an agreed sum to a common city fund to expand EVCI. This will boost the overall numbers of electric vehicle charging units across the city. Such provision aligns well to the separate Actions improving energy efficiency and reducing carbon emissions in the Buildings sector (see B1 and B2).</p>	
<b>Sector</b>	<input checked="" type="checkbox"/> Transport	
<b>Action Type</b>	<input checked="" type="checkbox"/> Investment ('Hard') <input type="checkbox"/> Policy ('Soft')	

<sup>76</sup> [GrCF2 W2 E2 - Samarkand E-Bus Project \(ebrd.com\)](#)

<b>Implementation Timeframe</b>	2025 – 2029	
<b>Status</b>	<input type="checkbox"/> New <input type="checkbox"/> Planned <input checked="" type="checkbox"/> Ongoing	
<b>GCAP Action Classification</b>	<input checked="" type="checkbox"/> Capital Investment <input type="checkbox"/> Other Investment	If 'Other Investment,' what type? <input type="checkbox"/> Standards, guidelines, and regulations <input type="checkbox"/> Strategies, plans, and programmes <input type="checkbox"/> Investment-related feasibility study <input type="checkbox"/> Awareness, demonstration, training, and capacity building <input type="checkbox"/> Organisational measure <input type="checkbox"/> Behavioural measure <input type="checkbox"/> Monitoring, data collection, analysis, and studies
<b>Action Owner(s)</b>	<ul style="list-style-type: none"> <li>Samarkand Regional Transport Department</li> <li>Samarkand City Mayor's Office</li> </ul>	
<b>Other Stakeholders</b>	<ul style="list-style-type: none"> <li>Joint Stock Company National Electric Grid of Uzbekistan</li> <li>Samarkand Regional Road Maintenance</li> <li>Samarkand City Department of Architecture and Construction</li> <li>EBRD E-bus project leads</li> </ul>	
<b>Location</b>	<p>Action applies within the city boundaries in suitable locations on main road corridors, including within residential and employment areas. A detailed study of priority locations is needed, taking into account convenience for users and (if necessary) any constraints such as electric grid capacity.</p> <p>Currently promising locations include the following road corridors: University Boulevard, Registan Street, Dakhbed Yuli Street, Bustonsaroy Street, Uzbekistan Street, Amir Temur Street, and Mirzo Ulugbek Street. By mandating new electric vehicle charging infrastructure in new development, locations will be increased over time.</p>	
<b>Priority Environmental Challenge(s) Addressed</b>	<p><b>Climate Change and Resilience:</b></p> <ul style="list-style-type: none"> <li>Increasing greenhouse gas emissions</li> <li>Lack of clarity on local government role in emissions reduction</li> </ul> <p><b>Environment and Biodiversity:</b></p> <ul style="list-style-type: none"> <li>Elevated values of PM2.5 and PM10</li> </ul> <p><b>Transport:</b></p> <ul style="list-style-type: none"> <li>Poor air quality from vehicle emissions</li> </ul>	
<b>Strategic Goal(s) Addressed</b>	<p><b>Environment and Biodiversity:</b></p> <ul style="list-style-type: none"> <li>Improve air and water quality in Samarkand</li> </ul> <p><b>Climate Change and Resilience:</b></p> <ul style="list-style-type: none"> <li>Continue transition to renewable energy</li> </ul> <p><b>Energy:</b></p> <ul style="list-style-type: none"> <li>Use smart and renewable technologies to reduce energy consumption in Samarkand</li> </ul> <p><b>Transport:</b></p> <ul style="list-style-type: none"> <li>Decarbonise Samarkand's transport sector through low-emission vehicles</li> </ul>	
<b>Link(s) to Existing Policies/Plans/Projects</b>	<input checked="" type="checkbox"/> Yes <ul style="list-style-type: none"> <li>EBRD e-buses investment project</li> <li>Samarkand Transport Masterplan</li> <li>Presidential Decree on measures for expansion of infrastructure of operation of electric vehicles, signed into law 19 December 2022</li> </ul> <input type="checkbox"/> No	
<b>Link(s) to Other GCAP Actions</b>	<input checked="" type="checkbox"/> Yes <ul style="list-style-type: none"> <li><b>Action B1:</b> Invest in energy efficiency in buildings through thermal performance retrofit and building design standards</li> <li><b>Action B2:</b> Invest in decarbonisation of district heating systems</li> </ul>	

	<ul style="list-style-type: none"> <li>• <b>Action E2:</b> Introduce fiscal incentives for households and businesses to adopt renewable energy technology</li> <li>• <b>Action E3:</b> Invest in energy efficient street lighting</li> <li>• <b>Action EB1:</b> Invest in air quality monitoring stations to track and improve air quality and enable the development of an Air Quality Action Plan</li> <li>• <b>Action T1:</b> Extend and integrate public transport network, including trams and e-buses, to reduce reliance on cars and cut air pollution</li> </ul> <input type="checkbox"/> No																	
<p><b>Cross-Cutting Themes</b></p>	<p><b>Climate and Disaster Risk</b></p>	<p><b>Smart Maturity</b></p>	<p><b>Gender and Social Inclusion</b></p>	<p><b>Heritage and Tourism</b></p>														
	<input checked="" type="checkbox"/> Directly targeted <input type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> Directly reduces Greenhouse gas (GHG) emissions from private transport. Potential to reduce GHG emissions further if electricity generation is decarbonised, as is currently planned, with significant expansion of solar, wind and (to a lesser extent) hydroelectric power proposed.	<input checked="" type="checkbox"/> Directly targeted <input type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> Electric vehicle charging will be able to incorporate digital technology, including smart charging, and may enable wider digital technology in the electricity network.	<input type="checkbox"/> Directly targeted <input checked="" type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> Electric vehicles will reduce the level of airborne particulates and pollutants from burning fossil fuels. This will improve the living and health conditions for poorer residents exposed to high levels of vehicle pollution.	<input type="checkbox"/> Directly targeted <input checked="" type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> Electric vehicles will reduce the levels of particulates and pollutants from burning fossil fuels, which will improve local air quality- important for attractiveness to tourists and for the preservation and enhancement of heritage assets.														
<p><b>Implementation Process and Timeline</b></p>	<table border="1"> <thead> <tr> <th>Step</th> <th>Duration</th> </tr> </thead> <tbody> <tr> <td> <b>1. Evidence gathering – a cross-organisation working group to be established to gather and review existing evidence in order to determine most feasible locations for EV charging infrastructure</b> </td> <td>9 months</td> </tr> <tr> <td> <b>2. Engagement – engagement with relevant governmental, operational and (if necessary) community stakeholders to communicate emerging solutions based on evidence</b> </td> <td>3 months</td> </tr> <tr> <td> <b>3. Approvals and funding – arranging for appropriate political approvals and funding sources to fund delivery, operation and maintenance. City could explore Charging as a Service (CaaS), with lower capital investment, but with annual revenue commitment for meeting service level agreements for charging - good for minimising capital and technology risk, but with higher annual running costs.</b> </td> <td>6 months</td> </tr> <tr> <td> <b>4. Inception – hiring engineering and construction contractors, as well as upgrading electricity transmission networks if required to include both active and passive provision.</b> </td> <td>1 year</td> </tr> <tr> <td> <b>5. Implementation – rollout of electric vehicle charging points.</b> </td> <td>1 year</td> </tr> <tr> <td> <b>6. Closeout – monitoring/mitigating issues with new electric vehicle charging points after construction work complete.</b> </td> <td>6 months</td> </tr> </tbody> </table>				Step	Duration	<b>1. Evidence gathering – a cross-organisation working group to be established to gather and review existing evidence in order to determine most feasible locations for EV charging infrastructure</b>	9 months	<b>2. Engagement – engagement with relevant governmental, operational and (if necessary) community stakeholders to communicate emerging solutions based on evidence</b>	3 months	<b>3. Approvals and funding – arranging for appropriate political approvals and funding sources to fund delivery, operation and maintenance. City could explore Charging as a Service (CaaS), with lower capital investment, but with annual revenue commitment for meeting service level agreements for charging - good for minimising capital and technology risk, but with higher annual running costs.</b>	6 months	<b>4. Inception – hiring engineering and construction contractors, as well as upgrading electricity transmission networks if required to include both active and passive provision.</b>	1 year	<b>5. Implementation – rollout of electric vehicle charging points.</b>	1 year	<b>6. Closeout – monitoring/mitigating issues with new electric vehicle charging points after construction work complete.</b>	6 months
Step	Duration																	
<b>1. Evidence gathering – a cross-organisation working group to be established to gather and review existing evidence in order to determine most feasible locations for EV charging infrastructure</b>	9 months																	
<b>2. Engagement – engagement with relevant governmental, operational and (if necessary) community stakeholders to communicate emerging solutions based on evidence</b>	3 months																	
<b>3. Approvals and funding – arranging for appropriate political approvals and funding sources to fund delivery, operation and maintenance. City could explore Charging as a Service (CaaS), with lower capital investment, but with annual revenue commitment for meeting service level agreements for charging - good for minimising capital and technology risk, but with higher annual running costs.</b>	6 months																	
<b>4. Inception – hiring engineering and construction contractors, as well as upgrading electricity transmission networks if required to include both active and passive provision.</b>	1 year																	
<b>5. Implementation – rollout of electric vehicle charging points.</b>	1 year																	
<b>6. Closeout – monitoring/mitigating issues with new electric vehicle charging points after construction work complete.</b>	6 months																	

	CapEx [€]	OpEx over 5 years [€]	Feasibility / Advisory Costs [€]
<b>Indicative Project Costs</b>	1,527,000	229,000	n/a
	<ul style="list-style-type: none"> <li>Provide fifty publicly accessible electric vehicle charging ports: 1,000,000</li> <li>Main contractor preliminaries (15%): 150,000</li> <li>Main contractor overheads and profits (5%): 58,000</li> <li>Fees (10%): 121,000</li> <li>Contingency (15%): 199,000</li> </ul>		
<b>Potential Financing Instruments and Sources</b>	<b>Instrument (Own-Source, Grant, Debt, Equity, Other)</b>		<b>Source (Municipal Government, State-Owned Enterprise, National Government, Private Sector, International Development Partner, Other)</b>
	<b>Loan</b>	International Development Partner	
	<b>Loan</b>	Private Sector	
	<b>Own Source</b>	Municipal Government	
<b>Revenue Opportunities</b>	<input checked="" type="checkbox"/> Yes Revenue from net additional electricity usage <input type="checkbox"/> No		
<b>Impact Measures (Quantitative and Qualitative)</b>	<b>Environmental Impacts</b>	State indicators	1 – Average annual concentration of PM2.5 1.1 – Average annual concentration of PM10 1.2 – Average daily concentration of SO2 1.3 – Average daily concentration of NOx 8 – Annual CO <sub>2</sub> equivalent emissions per capita 8.1 - Annual CO <sub>2</sub> emissions per unit of GDP
		Pressure indicators	10 – Average age of car fleet, total and by type 10.3 – Share of total passenger car fleet run by alternative energy (total and by type)
	<b>Socio-economic Impacts</b>	Jobs created	60
		Social inclusion benefits	Reduces air pollution, thus improving health outcomes for poorest and most excluded population.
		Other socio-economic benefits	Improved environment for tourism, with significant economic benefits attached to this sector.
	<b>Climate Impacts</b>	Estimated carbon emissions reduction	1,920 tCO <sub>2e</sub> annually
		Climate resilience benefits	N/A
	<b>Nature &amp; Biodiversity Impacts</b>	Natural capital benefits	Reduced air and noise pollution is highly likely to have a net positive benefit on the

			environment and local natural capital, including both flora and fauna.
	<b>Other Indicators/Co-benefits</b>	Operational cost, water, and/or energy savings, revenue generation, etc.	Higher revenue from electricity consumption may help to fund some of the necessary grid upgrades.
<b>Potential Project Risks and Mitigation Options</b>	<b>Area</b>	<b>Risks</b>	<b>Mitigation Options</b>
	<b>Social</b>	Lack of awareness, understanding or support among residents and/or businesses of the benefits of EV charging infrastructure.  Inaccessibility for marginalised social groups.	Appropriate engagement and communication with e.g. mahalla committees and business organisations to raise awareness of economic benefits of, and long-term financial sustainability of, electric vehicle charging infrastructure. Consider further incentivising the take up of electric vehicles through additional benefits, such as dedicated or free parking.  Engage with marginalised social groups to understand any barriers to the use of electric vehicles. For example, provide, if feasible, financial assistance or loans to purchase an electric vehicle or subsidise charging costs.
	<b>Environmental</b>	Negative amenity (e.g. tree removal, noise and dust emissions) associated with construction works.	Construction works should be managed and phased sensitively to minimise disruption and inconvenience to local businesses and residents.
	<b>Economic</b>	Cost of implementation/ financial feasibility.  Delays in implementation.	Prioritise the identification of secure sources of funding from the start and be open with financial backers about the risks and costs- but also the long-term expected return. CaaS could be considered as one mitigation option.  Consider schedule early and often; regularly update to relevant stakeholders of known issues and communicate delays as they occur for early warning.
	<b>Other</b>	Underutilisation- if charging points are deployed in the wrong areas, they may not be used sufficiently to justify investment and/or to offer environmental benefit.	Careful and detailed feasibility study using both physical evidence and stakeholder engagement to ensure charging points are deployed in the optimum locations in terms of driving uptake.

## Urban Development and Green Space Actions

Action UD1: Expand existing programme of street tree planting with native, drought-tolerant species	Estimated Total Cost: €20,560,000
<b>Description</b>	<p>Samarkand's urban growth in recent years has consisted of one-storey low-rise housing with limited public realm- contrasting with the planned Russian streets closer to the city centre which benefit from a mature tree canopy. Those parts of the city that lack trees suffer to a greater extent from noise and air pollution generated by road transport.. While ornamental trees set in parkland improve the amenity of Samarkand's city centre in some locations, the rest of the urban area is often short of trees, and large parts of the city have none, particularly in poorer and/or informal settlements on the outskirts. As such, poorer residents lack access to shade, greenery and the pollution mitigation offered by city trees.</p> <p>Trees reduce the level of atmospheric pollutants hazardous to human health. This includes reducing carbon monoxide (CO), particulate matter (PM2.5 and PM10), sulphur dioxide (SO2) and nitrous oxide (NO) levels. Urban trees, alongside the benefits already mentioned, also support biodiversity (birds, mammals, insects and fungi) and habitat connectivity, reduce UV levels by filtering sunlight through shade, and are effective in stormwater capture and hence nature-based flood management (complementing and/or contributing to the Sustainable Urban Drainage Systems provided for through Action W1). Trees also improve the stability of soil, particularly on slopes, through root system anchoring and the windbreak effect. Trees can also help mitigate the urban heat island effect; a particular issue given that climate modelling demonstrates that heatwaves are set to worsen in Samarkand as a result of climate change. Trees beautify their urban surroundings. In summary, urban tree planting is a straightforward intervention that can bring multiple environmental and socio-economic benefits.</p> <p>This Action would entail a large-scale tree-planting programme to be executed by the Regional Government, adding some 20,000 additional trees to the existing city greenery.</p> <p>It will include a site survey to identify appropriate locations. The most suitable individual locations will depend on various factors, including:</p> <ul style="list-style-type: none"> <li>• Ease of monitoring and maintenance, in particular the potential for saving OPEX by relying on existing irrigation for the current programme of tree planting.</li> <li>• Physical factors such as road width, space for pedestrians and cycles, type of road verge, and existing planting and utility corridors.</li> <li>• Areas around schools given that air pollution can raise the incidence of asthma in children.</li> <li>• Opportunities to integrate new tree planting within or alongside new public green space proposed (for which see Action UD2).</li> </ul> <p>City authorities will need to undertake a preliminary survey of the locations such as these that would most benefit from additional tree coverage. Stakeholder engagement could also be valuable in identifying other existing gaps where tree planting may be justified.</p> <p>The planting of 20,000 trees will be carried out by the city, in a systematic way in keeping with the findings of the site survey and relevant feasibility studies.</p> <p>To maximise sustainability benefits, the trees planted must be drought-tolerant and locally native species. This will reduce water consumption, support native ecosystems and habitats for insects and birds, and avoid the ecological risk posed by non-native species. Samarkand climate supports native tree species including cottonwood (Populus), willow (Salix), Russian olive (Elaeagnus), salt cedar (Tamarix), Callery pear (Pyrus), cherry (Prunus), elm (Ulmus), walnut (Juglans), oak (Quercus), Russian salt tree (Halimodendron), rose (Rosa) and sour cherry (Cerasus).</p>
	<b>Sector</b>
<b>Action Type</b>	<input checked="" type="checkbox"/> Investment ('Hard') <input type="checkbox"/> Policy ('Soft')

<b>Implementation Timeframe</b>	2025-2030	
<b>Status</b>	<input type="checkbox"/> New <input type="checkbox"/> Planned <input checked="" type="checkbox"/> Ongoing	
<b>GCAP Action Classification</b>	<input checked="" type="checkbox"/> Capital Investment <input type="checkbox"/> Other Investment	If 'Other Investment,' what type? <input type="checkbox"/> Standards, guidelines, and regulations <input type="checkbox"/> Strategies, plans, and programmes <input type="checkbox"/> Investment-related feasibility study <input type="checkbox"/> Awareness, demonstration, training, and capacity building <input type="checkbox"/> Organisational measure <input type="checkbox"/> Behavioural measure <input type="checkbox"/> Monitoring, data collection, analysis, and studies
<b>Action Owner(s)</b>	<ul style="list-style-type: none"> <li>• Samarkand Regional Department for Ecology and Environmental Protection</li> <li>• Samarkand Regional Transport and Highways</li> <li>• Samarkand City Department of Architecture and Construction</li> </ul>	
<b>Other Stakeholders</b>	<ul style="list-style-type: none"> <li>• Mahalla Committees in affected areas</li> <li>• UNESCO (where trees are planted within the UNESCO World Heritage Site and its buffer)</li> <li>• NGOs (such as Save Samarkand, Zarafshan, and Ezgulik)</li> <li>• Samarkand State Architecture and Construction University)</li> </ul>	
<b>Location</b>	<ul style="list-style-type: none"> <li>• Programme of tree planting along main arterial expressways (M37, M39 and A378)</li> <li>• Additional tree planting along other key arterial roads showing potential to accommodate more trees, including: Usta Umara Dzhurakulova Street, Sadridin Ayriy Street, Panzhakent Road, Bustonsaroy Street, Shah-i-Zinda Street, Rudakiy Street, Avitsenny Street, Vohid Abdullo Street, Dakhbed-Yuli Street, Beruni Street, Spitamen Avenue, Narpay Yuli Street, Amir Temur Street, Gagarin Street, Mirzo Ulugbek Street, Buyuk Ipak Yuli Street, Navci Avenue, Termez Street, Usmana Yusupova Street, Zarafshan Street and Afrosiyob Street. This is not necessarily an exhaustive list, but is recommended based on Google Maps traffic and satellite data showing where traffic volumes are high and tree coverage is currently low or non-existent.</li> </ul>	
<b>Priority Environmental Challenge(s) Addressed</b>	<b>Environment and Biodiversity:</b> <ul style="list-style-type: none"> <li>• Tensions between urban growth and biodiversity conservation</li> </ul> <b>Climate Change and Resilience:</b> <ul style="list-style-type: none"> <li>• Insufficient focus on climate change-related hazards</li> </ul>	
<b>Strategic Goal(s) Addressed</b>	<b>Environment and Biodiversity:</b> <ul style="list-style-type: none"> <li>• Protect and enhance biodiversity in Samarkand</li> </ul> <b>Climate Change and Resilience:</b> <ul style="list-style-type: none"> <li>• Improve Samarkand's resilience to climate and natural disasters</li> </ul> <b>Land Use:</b> <ul style="list-style-type: none"> <li>• Increase extent of Samarkand's green and open space</li> </ul>	
<b>Link(s) to Existing Policies/Plans/Projects</b>	<input checked="" type="checkbox"/> Yes <ul style="list-style-type: none"> <li>• National Uzbek Government – Yashil Makon programme<sup>77</sup></li> <li>• UNDP Uzbekistan Sectoral Adaptation Plan for Buildings, Goal 32</li> <li>• Existing Samarkand City Tree Planting Programme</li> </ul> <input type="checkbox"/> No	
<b>Link(s) to Other GCAP Actions</b>	<input checked="" type="checkbox"/> Yes <ul style="list-style-type: none"> <li>• <b>Action C1:</b> Establish a team for environmental data collection to gather and monitor data on buildings, industry, energy and DRR (Disaster Risk Reduction)</li> <li>• <b>Action EB3:</b> Develop biodiversity metrics to drive habitat improvement for species over time</li> <li>• <b>Action UD2:</b> Plan for and invest in new urban green space in Samarkand</li> </ul>	

<sup>77</sup> [Ensuring a green future for Uzbekistan through 1 billion trees | Climate Promise \(undp.org\)](#)

	<ul style="list-style-type: none"> <li><b>Action W1:</b> Invest in wastewater, sewerage and drainage infrastructure to deliver range of environmental benefits</li> </ul> <input type="checkbox"/> No			
<b>Cross-Cutting Themes</b>	<b>Climate and Disaster Risk</b>	<b>Smart Maturity</b>	<b>Gender and Social Inclusion</b>	<b>Heritage and Tourism</b>
	<input checked="" type="checkbox"/> Directly targeted <input type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> Direct capture of CO <sub>2</sub> and mitigation of urban heat island effect and lower temperatures during heatwaves owing to additional shading.	<input type="checkbox"/> Directly targeted <input checked="" type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> Digital data on tree coverage and number of trees planted could be gathered by new data team established through Action C1.	<input checked="" type="checkbox"/> Directly targeted <input type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> Improvement of access to nature and shade in lower income, socially excluded neighbourhoods which suffer from a lack of trees.	<input type="checkbox"/> Directly targeted <input checked="" type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> More street trees in Samarkand will mitigate air pollution and the urban heat island effect; both of these will have positive impacts on the preservation of heritage assets and the attractiveness of the city to tourists.
<b>Implementation Process and Timeline</b>	<b>Step</b>		<b>Duration</b>	
	1. Preliminary survey – a team with representatives from the Samarkand Regional Transport and Roads Department, City Department for Architecture and Construction, and Samarkand Regional Landscape and Ecology Department will survey the city’s current level of tree cover and identify key gaps and priorities		3-6 months	
	2. Engagement – engaging with relevant stakeholders listed above after preliminary survey is completed, to determine the locations to focus tree planting and to finalise surveys and maps		2-3 months	
	3. Approvals and funding – arranging for appropriate signoffs and funding arrangements for the finalised tree planting programme		3-6 months	
	4. Inception phase – engaging public sector employees, tree nurseries and farmers, and private sector contractors where employed to deliver the programme of tree planting works, informing residents and businesses of any disruption that may occur.		2-3 months	
	5. Main works – roll-out of tree planting programme across the city, aiming to deliver total of 20,000 net additional trees.		36-42 months	
<b>Indicative Project Costs</b>	<b>CapEx [€]</b>		<b>OpEx over 5 years [€]</b>	<b>Feasibility / Advisory Costs [€]</b>
	18,586,000 <ul style="list-style-type: none"> <li>Plant 20,000 trees: 12,168,000</li> <li>Main contractor preliminaries (15%): 1,825,000</li> </ul>		1,859,000	115,000 <ul style="list-style-type: none"> <li>Preliminary survey for tree planting locations: 100,000</li> </ul>

	<ul style="list-style-type: none"> <li>• Main contractor overheads and profits (5%): 700,000</li> <li>• Fees (10%): 1,469,000</li> <li>• Contingency (15%): 2,424,000</li> </ul>		<ul style="list-style-type: none"> <li>• Contingency (15%): 15,000</li> </ul>				
<b>Potential Financing Instruments and Sources</b>	<b>Instrument (Own-Source, Grant, Debt, Equity, Other)</b> <b>Source (Municipal Government, State-Owned Enterprise, National Government, Private Sector, International Development Partner, Other)</b>						
	<b>Own source</b>	Municipal Government					
	<b>Grant</b>	National Government					
	<b>Loan</b>	International Development Partner					
	<b>Loan</b>	Private Sector					
<b>Revenue Opportunities</b>	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No						
<b>Impact Measures (Quantitative and Qualitative)</b>	<b>Environmental Impacts</b>		<table border="1"> <tr> <td>                     State indicators                 </td> <td>                     1 – Average annual concentration of PM2.5                      1.1 – Average annual concentration of PM10                      1.3 – Average daily concentration of SO2                      1.4 – Average daily concentration of NOx                      7 – Abundance of bird species                      7.1 – Abundance of other species                 </td> </tr> <tr> <td>                     Pressure indicators                 </td> <td>                     N/A                 </td> </tr> </table>	State indicators	1 – Average annual concentration of PM2.5 1.1 – Average annual concentration of PM10 1.3 – Average daily concentration of SO2 1.4 – Average daily concentration of NOx 7 – Abundance of bird species 7.1 – Abundance of other species	Pressure indicators	N/A
	State indicators	1 – Average annual concentration of PM2.5 1.1 – Average annual concentration of PM10 1.3 – Average daily concentration of SO2 1.4 – Average daily concentration of NOx 7 – Abundance of bird species 7.1 – Abundance of other species					
	Pressure indicators	N/A					
	<b>Socio-economic Impacts</b>		<table border="1"> <tr> <td>                     Jobs created                 </td> <td>                     894                 </td> </tr> </table>	Jobs created	894		
	Jobs created	894					
			<table border="1"> <tr> <td>                     Social inclusion benefits                 </td> <td>                     Improves access to nature and shade for residents in areas with low levels of tree cover.                 </td> </tr> </table>	Social inclusion benefits	Improves access to nature and shade for residents in areas with low levels of tree cover.		
	Social inclusion benefits	Improves access to nature and shade for residents in areas with low levels of tree cover.					
			<table border="1"> <tr> <td>                     Other socio-economic benefits                 </td> <td>                     Significant improvements to human physical and mental health resulting from urban beautification, reduced air pollution exposure, reduced UV exposure, and cooling effect of trees, reducing temperatures during heatwaves.                 </td> </tr> </table>	Other socio-economic benefits	Significant improvements to human physical and mental health resulting from urban beautification, reduced air pollution exposure, reduced UV exposure, and cooling effect of trees, reducing temperatures during heatwaves.		
	Other socio-economic benefits	Significant improvements to human physical and mental health resulting from urban beautification, reduced air pollution exposure, reduced UV exposure, and cooling effect of trees, reducing temperatures during heatwaves.					
	<b>Climate Impacts</b>		<table border="1"> <tr> <td>                     Estimated carbon emissions reduction                 </td> <td>                     8,300 tCO<sub>2</sub>e over the lifetime of the trees                 </td> </tr> </table>	Estimated carbon emissions reduction	8,300 tCO <sub>2</sub> e over the lifetime of the trees		
Estimated carbon emissions reduction	8,300 tCO <sub>2</sub> e over the lifetime of the trees						
		<table border="1"> <tr> <td>                     Climate resilience benefits                 </td> <td>                     Significantly mitigates the impact of heatwaves through additional tree canopy cover and shading, reducing the urban heat island effect, improves drought resilience by enhancing stormwater capture and flood resilience, and reducing soil evapotranspiration. Root anchoring contributes to soil stability, hence improving resilience of soil to drought. Planting of urban street trees has been demonstrated to reduce                 </td> </tr> </table>	Climate resilience benefits	Significantly mitigates the impact of heatwaves through additional tree canopy cover and shading, reducing the urban heat island effect, improves drought resilience by enhancing stormwater capture and flood resilience, and reducing soil evapotranspiration. Root anchoring contributes to soil stability, hence improving resilience of soil to drought. Planting of urban street trees has been demonstrated to reduce			
Climate resilience benefits	Significantly mitigates the impact of heatwaves through additional tree canopy cover and shading, reducing the urban heat island effect, improves drought resilience by enhancing stormwater capture and flood resilience, and reducing soil evapotranspiration. Root anchoring contributes to soil stability, hence improving resilience of soil to drought. Planting of urban street trees has been demonstrated to reduce						

			perceived temperatures by between 5 and 7 degrees Celsius.
	<b>Nature &amp; Biodiversity Impacts</b>	Natural capital benefits	Provides considerable ecological benefits by increasing tree numbers and canopy cover providing additional habitat connectivity for native species including insects, birds, mammals and fungi. This Action is also consistent with Priority Investment Area 4.4 in the Natural Capital Valuation for Samarkand (see GCAP Appendix B).
	<b>Other Indicators/Co-benefits</b>	Operational cost, water, and/or energy savings, revenue generation, etc.	Additional tree planting saves energy for both heating and cooling buildings, especially cooling. However, the energy savings vary widely depending mainly on the location of the tree(s) relative to the building; they have been calculated as between 2.3%-90% for cooling and 1% to 20% for heating. <sup>78</sup>  Other externalities include higher economic output owing to improved human health and fewer sick days and hospital admittances for respiratory problems, heat stress and heatstroke, savings on healthcare costs borne by state <sup>7980</sup>
<b>Potential Project Risks and Mitigation Options</b>	<b>Area</b>	<b>Risks</b>	<b>Mitigation Options</b>
	<b>Social</b>	May result in unequal distribution of trees and associated impacts on property prices and rents.	Ensure areas prioritised for tree planting cover a wide range of areas in socio-economic terms- seek in particular to prioritise tree planting in poorer, more peripheral locations.
	<b>Environmental</b>	Planting inappropriate tree species can lead to overextraction of water, poor growth (and canopy cover) and importation of invasive species.	List of recommended native tree species provided above; planting these will mitigate the risk.
	<b>Economic</b>	Risk of traffic disruption from tree planting construction works.	To be mitigated through normal means associated with construction works (diversions, closures at less busy times, prior notification to residents and businesses).

<sup>78</sup> Ko, Y, (2018). Trees and Vegetation for Residential Energy Conservation: A critical review for evidence-based urban greening in North America, in Urban Forestry and Urban Greening, Volume 34, available at <https://www.sciencedirect.com/science/article/abs/pii/S1618866717306325>

<sup>79</sup> Greater London Authority, (2020). World's First Ultra Low Emission Zone to save NHS billions by 2050, available at <https://www.london.gov.uk/press-releases/mayoral/ulez-to-save-billions-for-nhs>

<sup>80</sup> Ding, L et al (2022). Health Benefits of Air Quality Improvement: Empirical Research Based on Medical Insurance Reimbursement Data in Frontiers in Public Health, Volume 10, available at <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8927649>

	<b>Other</b>	Trees can pose a hazard during severe weather conditions.	Trees should not be planted in proximity to overhead power or telephone lines, or exposed gas mains.
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Action UD2: Plan for and invest in new urban green space in Samarkand	Estimated Cost over GCAP Period: €54,981,000
<p><b>Description</b></p>	<p>Based on EBRD Green Cities indicator benchmarks (green for 50% and over, amber for 50-30% and red for under 30%) Samarkand has a very low share of green space within its city boundaries (13%). This negatively impacts residents' quality of life. While Samarkand's open space area ratio per capita is 21.44 sqm, which is high by international standards, it is not all 'green' space and is very unevenly distributed. This is indicated by the statistic that 39.09% of the population live within 300m of an open space, scoring amber rather than green on the EBRD benchmarks. Samarkand's open space is concentrated in the city centre. Large parts of the city, including most residential areas, have very low green space provision, and while there is extensive open space in the north-east of the city in particular, it is not necessarily accessible to the public and is not green space. As Samarkand grows further, currently open space on the urban fringe is disappearing and the problem is getting worse. However, it is not normally possible to create new green space by demolishing existing urban development, except in cases where brownfield land parcels emerge through industrial closures. While open space requirements for new development already exist, they are complementary to this action rather than a part of it as they are project-scale whereas this action is city-scale.</p> <p>Open green space in urban areas provide opportunities for healthy living through recreation and sports, builds social capital and improves mental health by providing amenity and community space, and as a result contribute more generally to overall quality of life. Such areas also help mitigate the urban heat island effect by cooling the air, including through shading and evapotranspiration. They improve air quality by producing oxygen, and contribute to better water management by reducing runoff and supporting groundwater recharge. Additionally, green spaces support urban biodiversity, offering habitats for various plant and animal species (see also Action EB3).</p> <p>The steps that Samarkand needs to implement in order to secure additional urban green space are as follows:</p> <ol style="list-style-type: none"> <li><b>1. Zoning policy at urban fringe:</b></li> </ol> <p>Samarkand needs to protect at least 30% of currently open land earmarked for new development as urban green space. This will ensure sustainable opportunities for recreation, sport and relaxation in residential suburbs and will at the same time help minimise and control urban sprawl. In practice, such currently open land lies outside the city boundaries in the wider urban area, so this element of the Action will need to be implemented by the Regional Government rather than the city government. While the new green space will be closest to new housing developments, it will also add to provision for existing residents. The 30% protection could be either allocation(s) in a new land use plan (see Action UD3) or a standalone requirement, but the former option is preferable as it is more likely to be implemented consistently and the boundaries of the new development, and hence clarity on the scale of new green space to be provided, will be clearer. In Uzbekistan, all land is already publicly owned, so in this sense land acquisition should be relatively straightforward.</p> <ol style="list-style-type: none"> <li><b>2. Provision within city boundaries:</b></li> </ol> <p>At the same time, the city government needs to identify opportunities within the city boundary for new urban green space. This could include currently underutilised land, such as low density development, or derelict/vacant/open land that is not currently 'green.' Most of (but not all) of these opportunities are likely to be small-scale, and hence can include pocket parks and playgrounds designed to serve a local residential catchment. However, the city centre already benefits from significant green space, so there is less need for new provision here. Engagement with mahalla committees will help determine the type of green space desired or needed. There is also a significant opportunity to integrate the provision of the new green space with or alongside the expansion of the urban street tree planting programme (for which see Action UD1).</p> <p>This Action envisages the 200 hectares of new green space will collectively provide:</p> <ul style="list-style-type: none"> <li>• 100,000 square metres of new playgrounds;</li> <li>• 200,000 square metres of new paving (paths and paved areas)</li> </ul>

	<ul style="list-style-type: none"> <li>• 500,000 square metres of new sports and recreation facilities; and</li> <li>• 1,200,000 square metres of amenity (green) open space.</li> </ul> <p><b>3. Delivery/construction of new green spaces:</b></p> <p>Once steps 1 and 2 above are complete, the new green spaces need to be delivered/constructed. At the urban fringe, this will require joint planning, delivery and construction alongside new housing. Within the city boundaries, delivery and construction can begin as soon as appropriate sites have been identified, local consultation has taken place, and the space has been designed. Recommended potential locations for the new green spaces are provided in the Locations section below.</p> <p>Through this Action, a total of at least 200 hectares of net additional open space should be secured, with as high a proportion as possible of this new land being provided within the city boundaries. An ambitious target would be 25% of the new land (50 hectares) being provided within the boundaries but given the extent of existing urban development a more realistic target would be around 12.5% (25 hectares) within the city boundaries, with 175 hectares outside.</p>	
<b>Sector</b>	<input checked="" type="checkbox"/> Land Use	
<b>Action Type</b>	<input checked="" type="checkbox"/> Investment ('Hard') <input type="checkbox"/> Policy ('Soft')	
<b>Implementation Timeframe</b>	2025 – 2030	
<b>Status</b>	<input checked="" type="checkbox"/> New <input type="checkbox"/> Planned <input type="checkbox"/> Ongoing	
<b>GCAP Action Classification</b>	<input checked="" type="checkbox"/> Capital Investment <input type="checkbox"/> Other Investment	<b>If 'Other Investment,' what type?</b> <input type="checkbox"/> Standards, guidelines, and regulations <input type="checkbox"/> Strategies, plans, and programmes <input type="checkbox"/> Investment-related feasibility study <input type="checkbox"/> Awareness, demonstration, training, and capacity building <input type="checkbox"/> Organisational measure <input type="checkbox"/> Behavioural measure <input type="checkbox"/> Monitoring, data collection, analysis, and studies
<b>Action Owner(s)</b>	<ul style="list-style-type: none"> <li>• Samarkand Regional Department for Ecology and Environmental Protection</li> <li>• Samarkand City Mayor's Department</li> <li>• Samarkand City Department of Architecture and Construction</li> </ul>	
<b>Other Stakeholders</b>	<ul style="list-style-type: none"> <li>• Mahalla Committees</li> <li>• Local NGOs (such as Save Samarkand, Zarafshan and Ezgulik)</li> <li>• UNESCO (where new open space is being provided within the World Heritage Site and its buffer)</li> </ul>	
<b>Location</b>	<p>Action requires activity across the entire urban area of Samarkand. However, there should be a Regional Government focus on safeguarding land as future open space at the urban fringe and a city government focus on provision of smaller sites within the city boundaries.</p> <p>Recommended locations for the provision of new green space, based on their existing poor access to open land, are as follows:</p> <ul style="list-style-type: none"> <li>• Southern end of Suzangaron Street Corridor, south of city centre;</li> <li>• Hujum ko'chasi and surrounding urban area, east of city centre;</li> <li>• Navoi Avenue corridor to north-west of city centre;</li> <li>• Along Ponjob Street in Sat-Tepo;</li> <li>• Termez Street corridor (south-east of city centre)</li> <li>• Narpay Yuli Street corridor (west of city centre); and/or</li> <li>• Existing open land at city fringe in locations including Uzbankinty, Kimyogarlal, Urtashikh and Ravanak.</li> </ul>	

<b>Priority Environmental Challenge(s) Addressed</b>	<b>Environment and Biodiversity:</b> <ul style="list-style-type: none"> <li>Tensions between urban growth and biodiversity conservation</li> <li>Inadequate provision of open/green spaces across the urban area</li> </ul>			
<b>Strategic Goal(s) Addressed</b>	<b>Environment and Biodiversity:</b> <ul style="list-style-type: none"> <li>Protect and enhance biodiversity in Samarkand</li> </ul> <b>Climate Change and Resilience:</b> <ul style="list-style-type: none"> <li>Improve Samarkand’s resilience to climate and natural disasters</li> </ul> <b>Land Use:</b> <ul style="list-style-type: none"> <li>Increase extent of Samarkand’s green and open space</li> </ul>			
<b>Link(s) to Existing Policies/Plans/Projects</b>	<input checked="" type="checkbox"/> Yes <ul style="list-style-type: none"> <li>UNDP Uzbekistan Sectoral Adaptation Plan for Buildings, Goal 31</li> </ul> <input type="checkbox"/> No			
<b>Link(s) to Other GCAP Actions</b>	<input checked="" type="checkbox"/> Yes <ul style="list-style-type: none"> <li><b>Action EB3:</b> Develop biodiversity metrics to drive habitat improvement for species over time</li> <li><b>Action UD1:</b> Expand existing programme of street tree planting with native, drought-tolerant species</li> <li><b>Action UD3:</b> Develop and adopt a strategic land use plan and heritage framework to guide spatial decision-making</li> <li><b>Action T3:</b> Invest in and promote cycling and walking infrastructure</li> <li><b>Action W1:</b> Invest in wastewater, sewerage and drainage infrastructure to deliver range of environmental benefits</li> </ul> <input type="checkbox"/> No			
<b>Cross-Cutting Themes</b>	<b>Climate and Disaster Risk</b>	<b>Smart Maturity</b>	<b>Gender and Social Inclusion</b>	<b>Heritage and Tourism</b>
	<input checked="" type="checkbox"/> Directly targeted <input type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> Green space will significantly improve local climate and disaster resilience by cooling the city, and allowing for greater flood and stormwater absorption.	<input type="checkbox"/> Directly targeted <input type="checkbox"/> Some elements <input checked="" type="checkbox"/> No direct links <u>Reason:</u> Not relevant to smart maturity.	<input type="checkbox"/> Directly targeted <input checked="" type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> The lowest-income residents have particularly low levels of access to existing green space. By increasing the amount of green space, social inclusion and health outcomes will be improved.	<input type="checkbox"/> Directly targeted <input checked="" type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> Enhancement of urban green space will help to improve the tourism experience for visitors to Samarkand, albeit the impact will be low as the most heavily-touristed areas are also those with most existing green space.
<b>Implementation Process and Timeline</b>	<b>Step</b>		<b>Duration</b>	
	1. Zoning policy at urban fringe (developing policy, mapping land to which it will apply, achieving political buy-in)		1 year	
	2. New green space within city boundaries (identifying opportunity areas, engagement with local residents, designing new spaces)		18 months	
	3. Delivery/construction of new green spaces (both outside and within city boundary)		6 years	
<b>Indicative Project Costs</b>	<b>CapEx [€]</b>		<b>OpEx over 5 years [€]</b>	<b>Feasibility / Advisory Costs [€]</b>
	(GCAP Period) 52,613,000 (Lifetime of Action) 94,704,000  <ul style="list-style-type: none"> <li>Delivery/construction of new green spaces: 62,000,000</li> </ul>		2,368,000	n/a

	<ul style="list-style-type: none"> <li>• Main contractor preliminaries (15%): 9,300,000</li> <li>• Main contractor overheads and profits (5%): 3,565,000</li> <li>• Fees (10%): 7,487,000</li> <li>• Contingency (15%): 12,353,000</li> </ul>																	
<p>Potential Financing Instruments and Sources</p>	<table border="1"> <thead> <tr> <th>Instrument (Own-Source, Grant, Debt, Equity, Other)</th> <th colspan="2">Source (Municipal Government, State-Owned Enterprise, National Government, Private Sector, International Development Partner, Other)</th> </tr> </thead> <tbody> <tr> <td>Own Source</td> <td colspan="2">Municipal Government</td> </tr> <tr> <td>Grant</td> <td colspan="2">National Government</td> </tr> <tr> <td>Loan</td> <td colspan="2">International Development Partner</td> </tr> <tr> <td>PPP</td> <td colspan="2">Municipal Government/Private Sector (particularly if open space delivered as part of new housing developments)</td> </tr> </tbody> </table>			Instrument (Own-Source, Grant, Debt, Equity, Other)	Source (Municipal Government, State-Owned Enterprise, National Government, Private Sector, International Development Partner, Other)		Own Source	Municipal Government		Grant	National Government		Loan	International Development Partner		PPP	Municipal Government/Private Sector (particularly if open space delivered as part of new housing developments)	
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<p>Revenue Opportunities</p>	<p><input checked="" type="checkbox"/> Yes                  New green spaces/parks may offer some possibility for municipal revenues from the operation of leisure and sport facilities, cafes, restaurants and tourism attractions.</p> <p><input type="checkbox"/> No</p>																	
<p>Impact Measures (Quantitative and Qualitative)</p>	<table border="1"> <thead> <tr> <th>Environmental Impacts</th> <th>State indicators</th> <th></th> </tr> </thead> <tbody> <tr> <td rowspan="2"></td> <td>State indicators</td> <td>                     6 – Open green space area per capita                      6.1 – Share of green space areas within urban limits                      6.2 – Share of population living within 300m of open green space of at least 0.5ha                 </td> </tr> <tr> <td>Pressure indicators</td> <td>                     33 – Population density on urban land                      34 – Average annual growth rate of built-up areas                      34.1 – Share of brownfield development                 </td> </tr> <tr> <td rowspan="3"></td> <td>Jobs created</td> <td>1,077</td> </tr> <tr> <td>Social inclusion benefits</td> <td>Additional urban green space will be particularly beneficial for lower income residents, especially for marginalised rural to urban migrants in outer suburbs.</td> </tr> <tr> <td>Other socio-economic benefits</td> <td>Increased urban green space will improve recreation provision for children and help with childcare needs, such as by providing playgrounds, and improve wider health and wellbeing through increased provision of</td> </tr> </tbody> </table>			Environmental Impacts	State indicators			State indicators	6 – Open green space area per capita 6.1 – Share of green space areas within urban limits 6.2 – Share of population living within 300m of open green space of at least 0.5ha	Pressure indicators	33 – Population density on urban land 34 – Average annual growth rate of built-up areas 34.1 – Share of brownfield development		Jobs created	1,077	Social inclusion benefits	Additional urban green space will be particularly beneficial for lower income residents, especially for marginalised rural to urban migrants in outer suburbs.	Other socio-economic benefits	Increased urban green space will improve recreation provision for children and help with childcare needs, such as by providing playgrounds, and improve wider health and wellbeing through increased provision of
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			sports and recreation facilities.
	<b>Climate Impacts</b>	Estimated carbon emissions reduction	3,830 tCO <sub>2</sub> e over the lifetime of the grassland and trees
		Climate resilience benefits	Urban green space can help stormwater drainage capture, and promote cooling, reducing the urban heat island effect and ameliorating heatwave conditions.
	<b>Nature &amp; Biodiversity Impacts</b>	Natural capital benefits	Urban green space provides significant opportunities to increase natural capital through tree and vegetation planting, particularly of native species. This Action is also consistent with Priority Investment Areas 4.1, 4.2 and 4.8 in the Natural Capital Valuation for Samarkand (see GCAP Appendix B).
<b>Other Indicators/Co-benefits</b>	Operational cost, water, and/or energy savings, revenue generation, etc.	Will improve health and wellbeing of city residents, thereby reducing economic costs associated with illness and chronic conditions, may reduce traffic accidents involving children by providing safe places for children to play.	
<b>Potential Project Risks and Mitigation Options</b>	<b>Area</b>	<b>Risks</b>	<b>Mitigation Options</b>
	<b>Social</b>	Displacement of/disruption to local residents.	Avoid displacing residents by demolishing existing homes to create new green space. Seek to minimise amenity impacts of construction by considering ways to reduce e.g. dust and noise impacts, and keeping construction phase as condensed/short as possible.
	<b>Environmental</b>	High water consumption in maintenance	Ensure that new green spaces only use drought-tolerant native species; respond to the local climatic conditions through use of approaches such as xeriscaping.
	<b>Economic</b>	Constraints on economic growth-open space provided instead of new homes, shops and jobs.	Demonstration/awareness raising of significant economic value and growth, as well as intangible factors such as quality of place, added through open space alongside new homes, shops and jobs.

	<b>Other</b>	New green space provided in suboptimal locations	Opportunity areas should be appropriately identified and consultation should be carried out with local residents/mahallas in order to ensure new provision meets specific local needs.
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Action UD3: Develop and adopt a strategic land use plan and heritage framework to guide spatial decision-making	Estimated Total Cost: €2,232,000
<p><b>Description</b></p>	<p>Samarkand has no publicly available or adopted land use plan. This makes it almost impossible for residents, businesses, investors, developers and different levels of government to understand the 20-30 year vision or spatial priorities for the city in terms of policy and strategy- whether economic, environmental or spatial.<sup>81</sup> This also makes it difficult to understand how (or if) important heritage sites are being protected from the effects of development or other land uses.</p> <p>While a draft land use plan has been progressed over the last 15 years or so, it is not available for inspection and its contents and progress are unknown. UNESCO has been recommending Samarkand City develops a land use plan with heritage management framework for many years.</p> <p>This Action seeks a comprehensive land use plan for Samarkand to enable forward planning of a wide range of spatial interventions across multiple sectors, including buildings, industries and transport. It will promote high-density, transit-oriented development, maximising the use of brownfield opportunities, thus reducing greenfield urban sprawl, which results in emissions-generating car transport. At the same time, the land use plan would include a heritage management framework to protect and enhance the UNESCO World Heritage assets of Samarkand and their settings.</p> <p>Once a strategic land use plan is adopted, it provides a firm basis for enabling, derisking and justifying all kinds of development and infrastructure investments across the full range of urban sectors (transport, water, buildings, industries) that are not yet possible (or carry high financial risk) in Samarkand. This is because land use plans offer policy and spatial certainty to developers, investors and infrastructure providers and managers; they achieve this by providing consistent and clear information to all parties on the locations where and the circumstances under which relevant developments and investments will be supported politically by the Regional Government. In turn, this results in investments that are more effective in terms of both return on investment for developers and maximisation of benefits for local residents.</p> <p>The following components should be included in a comprehensive land use plan for Samarkand:</p> <ul style="list-style-type: none"> <li>• Definitions of land use categories (zoning)</li> <li>• Heritage management framework – sets out specific requirements for developments impacting the UNESCO World Heritage Site and its buffer as well as other designated heritage assets and areas of conservation importance. Requirements would cover height limits, impacts on views, materials, details, design</li> <li>• Sustainable development policies including guidance on transit oriented development, active travel networks, nature-based solutions and links/cross-references to related projects and plans, e.g. energy efficiency programmes, the Integrated Water Management Plan, new open space provision, the Samarkand Transport Masterplan</li> <li>• Infrastructure delivery plan incorporating key projects (including transport infrastructure, utilities upgrades, social infrastructure such as schools and hospitals)</li> <li>• Development site allocations and phasing of delivery</li> <li>• Economic and employment needs provision</li> <li>• Document to be accompanied by GIS-based mapping of:             <ul style="list-style-type: none"> <li>○ Existing built form as a base layer, showing future development site allocations</li> <li>○ Movement and access network (existing and proposed)</li> <li>○ Open spaces/ green corridors (existing and proposed)</li> <li>○ Land use zones</li> <li>○ Street networks/ road hierarchies (existing and proposed)</li> <li>○ Employment hubs/ community hubs/ retail hubs (existing and to be developed)</li> </ul> </li> </ul>

<sup>81</sup> In the absence of a land use plan for Samarkand, relevant spatial policies are being progressed at national government level instead. See, for example, Presidential Resolution 233 (promoting the construction of Shirin, a new commercial centre for Samarkand including a new headquarters for the Regional Government on a greenfield site close to the airport- and hence unlocking the redevelopment of the existing Regional Government quarter in the city centre for commercial and tourist uses) and Presidential Order 70 (specifying, among other requirements, Samarkand’s annual new housing target for 2024). The Resolution and Order, respectively, are available at <https://lex.uz/uz/docs/6540002#> and <https://lex.uz/acts/6906825>. While these national government actions offer some degree of certainty to investors, a strategic land use plan would improve the situation by enabling a more holistic vision for the city across all relevant sectors, including heritage.

	<ul style="list-style-type: none"> <li>○ Cultural and community spaces (existing and proposed)</li> </ul> <p>Stakeholder engagement for any update, completion or replacement of the existing plan is a priority. Mahalla committees and other relevant stakeholders, including utility companies, the Chamber of Commerce, academia, NGOs, and relevant other departments of the Regional and City Government should be invited to comment on the draft city plan to inform its development.</p> <p>The technical starting point for the land use plan is unknown because it depends on the extent and quality of the work carried out so far for the emerging plan. However, it is assumed that much existing information exists that can be developed further into a comprehensive and up-to-date evidence base across all relevant sectors. In the case of Samarkand, the evidence base development would require as its first step a gap analysis of the quantity and quality of the evidence base for the plan already under development.</p> <p>Following the evidence stage, the policies, proposals, management measures and/or zoning that will be presented in the final land use plan and heritage management document need to be developed based on that evidence in consultation with the key stakeholders outlined above.</p>	
<b>Sector</b>	<input checked="" type="checkbox"/> Land Use	
<b>Action Type</b>	<input type="checkbox"/> Investment ('Hard') <input checked="" type="checkbox"/> Policy ('Soft')	
<b>Implementation Timeframe</b>	2025 – 2029	
<b>Status</b>	<input type="checkbox"/> New <input type="checkbox"/> Planned <input checked="" type="checkbox"/> Ongoing	
<b>GCAP Action Classification</b>	<input type="checkbox"/> Capital Investment <input checked="" type="checkbox"/> Other Investment <table border="0" style="margin-left: 20px;"> <tr> <td style="vertical-align: top;">           If 'Other Investment,' what type?           <ul style="list-style-type: none"> <li><input type="checkbox"/> Standards, guidelines, and regulations</li> <li><input checked="" type="checkbox"/> Strategies, plans, and programmes</li> <li><input type="checkbox"/> Investment-related feasibility study</li> <li><input type="checkbox"/> Awareness, demonstration, training, and capacity building</li> <li><input type="checkbox"/> Organisational measure</li> <li><input type="checkbox"/> Behavioural measure</li> <li><input type="checkbox"/> Monitoring, data collection, analysis, and studies</li> </ul> </td> </tr> </table>	If 'Other Investment,' what type? <ul style="list-style-type: none"> <li><input type="checkbox"/> Standards, guidelines, and regulations</li> <li><input checked="" type="checkbox"/> Strategies, plans, and programmes</li> <li><input type="checkbox"/> Investment-related feasibility study</li> <li><input type="checkbox"/> Awareness, demonstration, training, and capacity building</li> <li><input type="checkbox"/> Organisational measure</li> <li><input type="checkbox"/> Behavioural measure</li> <li><input type="checkbox"/> Monitoring, data collection, analysis, and studies</li> </ul>
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<b>Action Owners</b>	<ul style="list-style-type: none"> <li>• Samarkand Regional Department of Architecture and Construction</li> <li>• Samarkand City Mayor's Office</li> </ul>	
<b>Other Stakeholders</b>	<ul style="list-style-type: none"> <li>• Samarkand Region Cadastral Department</li> <li>• Samarkand Region Department for Ecology and Environmental Protection</li> <li>• Samarkand Regional Transport Department</li> <li>• Mahalla Committees</li> <li>• NGOs (such as Save Samarkand, Zarafshan and Ezgulik)</li> <li>• UNESCO (especially where World Heritage Site and buffer affected)</li> <li>• Samarkand State Architecture and Construction University</li> </ul>	
<b>Location</b>	Land use plan applies equally to all land within the boundaries of Samarkand City. To be developed by the Regional Government, whose offices are at Koksaroy Square 1, Samarkand.	
<b>Priority Environmental Challenges Addressed</b>	<p><b>Climate Change and Resilience:</b></p> <ul style="list-style-type: none"> <li>• Increasing greenhouse gas emissions</li> </ul> <p><b>Environment and Biodiversity:</b></p> <ul style="list-style-type: none"> <li>• Tensions between urban growth and biodiversity conservation</li> <li>• Inadequate provision of open/green spaces across the urban area</li> </ul> <p><b>Land Use:</b></p> <ul style="list-style-type: none"> <li>• Heritage risks</li> <li>• Lack of green/open spaces</li> <li>• Illegal or poorly planned development</li> </ul> <p><b>Transport:</b></p> <ul style="list-style-type: none"> <li>• Traffic congestion</li> <li>• Inadequate walking and cycling infrastructure</li> </ul>	

<p><b>Strategic Goals Addressed</b></p>	<ul style="list-style-type: none"> <li>Inadequate public transport</li> </ul> <p><b>Environment and Biodiversity:</b></p> <ul style="list-style-type: none"> <li>Protect and enhance biodiversity in Samarkand</li> </ul> <p><b>Climate Change and Resilience:</b></p> <ul style="list-style-type: none"> <li>Improve Samarkand’s resilience to climate and natural disasters</li> </ul> <p><b>Land Use:</b></p> <ul style="list-style-type: none"> <li>Develop land use plans for Samarkand, incorporating heritage management</li> <li>Increase extent of Samarkand’s green and open space</li> </ul> <p><b>Transport:</b></p> <ul style="list-style-type: none"> <li>Improve pedestrian and cycling infrastructure in Samarkand</li> </ul>									
<p><b>Links to Existing Policies/Plans/Projects</b></p>	<p><input checked="" type="checkbox"/> Yes</p> <ul style="list-style-type: none"> <li>Draft Samarkand City Masterplan (progress and quality unknown)</li> <li>Samarkand Transport Masterplan</li> <li>UNESCO-led management of and documentation on Samarkand World Heritage site from designation to present</li> </ul> <p><input type="checkbox"/> No</p>									
<p><b>Link(s) to Other GCAP Actions</b></p>	<p><input checked="" type="checkbox"/> Yes</p> <p><b>Action UD1:</b> Expand existing programme of street tree planting with native, drought-tolerant species</p> <p><b>Action UD2:</b> Plan for and invest in new urban green space in Samarkand</p> <p><b>Action T1:</b> Extend and integrate public transport network, including trams and e-buses, to reduce reliance on cars and cut air pollution</p> <p><b>Action T3:</b> Invest in and promote cycling and walking infrastructure</p> <p><b>Action W2:</b> Develop Integrated Water Resource Management Plan, including drought management actions</p> <p><input type="checkbox"/> No</p>									
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	<p><input checked="" type="checkbox"/> Directly targeted</p> <p><input type="checkbox"/> Some elements</p> <p><input type="checkbox"/> No direct links</p> <p><u>Reason:</u> Strategic land use plan facilitates transport-oriented development, identification of flood zones, identification of new green space- all of which help reduce Samarkand’s climate and disaster risk.</p>	<p><input type="checkbox"/> Directly targeted</p> <p><input checked="" type="checkbox"/> Some elements</p> <p><input type="checkbox"/> No direct links</p> <p><u>Reason:</u> Strategic land use plan will be digital for ease of access and sharing. Will be accompanied by comprehensive GIS-based mapping of evidence and policies- some of the layers used can be the same as in Action C3.</p>	<p><input type="checkbox"/> Directly targeted</p> <p><input checked="" type="checkbox"/> Some elements</p> <p><input type="checkbox"/> No direct links</p> <p><u>Reason:</u> The strategic land use plan is an opportunity to increase access to green space and improved social infrastructure for the poorest and most socially excluded residents;</p>	<p><input checked="" type="checkbox"/> Directly targeted</p> <p><input type="checkbox"/> Some elements</p> <p><input type="checkbox"/> No direct links</p> <p><u>Reason:</u> The incorporation of a heritage management framework will assist greatly in controlling inappropriate development at or close to UNESCO World Heritage Site areas and their buffers.</p>						
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	c) <b>Develop detailed digital mapping to accompany strategic land use plan and heritage framework</b>		
	<b>3. Approval of the strategic land use plan and heritage framework</b>		6 months
	<b>4. Monitoring and implementation of the strategic land use plan and heritage framework</b>		Ongoing
<b>Indicative Project Costs</b>	<b>CapEx [€]</b>	<b>OpEx over 5 years [€]</b>	<b>Feasibility / Advisory Costs [€]</b>
	1,786,000  <ul style="list-style-type: none"> <li>Develop comprehensive land use plan for the City: 1,169,000</li> <li>Main contractor preliminaries (15%): 175,000</li> <li>Main contractor overheads and profits (5%): 67,000</li> <li>Fees (10%): 141,000</li> <li>Contingency (15%): 233,000</li> </ul>	446,000	n/a
<b>Potential Financing Instruments and Sources</b>	<b>Instrument (Own-Source, Grant, Debt, Equity, Other)</b>	<b>Source (Municipal Government, State-Owned Enterprise, National Government, Private Sector, International Development Partner, Other)</b>	
	<b>Own Source</b>	Municipal Government	
	<b>Grant</b>	National Government	
<b>Revenue Opportunities</b>	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		
<b>Impact Measures (Quantitative and Qualitative)</b>	<b>Environmental Impacts</b>	State indicators	6 – Open green space area per capita 6.1 – Share of green space areas within urban limits 6.2 – Share of population living within 300m of open green space of at least 0.5ha 9.1 – Percentage of public infrastructure at risk 9.2 – Percentage of households at risk
		Pressure indicators	11 – Transport modal share in commuting cars 11.1 – Transport modal share in total trips 11.2 – Motorisation rate 11.3 – Average number of vehicles by household 11.4 – Kilometres of road dedicated exclusively to public transit per 100,000 population 11.5 – Kilometres of dedicated bicycle path per 100,000 population 11.6 – Share of population having access to public transport within 15 min by foot 12 – Average travel speed on primary thoroughfares during peak hour 12.1 – Travel speed of bus service on major thoroughfares daily average 33 – Population density on urban land 33.1 – Average commuting distance 33.2 – Average commuting time

			<p>33.3 – Proportion of the population living within 20 minutes to everyday services, grocery stores, clinics etc.</p> <p>34 – Average annual growth rate of built-up areas</p> <p>34.1 – Share of brownfield development</p> <p>35 – Vacancy rate of commercial buildings</p> <p>35.1 – Vacancy rates of residential buildings</p>
	<b>Socio-economic Impacts</b>	Jobs created	0 – It is assumed this Action will be implemented relying on existing capacity.
		Social inclusion benefits	Coordination of infrastructure and development through urban masterplan will improve health/ living conditions for poorer residents by avoiding unplanned sprawl with little supporting infrastructure and/or formal open space.
		Other socio-economic benefits	Better planned development will lead to cost efficiencies, for example, enable opportunities for co-location of municipal services. Heritage management framework will protect assets for future generations, enhance tourism experience and contribute significantly to local economy.
	<b>Climate Impacts</b>	Estimated carbon emissions reduction	No direct carbon emissions reduction associated with this Action.
		Climate resilience benefits	<p>Strategic land use plan provides opportunity to minimise development at risk of surface water and fluvial flooding.</p> <p>Urban green space can help to act as stormwater drainage capture infrastructure, and have a cooling effect, reducing the urban heat island and ameliorating heatwave conditions.</p>
	<b>Nature &amp; Biodiversity Impacts</b>	Natural capital benefits	Urban green spaces and habitats protected and enhanced through the land use plan provide significant opportunities to increase natural capital through tree and vegetation planting, incorporating native, drought tolerant species. This Action is also consistent with Priority Investment Area 4.3 in the Natural Capital Valuation for Samarkand (see GCAP Appendix B)
<b>Other Indicators/Co-benefits</b>	Operational cost, water, and/or energy savings, revenue generation, etc.	Will enable additional and higher quality jobs and homes, thus making Samarkand a more attractive destination for tourism and investment, which will generate significant revenue.	
<b>Potential Project Risks and Mitigation Options</b>	<b>Area</b>	<b>Risks</b>	<b>Mitigation Options</b>
	<b>Social</b>	Lack of stakeholder consultation.	Ensure consultation is built into Action from the start, applying the principles of public and stakeholder engagement covered at the GCAP Capacity Building

		Inadequate focus on heritage	session on this topic attended by Samarkand Regional Government and partner organisations (April 2024).  Ensure comprehensive register of all cultural landmarks and heritage sites is established as a baseline, then used to inform other relevant elements of the strategic land use plan.
	<b>Environmental</b>	New green spaces increase water use.	Ensure that new green spaces are highly drought tolerant, using native species/ xeriscaping and reflective of the local climatic conditions, otherwise they may increase overall water pressure in a semi-arid region.
	<b>Economic</b>	Overly prescriptive land use policies	Ensure land use zoning is not overly restrictive with consideration of mixed uses and provisions for variations to enable the city to adapt to economic and business needs. Masterplan must allocate sufficient areas for employment and manufacturing uses.
	<b>Other</b>	Masterplan not implemented.	In Masterplan development and process, ensure policies/measures/proposals are implementable and build in firm structure for monitoring, implementation and evaluation which can be used to inform the next land use plan.

## Water Actions

Action W1: Invest in wastewater, sewerage and drainage infrastructure to deliver range of environmental benefits	Estimated Cost over GCAP period: €145,535,000	
Description	<p>While 63% of Samarkand’s population is connected to the wastewater network, many other households use cesspools and septic tanks, which are likely to contaminate groundwater and soil. Wastewater treatment is not mandatory for new developments. Further, despite recent system upgrades, contamination has been detected in the Zarafshan from wastewater treatment plants (WWTPs). A stormwater drainage system exists but the exact length is unknown. However, as it consists of open culverts along each side of the city’s main roads, an approximate length can be estimated. The stormwater drainage culverts are connected at various points to the wastewater system, resulting in sewage overflows during severe rainfall. There is therefore a need to expand and upgrade wastewater infrastructure in Samarkand to the unconnected population, as well as to any new developments.</p> <p>This action will entail the following elements:</p> <p><b>Wastewater network expansion:</b> Given that 63% of the population is already connected, an estimated total of 280km of wastewater network pipelines will need to be constructed to cover all of Samarkand’s current residents. However, this Action responds to Samarkand Regional Government’s assessment that 150km of this total can be constructed within the scope of the GCAP. The main WWTP at Pstdarg’om Channel has excess capacity and will be able to accommodate additional inflow due to this network expansion.</p> <p><b>Installation of energy-efficient pumps and modernisation of WWTPs</b> will also take place. This will include improving the energy efficiency of the most energy-intensive treatment processes - aeration by installing fine bubble diffusers, a high-density/low-flux aeration system or an oxygen booster system. Furthermore, smart monitoring systems will be introduced in the WWTPs to collect real-time data on water quality and flow rate; this will enable the tailoring of operations to meet diurnal and seasonal demand.</p> <p><b>Sustainable urban drainage systems (SuDS)</b> also need to be integrated into the drainage network expansion to reduce flood risk, delay surface water runoff, ease pressure on WWTPs, and integrate the water cycle into urban development,. This would include identification of areas with water retention capacity to support the drainage network- such as green spaces designed to flood safely, and measures such as permeable surfaces, filter strips, filter and infiltration trenches, swales, detention basins, bioretention systems, raingardens, new wetlands and ponds. For the purposes of costing this Action, it has been assumed that new SuDS development could protect the most vulnerable fifth (20%) of the city’s population for the purposes of the GCAP Action.</p> <p><b>Upgrade of the existing stormwater drainage system</b> in Samarkand may be required, but the upgrade itself and its cost has been excluded from this Action, because first, a feasibility study is needed, as follows:</p> <ul style="list-style-type: none"> <li>• Detailed mapping/survey, building on existing network maps held by the Suvta’minot, to determine an accurate figure for total network length, its condition, and the number and location of cross connections with the wastewater network.</li> <li>• A study to identify areas, if any, prone to flooding but not connected to the drainage network and where expanding stormwater drainage channels and/or pipes would offer benefits;</li> </ul> <p>As part of any future network upgrade, stormwater drainage and sewage systems will need to be separated, reducing sewage overflows during heavy rainfall and decreasing treatment capacity needed at WWTPs. In turn, this will decrease the amount of energy used in wastewater pumping and treatment.</p>	
Sector	<input checked="" type="checkbox"/> Water	
Action Type	<input checked="" type="checkbox"/> Investment ('Hard')	<input type="checkbox"/> Policy ('Soft')
Implementation Timeframe	2025 – 2030	

<b>Status</b>	<input checked="" type="checkbox"/> New <input type="checkbox"/> Planned <input type="checkbox"/> Ongoing			
<b>GCAP Action Classification</b>	<input checked="" type="checkbox"/> Capital Investment <input type="checkbox"/> Other Investment	If 'Other Investment,' what type? <input type="checkbox"/> Standards, guidelines, and regulations <input type="checkbox"/> Strategies, plans, and programmes <input type="checkbox"/> Investment-related feasibility study <input type="checkbox"/> Awareness, demonstration, training, and capacity building <input type="checkbox"/> Organisational measure <input type="checkbox"/> Behavioural measure <input type="checkbox"/> Monitoring, data collection, analysis, and studies		
<b>Action Owner(s)</b>	<ul style="list-style-type: none"> <li>UzSuvta'minot JSC</li> <li>Samarkand Suvta'minot</li> </ul>			
<b>Other Stakeholders</b>	<ul style="list-style-type: none"> <li>Ministry of Water Resources</li> <li>Ministry of Construction, Housing and Communal Services</li> <li>Samarkand Regional Government</li> <li>Samarkand City Government Mayor's office</li> </ul>			
<b>Location</b>	<p>Jomboy, Ravanak and other areas served by Samarkand Suvta'minot not connected to the wastewater network; areas served by Samarkand Suvta'minot not connected to the stormwater drainage network (most likely to be outlying suburbs that have experienced rapid recent development, such as south of Bukharikishlak); areas served by Samarkand Suvta'minot where sewage overflows have been identified.</p> <p>In terms of the WWTPs that need upgrade through this Action, Samarkand Regional Government advises that they are located on Mekhrigiyo, Ilgora and Dargoma streets and at Samarkand State Medical University.</p>			
<b>Priority Environmental Challenge(s) Addressed</b>	<p><b>Environment and Biodiversity</b></p> <ul style="list-style-type: none"> <li>Pollution of important surface water sources</li> </ul> <p><b>Climate Change and Resilience</b></p> <ul style="list-style-type: none"> <li>Insufficient focus on climate change-related hazards</li> </ul> <p><b>Water</b></p> <ul style="list-style-type: none"> <li>Poor maintenance of drainage infrastructure</li> <li>Inadequate wastewater treatment</li> </ul>			
<b>Strategic Goal(s) Addressed</b>	<p><b>Water</b></p> <ul style="list-style-type: none"> <li>Improve Samarkand's water supply and drainage infrastructure</li> </ul>			
<b>Link(s) to Existing Policies/Plans/Projects</b>	<input checked="" type="checkbox"/> Yes <ul style="list-style-type: none"> <li>World Bank funded reconstruction of WWTPs and sewage system in Samarkand completed in 2015.</li> <li>Ongoing Abu Dhabi Development Fund programme to modernise water supply systems</li> <li>Presidential Decree No. UP-6024 validating the Concept for the Development of Uzbekistan's Water Sector for the period 2020-2030</li> <li>Prosperous Mahallas upgrade programme</li> <li>1993 Law on Water and Water Use (Article 74)</li> <li>Concept of Development of Water Management Sector of the Republic of Uzbekistan for 2020-2030</li> </ul> <input type="checkbox"/> No			
<b>Link(s) to Other GCAP Actions</b>	<input checked="" type="checkbox"/> Yes <ul style="list-style-type: none"> <li><b>Action W2:</b> Develop Integrated Water Resource Management Plan, including drought management actions</li> </ul> <input type="checkbox"/> No			
<b>Cross-Cutting Themes</b>	<b>Climate and Disaster Risk</b>	<b>Smart Maturity</b>	<b>Gender and Social Inclusion</b>	<b>Heritage and Tourism</b>
	<input type="checkbox"/> Directly targeted	<input type="checkbox"/> Directly targeted	<input type="checkbox"/> Directly targeted	<input type="checkbox"/> Directly targeted

	<input checked="" type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> SuDS and other water retention strategies incorporation will reduce climate-related flood risk and improve flood resilience.	<input checked="" type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> The Action will incorporate digital monitoring technologies, GIS mapping, network sensors, and flow meters into wastewater and drainage networks. There is also potential for a combined hydraulic model to design and optimise urban drainage interventions, but this is not within the current scope of the Action.	<input checked="" type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> Expansion of the wastewater network will particularly benefit vulnerable populations and lower-income households; reducing sewage overflow in flooding will reduce disease risk too.	<input checked="" type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> Reduced flooding, in particular reducing sewage overflow, will significantly improve the environment for tourism, particularly in the city centre where it has been a problem in the past.														
<b>Implementation Process and Timeline</b>	<table border="1"> <thead> <tr> <th>Step</th> <th>Duration</th> </tr> </thead> <tbody> <tr> <td>1. Mapping existing wastewater and drainage networks, identifying cross-connections of both networks and areas prone to flooding and sewage overflow</td> <td>1 year</td> </tr> <tr> <td>2. Inventory of drainage network length and condition – type of drainage, diameter or pipe, structural condition (leaks, corrosions, blockage)</td> <td>1 year</td> </tr> <tr> <td>3. Update planning/building regulations to include requirement for wastewater treatment and SuDS implementation in new developments</td> <td>2 months</td> </tr> <tr> <td>4. Develop and implement extension and upgrade of the wastewater network</td> <td>2 years</td> </tr> <tr> <td>5. Develop and implement extension and upgrade of the stormwater drainage network</td> <td>3 years</td> </tr> <tr> <td>6. Allocate budget for ongoing maintenance</td> <td>3 months</td> </tr> </tbody> </table>				Step	Duration	1. Mapping existing wastewater and drainage networks, identifying cross-connections of both networks and areas prone to flooding and sewage overflow	1 year	2. Inventory of drainage network length and condition – type of drainage, diameter or pipe, structural condition (leaks, corrosions, blockage)	1 year	3. Update planning/building regulations to include requirement for wastewater treatment and SuDS implementation in new developments	2 months	4. Develop and implement extension and upgrade of the wastewater network	2 years	5. Develop and implement extension and upgrade of the stormwater drainage network	3 years	6. Allocate budget for ongoing maintenance	3 months
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	<b>Own-Source</b>	Municipal Government	
	<b>Grant</b>	National Government	
	<b>Loan</b>	International Development Partner	
	<b>Loan</b>	Private Sector	
<b>Revenue Opportunities</b>	<input checked="" type="checkbox"/> Yes Net additional wastewater tariffs collected by Samarkand Suvta'minot <input type="checkbox"/> No		
<b>Impact Measures (Quantitative and Qualitative)</b>	<b>Environmental Impacts</b>	State indicators	2 – BOD in rivers and lakes – mg/l 2.1 – Ammonium NH4 concentration in rivers and lakes – mg/l 5 – Water Exploitation Index - % 9 – Estimated economic damage from natural disasters, floods, droughts, earthquakes, etc. as a share of GDP - %
		Pressure indicators	26 – Percentage of residential and commercial wastewater treated - % 27 – Sewer Network Integrity (Pipe break) – break/km/year 27.1 – Energy used for wastewater collection and treatment – KWh/m3 28 – Percentage of dwellings damaged by the most intense flooding in the last 10 years - % 28.1 – Annual number of storm water/sewerage overflows – number of events per year
	<b>Socio-economic Impacts</b>	Jobs created	2,088
		Social inclusion benefits	Expansion of the wastewater network will particularly benefit vulnerable and lower-income households.
		Other socio-economic benefits	Expansion and upgrade of the wastewater and drainage networks will protect historic sites from water damage and sewer overflows, and improve conditions for tourism.
	<b>Climate Impacts</b>	Estimated carbon emissions reduction	6,230 tCO <sub>2</sub> e annually
		Climate resilience benefits	Drainage network expansion and upgrade and introduction of SuDS will reduce flood risk and improve flood resilience. Costs from flooding across Samarkand Region are currently estimated at approx. 40 million EUR per annum, and implementation of SuDS to protect 25% of the Samarkand city population from the worst effects of flooding will significantly reduce this figure.
	<b>Nature &amp; Biodiversity Impacts</b>	Natural capital benefits	Wastewater network expansion and upgrade will reduce groundwater and soil contamination. This Action is also consistent with Priority Investment Areas 1.7 and 4.7 in the

			Natural Capital Valuation for Samarkand (see GCAP Appendix B).
	<b>Other Indicators/Co-benefits</b>	Operational cost, water, and/or energy savings, revenue generation, etc.	Wastewater network efficiency operational improvements will reduce operating costs.  Energy-efficient pump installation is estimated to result in 44% energy savings. Fine bubble diffusers typically decrease energy use by 30-40%. High density/low flux aeration systems can provide 34% energy savings and oxygen booster systems can have a 40% energy saving over standard aeration processes. On this basis, there is potential, depending on which technologies are adopted in which locations, to achieve energy savings of around 30-40% from the current baseline.
<b>Potential Project Risks and Mitigation Options</b>	<b>Area</b>	<b>Risks</b>	<b>Mitigation Options</b>
	<b>Social</b>	Construction impact on communities.	Minimise construction site impact on public, local residents and businesses – safe passage for pedestrians and traffic, restricted construction hours, construction noise, dust, and vibration restrictions.
		Health risks to construction workers from sewage work upgrades.	Appropriate personal protective equipment issued and used correctly; decontamination facilities such as showers; appropriate training and reporting.
		Resistance to works from local populations.	Engagement and dialogue with affected communities to explain the benefits (and the costs, including health hazards, of a do-nothing scenario).
	<b>Environmental</b>	Water body contamination from WWTPs.	Ensure that the pollutants discharged into water bodies are below norms established by the Law on Water and Water Use and that the law is enforced through regular monitoring and tracing.
		Water/soil contamination during construction phase.	Ensure robust construction management practices to minimise and/or mitigate water or soil contamination during the construction phase.
<b>Economic</b>	Cost over-run.	Ensure strong project management regime, including preliminary budgeting, detailed cost breakdown, cost tracking, expense monitoring, risk management and contingency.	
<b>Other</b>	Construction impact on historic sites.	Minimise construction site impact on historic sites – construction noise, dust, and vibration restrictions, identify historic features most at risk and use appropriate level of protection.	
	Unforeseen technical defects in existing	Technical defects may be uncovered in the existing wastewater infrastructure during the upgrade works-particularly as knowledge of and monitoring of the existing	

		wastewater infrastructure.	system is poor. This can be mitigated through using the right diagnostic tools (including digital tools such as GIS) and through phased/rescheduled works should defects be uncovered.
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Action W2: Develop Integrated Water Resource Management Plan, including drought management actions	Estimated Total Cost: € 251,000
Description	<p>The climate in Samarkand is arid and limited water is available. Uzbekistan is among the world’s most water-stressed countries. The Zarafshan River is Samarkand’s main surface water source and influences the condition of groundwater and surface waterways it feeds.</p> <p>It is clear from the GCAP baseline stage assessment of all water systems in Samarkand that ongoing unsustainable and large-scale abstraction of ground and surface water, particularly by agriculture for irrigation, directly impacts water stress levels in Samarkand Region and city. This has been further exacerbated by the droughts experienced in recent years, likely related to climate change- and future projections indicate the water shortage is likely to worsen in future. The abstraction of ground and surface water results in a lowered water table, reducing drinking water supply and impeding groundwater pumping.</p> <p>This Action aims to improve Samarkand’s long-term water security and resilience by developing a municipal Integrated Water Resource Management (IWRM) plan, including drought management actions and exploration of options for nature-based solutions, for example rewilding currently concrete water channels and collectors with softer landscaping including trees and earthen banks.</p> <p>IWRM is a cross-sectoral, holistic approach, based on the fact that the many different sources and uses of finite water resources are interdependent. IWRM promotes the coordinated development and management of water, land, and related resources to maximize economic and social welfare without compromising the sustainability of ecosystems.</p> <p>Once an IWRM plan is adopted, it provides a firm basis for enabling, derisking and justifying development and infrastructure investments across the water sector that are not yet possible (or carry high financial risk) in Samarkand. This is because IWRM plans provide consistent and clear information to all relevant audiences on the main opportunities within and threats to local water resources, enabling more effective management of waste and stormwater through infrastructure such as SuDS (see also Action W1); construction of sufficient water storage infrastructure in the right locations (see also Action W3); more sustainable infrastructure for water abstraction; and opportunities for investment in water saving and recycling infrastructure in the right places, such as rain harvesters and collectors and drip irrigation systems.</p> <p>An IWRM plan will identify the current state of water resources in Samarkand, goals for water resource management, and water management strategies. It will need to be developed through the following steps:</p> <ol style="list-style-type: none"> <li><b>1. Establish Management Team:</b></li> </ol> <p>To initiate the development of the IWRM plan, a Management Team to organise and coordinate effort and facilitate regular stakeholder consultation needs to be established.</p> <ol style="list-style-type: none"> <li><b>2. Identify and Engage with Stakeholders:</b></li> </ol> <p>A core principle of the IWRM approach is stakeholder participation. Therefore, stakeholders that reflect the water priorities and needs of the entire city need to be identified, their interest and influence on water management understood and a stakeholder participation strategy developed. The stakeholders are likely to include Samarkand Regional Government, UzSuvta’minot JSC, Samarkand Suvta’minot, Ministry of Construction, Housing and Communal Services, Ministry of Water Resources, industries, and community groups. The capacity-building needs of the stakeholders can also be considered during this stage, including their understanding, awareness, and skills with regard to IWRM.</p> <ol style="list-style-type: none"> <li><b>3. Baseline Assessment of Water Resources:</b></li> </ol> <p>The next step will be to assess and analyse the current water resources situation, including developing water balances (equations showing the flows of water into and out of the study area), and their management in Samarkand. This will involve gathering data on available water resources, such as groundwater and surface water, and their environmental conditions, water</p>

	<p>usage, city's population growth forecast, and climate projections. Further, capacity and conditions of existing water, wastewater and drainage infrastructure should be established, including piped network, channels, pumps, and water and wastewater treatment plants. This stage could also involve examining existing water policies and regulations.</p> <p><b>4. Vision setting:</b></p> <p>The strategic vision, defining the objectives and targets of the IWRM plan, then needs to be set. Clear goals for water resource management should be defined and prioritised based on local needs, stakeholder input, options for nature-based solutions, and the current state of water resources and climate in Samarkand. Benchmarks should also be established to monitor progress towards achieving the goals identified and resources allocated accordingly.</p> <p><b>5. Establish water management strategies:</b></p> <p>The final step in developing the IWRM plan will be establishing water management strategies for Samarkand. The strategies should be selected based on prioritised goals identified in the Vision Setting step and then evaluated based on advantages and disadvantages, feasibility, trade-offs between different water users and interdependences between water supply, demand, treatment, drainage, and quality. Water management strategies could include water demand management, such as system efficiency improvements, opportunities for nature-based solutions and conservation practices, public awareness campaigns, water supply management, such as increasing potable water storage and water reuse and recycling, water quality protection, such as pollution control, water treatment facility upgrade, and drought management, such as contingency planning, diversification of water sources, and emergency preparedness.</p>	
<b>Sector</b>	<input checked="" type="checkbox"/> Environment and Biodiversity <input checked="" type="checkbox"/> Climate and Resilience <input checked="" type="checkbox"/> Water	
<b>Action Type</b>	<input type="checkbox"/> Investment ('Hard')	<input checked="" type="checkbox"/> Policy ('Soft')
<b>Implementation Timeframe</b>	2025 – 2027	
<b>Status</b>	<input checked="" type="checkbox"/> New <input type="checkbox"/> Planned <input type="checkbox"/> Ongoing	
<b>GCAP Action Classification</b>	<input type="checkbox"/> Capital Investment <input checked="" type="checkbox"/> Other Investment	<p>If 'Other Investment,' what type?</p> <input type="checkbox"/> Standards, guidelines, and regulations <input checked="" type="checkbox"/> Strategies, plans, and programmes <input type="checkbox"/> Investment-related feasibility study <input type="checkbox"/> Awareness, demonstration, training, and capacity building <input type="checkbox"/> Organisational measure <input type="checkbox"/> Behavioural measure <input type="checkbox"/> Monitoring, data collection, analysis, and studies
<b>Action Owner(s)</b>	<ul style="list-style-type: none"> <li>UzSuvta'minot JSC</li> <li>Samarkand Suvta'minot</li> <li>Samarkand Regional Government</li> </ul>	
<b>Other Stakeholders</b>	<ul style="list-style-type: none"> <li>Ministry of Water Resources</li> <li>Ministry of Construction, Housing and Communal Services</li> </ul>	
<b>Location</b>	Regional Government and Samarkand Suvta'minot office; Action applies equally to entire area served by Samarkand Suvta'minot	
<b>Priority Environmental Challenge(s) Addressed</b>	<p><b>Climate Change and Resilience</b></p> <ul style="list-style-type: none"> <li>Insufficient focus on climate change-related hazards</li> </ul> <p><b>Environment and Biodiversity</b></p> <ul style="list-style-type: none"> <li>Pollution of important surface water sources</li> <li>Overall high level of water stress that could affect ecosystems</li> </ul> <p><b>Water</b></p>	

	<ul style="list-style-type: none"> <li>• Drought/water shortage</li> <li>• High household water consumption</li> </ul>			
<b>Strategic Goal(s) Addressed</b>	<p><b>Environment and Biodiversity</b></p> <ul style="list-style-type: none"> <li>• Improve air and water quality in Samarkand</li> </ul> <p><b>Climate Change and Resilience</b></p> <ul style="list-style-type: none"> <li>• Improve Samarkand's resilience to climate and natural disasters</li> </ul> <p><b>Water</b></p> <ul style="list-style-type: none"> <li>• Increase reuse/recycling of water in Samarkand</li> </ul>			
<b>Link(s) to Existing Policies/Plans/Projects</b>	<input checked="" type="checkbox"/> Yes <ul style="list-style-type: none"> <li>• 1993 Law on Water and Water Use</li> <li>• 2013 Resolution of the Cabinet of Ministers No. 11. 'On Approval of the Regulation on Water Use and Water Consumption'</li> <li>• 2017 Resolution of the Cabinet of Ministers No. 430 'About Measures for Further Streamlining of Activities in the Field of Use of Underground Waters'</li> <li>• Increasing the Level of Supply and Quality of Potable Water for the Population (Presidential Decree No. UP-5883, Presidential Decree No. UP-5241, Presidential Decree PP- 2910)</li> <li>• Concept of Development of Water Management Sector of the Republic of Uzbekistan for 2020-2030</li> <li>• UzSuvta'minot Telegram and Facebook campaign on reducing per capita water consumption</li> <li>• Small dams along Zarafshan supporting recharge</li> <li>• Drilling more wells and deepening of existing wells</li> </ul> <input type="checkbox"/> No			
<b>Link(s) to Other GCAP Actions</b>	<input checked="" type="checkbox"/> Yes <ul style="list-style-type: none"> <li>• <b>Action I3:</b> Mitigate industrial water pollution by strengthening enforcement of regulations on industrial wastewater discharge</li> <li>• <b>Action W1:</b> Invest in wastewater, sewerage and drainage infrastructure to deliver range of environmental benefits</li> <li>• <b>Action W3:</b> Invest in resilience of potable water storage to increase quality and availability of supply</li> </ul> <input type="checkbox"/> No			
<b>Cross-Cutting Themes</b>	<b>Climate and Disaster Risk</b>	<b>Smart Maturity</b>	<b>Gender and Social Inclusion</b>	<b>Heritage and Tourism</b>
	<input type="checkbox"/> Directly targeted <input checked="" type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> IWRM plan implementation will help reduce unsustainable water abstraction and impact of droughts on water supply, increase water storage capacity and water reuse, improve water conservation practice and awareness, and water quality.	<input type="checkbox"/> Directly targeted <input checked="" type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> IWRM plan relies on data collection and analysis. GIS mapping of baseline water infrastructure will inform the IWRM plan and its progress, as well as improve smart maturity.	<input type="checkbox"/> Directly targeted <input checked="" type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> IWRM plan will reduce overall water stress and improve/increase municipal resilience to droughts; this will benefit all water customers, in particular the poorest and most vulnerable sections of the population who are most at risk of negative impacts from disasters and climate change.	<input type="checkbox"/> Directly targeted <input checked="" type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> IWRM plan will reduce overall water stress and improve/increase municipal resilience to droughts; this will have positive benefits for tourism as one among many municipal activities that rely on sustainable supply of water.
<b>Implementation Process and Timeline</b>	<b>Step</b>		<b>Duration</b>	
	<b>1. Establish Management Team</b>		1 month	
	<b>2. Identify and Engage with Stakeholders</b>		2 months	
	a) <b>Assess stakeholder interest and influence</b>		0.5 months	

	b) <b>Outline stakeholder participation strategy</b> c) <b>Examine stakeholder capacity-building needs</b>	0.5 months 1 month	
	<b>3. Baseline Assessment of Water Resources</b> a) <b>Data gathering on water resources – availability and condition</b> b) <b>Data gathering on water infrastructure - capacity and condition</b> c) <b>Examine existing water policies and regulations</b>	1 year 10 months 10 months 2 months	
	<b>4. Vision setting</b> a) <b>Define IWRM strategic goals</b> b) <b>Establish benchmarks</b>	4 months 2 months 2 months	
	<b>5. Establish water management strategies</b> a) <b>Identify water management strategies based on strategic goals</b> b) <b>Evaluate water management strategies</b>	6 months 4 months 2 months	
<b>Indicative Project Costs</b>	<b>CapEx [€]</b>	<b>OpEx over 5 years [€]</b>	<b>Feasibility / Advisory Costs [€]</b>
	n/a	50,000	201,000  <ul style="list-style-type: none"> <li>Establish team, engage with stakeholders and prepare the baseline, vision and strategies of the IWRM plan: 175,000</li> <li>Contingency (15%): 26,000</li> </ul>
<b>Potential Financing Instruments and Sources</b>	<b>Instrument (Own-Source, Grant, Debt, Equity, Other)</b>		<b>Source (Municipal Government, State-Owned Enterprise, National Government, Private Sector, International Development Partner, Other)</b>
	<b>Own Source</b>		Municipal Governments
	<b>Loan</b>		International Development Partner
	<b>Grant</b>		National Government
<b>Revenue Opportunities</b>	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		
<b>Impact Measures (Quantitative and Qualitative)</b>	<b>Environmental Impacts</b>	State indicators	2 – Biochemical Oxygen Demand (BOD) in rivers and lakes 2.1 – Ammonium (NH4) concentration in rivers and lakes 2.2 – Bathing waters meeting minimum standards 5 – Water Exploitation Index
		Pressure indicators	25 – Domestic water consumption per capita 25.4 – Potable water storage 25.5 – Water consumption per unit of city GDP 25.6 – Share of industrial water consumption
	<b>Socio-economic Impacts</b>	Jobs created	3
		Social inclusion benefits	Overall water stress reduced and resilience improved, with particular benefits for the poorest and most vulnerable residents.
		Other socio-economic benefits	Overall water stress reduced and resilience improved, with benefits for wide range of economic activities, including but not limited to tourism.

	<b>Climate Impacts</b>		Estimated carbon emissions reduction	2,080 tCO <sub>2</sub> e annually
			Climate resilience benefits	IWRM plan implementation will help reduce unsustainable water abstraction and drought impact on water supply, increase water storage capacity and water reuse, improve water conservation practice and awareness, and water quality. This will help build resilience to climate-related hazards, such as drought.
	<b>Nature &amp; Biodiversity Impacts</b>		Natural capital benefits	IWRM plan implementation will help with habitat conservation and water quality improvements, thereby directly supporting conservation of natural capital of Samarkand. This Action is also consistent with Priority Investment Area 1.2 in the Natural Capital Valuation for Samarkand (see GCAP Appendix B).
	<b>Other Indicators/Co-benefits</b>		Operational cost, water, and/or energy savings, revenue generation, etc.	<p>IWRM plan implementation will improve water and wastewater network operational efficiency, reducing operating costs.</p> <p>IWRM plans are some of the most effective ways to save water because they enable a strategic, comprehensive approach. Recent examples across the world for cities in climates comparable to Samarkand include Las Vegas, USA, whose IWRM plan resulted in per capita water use decreasing by 47% between 2002 and 2020; Albuquerque, USA (49% decrease between 1995 and 2022) and Canberra, Australia (25% decrease between 2004 and 2023). On this basis, it is estimated that this action could result in a 25-50% reduction in per capita water use; for Samarkand this would result in a reduction from the current baseline of 246 litres per day to 123-184 litres per day.</p>
<b>Potential Project Risks and Mitigation Options</b>	<b>Area</b>	<b>Risks</b>	<b>Mitigation Options</b>	
	<b>Social</b>	Access to water resources improves only for existing wealthier population.	Conduct social impact assessment, implement targeted engagement efforts, ensure comprehensive and meaningful approach to stakeholder engagement.	
	<b>Environmental</b>	Insufficient focus within the IWMP process on relevant ecological or environmental impacts or benefits.	Consider sustainability of ecosystems during IWRM Plan development process, establish benchmarks and targets that track ecosystem health as appropriate.	

	<b>Economic</b>	High cost of developing the IWMP.	Conduct cost-benefit analysis, minimise costs, track costs and expenses, secure appropriate funding, establish contingency funds.
	<b>Other</b>	Inadequate governance structure or support.	Early establishment of strong, empowered implementation team; recognise IWMP as opportunity to improve institutional capacity and coordination among government agencies and stakeholders to promote transparency and accountability in water management.

Action W3: Invest in resilience of potable water storage to increase quality and availability of supply		Estimated Total Cost: € 60,747,000
Description	<p>Samarkand is arid and prone to drought. The Zarafshan river is the city's main surface water source and also influences the condition of groundwater and surface waterways it feeds. There are two surface water intakes, and fifty wells. Water is stored in the Chonon Ota reservoir, with 6,000m<sup>3</sup> of storage, and then flows to two other reservoirs with a capacity of 10,000m<sup>3</sup> each. As revealed by the GCAP baseline stage assessment of the drinking water system in Samarkand that across these reservoirs, there is a very low drinking water storage capacity of 4.4 hours. This indicates a lack of resilience and high vulnerability of the system to shocks, including not just climate-related water shortage but also to other disasters or incidents such as earthquakes, reservoir damage or contamination, and infrastructure failures.</p> <p>A key objective of this Action is therefore to improve the quantity and resilience of potable water storage to increase the quality and availability of supply. Improving potable water storage will involve a combination of strategies to increase storage capacity, improve future resilience, and optimise water management practices, as follows:</p> <p style="text-align: center;"><b>1. Assess baseline conditions:</b></p> <p>The first step will be to assess Samarkand's current and future water demand and storage needs. This will require collating existing and gathering further data on water usage patterns, population growth forecasts, potential impacts of climate change and water availability, and the capacity and conditions of existing water supply network and storage. This information will be used to identify gaps in the existing storage capacity and prioritise areas for improvement.</p> <p style="text-align: center;"><b>2. Expand potable water storage capacity:</b></p> <p>In this next stage, a range of different types of storage infrastructure might be considered:</p> <p><b>Reservoirs</b> – expanding the capacity of existing reservoirs, such as Chonon Ota. Constructing new strategic reservoirs at appropriate locations. It is assumed that this is the easiest and most feasible option and so the Action has been costed on this basis. However, there may also be potential for other solutions such as:</p> <p><b>Local tanks</b> – installing new local above ground or underground storage tanks to provide storage capacity, particularly in densely built areas of the city where demand is high.</p> <p><b>Underground water storage</b> – Study the feasibility of aquifer recharge systems to artificially replenish groundwater sources by redirecting surplus surface water or treated wastewater into the ground and withdrawing water during times of high demand.</p> <p>Advantages and disadvantages, feasibility, and suitable locations should be considered while selecting storage infrastructure and then progressing with one or more preferred options. Furthermore, to reduce vulnerability to system shocks, improve supply reliability during emergencies, and minimise losses during supply, water storage distribution should be considered across multiple locations and storage facilities.</p> <p>The final step will involve the construction, if necessary, of new pipes to connect new water storage infrastructure to the city's supply network and improve resilience and durability against natural hazards and climate change risks. However, this may not be required depending on the chosen location for the additional new storage capacity - for example, existing reservoirs already have pipe connections.</p>	
Sector	<input checked="" type="checkbox"/> Climate and Resilience <input checked="" type="checkbox"/> Water	
Action Type	<input checked="" type="checkbox"/> Investment ('Hard') <input type="checkbox"/> Policy ('Soft')	
Implementation Timeframe	2025 – 2030	
Status	<input type="checkbox"/> New	

	<input type="checkbox"/> Planned <input checked="" type="checkbox"/> Ongoing			
<b>GCAP Action Classification</b>	<input checked="" type="checkbox"/> Capital Investment <input type="checkbox"/> Other Investment	If 'Other Investment,' what type? <input type="checkbox"/> Standards, guidelines, and regulations <input type="checkbox"/> Strategies, plans, and programmes <input type="checkbox"/> Investment-related feasibility study <input type="checkbox"/> Awareness, demonstration, training, and capacity building <input type="checkbox"/> Organisational measure <input type="checkbox"/> Behavioural measure <input type="checkbox"/> Monitoring, data collection, analysis, and studies		
<b>Action Owner(s)</b>	<ul style="list-style-type: none"> <li>UzSuvta'minot JSC</li> <li>Samarkand Suvta'minot</li> <li>Ministry of Water Resources</li> </ul>			
<b>Other Stakeholders</b>	<ul style="list-style-type: none"> <li>Ministry of Construction, Housing and Communal Services</li> <li>Cabinet of Ministers</li> <li>Samarkand Regional Government</li> </ul>			
<b>Location</b>	Chonon Ota reservoir and potentially other reservoirs near Samarkand; also along Zarafshan River and its tributaries. Connecting pipe infrastructure within area served by Samarkand Suvta'minot			
<b>Priority Environmental Challenge(s) Addressed</b>	<b>Climate Change and Resilience:</b> <ul style="list-style-type: none"> <li>Insufficient focus on climate change-related hazards</li> </ul> <b>Environment and Biodiversity:</b> <ul style="list-style-type: none"> <li>Overall high level of water stress</li> </ul> <b>Water:</b> <ul style="list-style-type: none"> <li>Drought/water shortage</li> <li>Ageing/poor quality drinking water supply</li> </ul>			
<b>Strategic Goal(s) Addressed</b>	<b>Climate Change and Resilience:</b> <ul style="list-style-type: none"> <li>Improve Samarkand's resilience to climate and natural disasters</li> </ul> <b>Water:</b> <ul style="list-style-type: none"> <li>Increase reuse/recycling of water in Samarkand</li> <li>Improve Samarkand's water supply and drainage infrastructure</li> </ul>			
<b>Link(s) to Existing Policies/Plans/Projects</b>	<input checked="" type="checkbox"/> Yes <ul style="list-style-type: none"> <li>1993 Law on Water and Water Use (Article 74)</li> <li>2013 Resolution of the Cabinet of Ministers No. 11. 'On Approval of the Regulation on Water Use and Water Consumption'</li> <li>'Increasing the Level of Supply and Quality of Potable Water for the Population'(Presidential Decree No. UP-5883, Presidential Decree No. UP-5241, Presidential Decree PP- 2910)</li> <li>Ongoing Abu Dhabi Development Fund programme to modernise water supply systems</li> <li>Small dams along Zarafshan supporting recharge</li> <li>Prosperous Mahallas upgrade programme</li> </ul> <input type="checkbox"/> No			
<b>Link(s) to Other GCAP Actions</b>	<input checked="" type="checkbox"/> Yes <ul style="list-style-type: none"> <li><b>Action C2:</b> Build capacity of city to collect and share data (using GIS systems) to map and plan for climate and disaster risks.</li> <li><b>Action CR1:</b> Establish a scenario-based approach to disaster risk management (DRM) and response across all sectors.</li> <li><b>Action B3:</b> Pilot review of seismic resilience of existing critical infrastructure to inform investment in retrofit measures</li> <li><b>Action W2:</b> Develop Integrated Water Resource Management Plan, including drought management actions</li> </ul> <input type="checkbox"/> No			
<b>Cross-Cutting Themes</b>	<b>Climate and Disaster Risk</b>	<b>Smart Maturity</b>	<b>Gender and Social Inclusion</b>	<b>Heritage and Tourism</b>

	<input checked="" type="checkbox"/> Directly targeted <input type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> Potable water storage expansion will increase the resilience of Samarkand to shocks, including natural disasters and climate change risks.	<input type="checkbox"/> Directly targeted <input checked="" type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> This Action has potential to support incorporation of smart technologies into the water storage and supply network, but this is not provided for within the direct scope of the Action.	<input type="checkbox"/> Directly targeted <input checked="" type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> Potable water storage expansion will benefit all residents connected to the mains water system, including vulnerable populations and lower-income households.	<input type="checkbox"/> Directly targeted <input checked="" type="checkbox"/> Some elements <input type="checkbox"/> No direct links <u>Reason:</u> If impounding reservoirs are used for raw water storage they could facilitate tourism for water-based recreational activities. Reliable access to potable water supports all economic activities including tourism.										
<b>Implementation Process and Timeline</b>	<table border="1"> <thead> <tr> <th>Step</th> <th>Duration</th> </tr> </thead> <tbody> <tr> <td> <b>1. Assess baseline conditions</b>                      a) <b>Data gathering on water usage, population, water availability, and capacity and conditions of existing infrastructure</b>                      b) <b>Identify/verify gaps in water storage capacity</b> </td> <td>                     1 year                      10 months                        2 months                 </td> </tr> <tr> <td> <b>2. Expand potable water storage capacity</b>                      a) <b>Consider different types of storage infrastructure, suitable locations, and feasibility- then select a preferred option based on performance against relevant criteria</b>                      b) <b>Implement potable water storage expansion</b> </td> <td>                     3 years                      6 months                        2.5 years                 </td> </tr> </tbody> </table>				Step	Duration	<b>1. Assess baseline conditions</b> a) <b>Data gathering on water usage, population, water availability, and capacity and conditions of existing infrastructure</b> b) <b>Identify/verify gaps in water storage capacity</b>	1 year 10 months  2 months	<b>2. Expand potable water storage capacity</b> a) <b>Consider different types of storage infrastructure, suitable locations, and feasibility- then select a preferred option based on performance against relevant criteria</b> b) <b>Implement potable water storage expansion</b>	3 years 6 months  2.5 years				
Step	Duration													
<b>1. Assess baseline conditions</b> a) <b>Data gathering on water usage, population, water availability, and capacity and conditions of existing infrastructure</b> b) <b>Identify/verify gaps in water storage capacity</b>	1 year 10 months  2 months													
<b>2. Expand potable water storage capacity</b> a) <b>Consider different types of storage infrastructure, suitable locations, and feasibility- then select a preferred option based on performance against relevant criteria</b> b) <b>Implement potable water storage expansion</b>	3 years 6 months  2.5 years													
<b>Indicative Project Costs</b>	<b>CapEx [€]</b> 59,556,000 <ul style="list-style-type: none"> <li>Expansion of potable water storage capacity: 38,990,000</li> <li>Main contractor preliminaries (15%): 5,848,000</li> <li>Main contractor overheads and profits (5%): 2,242,000</li> <li>Fees (10%): 4,708,000</li> <li>Contingency (15%): 7,768,000</li> </ul>		<b>OpEx over 5 years [€]</b> 1,191,000	<b>Feasibility / Advisory Costs [€]</b> n/a										
<b>Potential Financing Instruments and Sources</b>	<table border="1"> <thead> <tr> <th>Instrument (Own-Source, Grant, Debt, Equity, Other)</th> <th>Source (Municipal Government, State-Owned Enterprise, National Government, Private Sector, International Development Partner, Other)</th> </tr> </thead> <tbody> <tr> <td><b>Loan</b></td> <td>International Development Partner</td> </tr> <tr> <td><b>Grant</b></td> <td>National Government</td> </tr> <tr> <td><b>Grant</b></td> <td>International Development Partner</td> </tr> <tr> <td><b>Own Source</b></td> <td>Municipal Government</td> </tr> </tbody> </table>				Instrument (Own-Source, Grant, Debt, Equity, Other)	Source (Municipal Government, State-Owned Enterprise, National Government, Private Sector, International Development Partner, Other)	<b>Loan</b>	International Development Partner	<b>Grant</b>	National Government	<b>Grant</b>	International Development Partner	<b>Own Source</b>	Municipal Government
Instrument (Own-Source, Grant, Debt, Equity, Other)	Source (Municipal Government, State-Owned Enterprise, National Government, Private Sector, International Development Partner, Other)													
<b>Loan</b>	International Development Partner													
<b>Grant</b>	National Government													
<b>Grant</b>	International Development Partner													
<b>Own Source</b>	Municipal Government													
<b>Revenue Opportunities</b>	<input checked="" type="checkbox"/> Yes Increased water tariffs collected by Samarkand Suvta'minot. <input type="checkbox"/> No													
<b>Impact Measures (Quantitative and Qualitative)</b>	<b>Environmental Impacts</b>	State indicators	3 – Water samples complying with national potable water quality standards											

			5 – Water Exploitation Index 9 – Estimated economic damage from natural disasters 9.1 – Percentage of public infrastructure at risk	
		Pressure indicators	25.2 – Daily number of hours of continuous water supply per household 25.4 – Potable water storage	
	<b>Socio-economic Impacts</b>	Jobs created		872
		Social inclusion benefits		Potable water storage expansion will benefit all residents connected to mains water, including vulnerable populations and lower-income households.
		Other socio-economic benefits		Reliable supply of drinking water is essential for maintaining public health. Reliable access to potable water supports wide range of economic activities such as agriculture, industry, commerce, and tourism.
	<b>Climate Impacts</b>	Estimated carbon emissions reduction		No direct carbon emissions reduction associated with this Action.
		Climate resilience benefits		Potable water storage expansion will reduce the vulnerability of the system to shocks, including natural disasters and climate change risks such as droughts and floods.
	<b>Nature &amp; Biodiversity Impacts</b>	Natural capital benefits		Impounding reservoirs used for raw water storage could create new aquatic habitats and provide food sources for a variety of plant and animal species.
	<b>Other Indicators/Co-benefits</b>	Operational cost, water, and/or energy savings, revenue generation, etc.		Improving operational efficiency of water storage and supply system will reduce operating costs.
	<b>Potential Project Risks and Mitigation Options</b>	<b>Area</b>	<b>Risks</b>	<b>Mitigation Options</b>
<b>Social</b>		Displacement and land use conflicts when constructing new water storage facilities.	Conduct comprehensive social impact assessment if necessary to do so. Involve affected communities and stakeholders in the decision-making process- for example, mahalla committees. Provide fair compensation and resettlement support if necessary.	
<b>Environmental</b>		Habitat destruction.	Conduct environmental impact assessment, preserve critical habitats, implement habitat restoration.	
<b>Economic</b>		Cost overrun.	Conduct cost-benefit analysis and feasibility studies, minimise costs, track costs and expenses, establish contingency funds.	
<b>Other</b>		Vulnerability of storage facilities to climate change	Incorporate climate change and disaster resilience measures in the design and the construction phase of water storage and supply infrastructure.	

		<p>or disasters such as earthquakes.</p>	<p>Ensure early commitment from all necessary levels of government, and emphasise from the start the long-term nature and large scale of the project (while highlighting eventual benefits).</p>
		<p>Regulatory or political risks.</p>	

# 6. Implementation and Monitoring Plan

## Objectives

The Implementation and Monitoring Plan has been developed in consultation with the Regional Government and EBRD to support the effective implementation of the GCAP for Samarkand and track its progress and impact going forward.

The approach outlined below will ensure that the Regional Government has an effective structure to:

- Support and track the implementation of its GCAP;
- Review and report the results and impacts of each Green City Action; and
- Identify opportunities for amending or enhancing Green City Actions.

Two Microsoft Excel-based tools have been developed to support the Regional Government in this activity: a **Progress Monitoring Plan** and an **Impact Monitoring Plan**. Both are provided alongside this final GCAP report. These tools will enable the Regional Government to regularly review its performance, promoting transparency and facilitating continuous improvement of both actions and their corresponding implementation structures.

This chapter also outlines the key roles and responsibilities necessary to implement the GCAP and maintain accountability of its progress. The implementation and monitoring roles for the GCAP are further detailed below in Table -1, while Figure 6-1 provides an overview of the key organisation structure for the related processes.

## Implementation Approach and Governance

A robust governance structure, including formalised responsibilities, is critical to the successful implementation of the GCAP. Table -1 outlines key roles and responsibilities, **including forming a new ‘Coordination Unit’** to ensure joined-up delivery of the GCAP and support its ongoing monitoring.

Embedded within the Regional Government’s existing structure, **the new GCAP Coordination Unit is the key means by which those responsible for implementing the GCAP will be co-ordinated and monitored, ensuring GCAP longevity and its resilience to administrative or wider changes.** Given that many of the Actions are interdisciplinary, a collaborative approach will ensure efficient implementation and the opportunity for mainstreaming new knowledge, good practice and learnings. The Unit will establish institutional space and resources, supporting the Regional Government’s capacity to innovate and build the capacity needed for GCAP implementation.

The Coordination Unit will include a range of representatives from Regional Government departments and different institutions, referred to as **‘Green Champions,’** who will be facilitated by Samarkand’s GCAP Coordinator. These roles will maintain accountability for the progress of the GCAP over the timelines set out in this document. The Regional Government’s IT Department will provide technical capabilities and data management support. A **Terms of Reference** will define the purpose and structure of the Coordination Unit, ensuring a common understanding of the scope of activities and basis for decision-making.

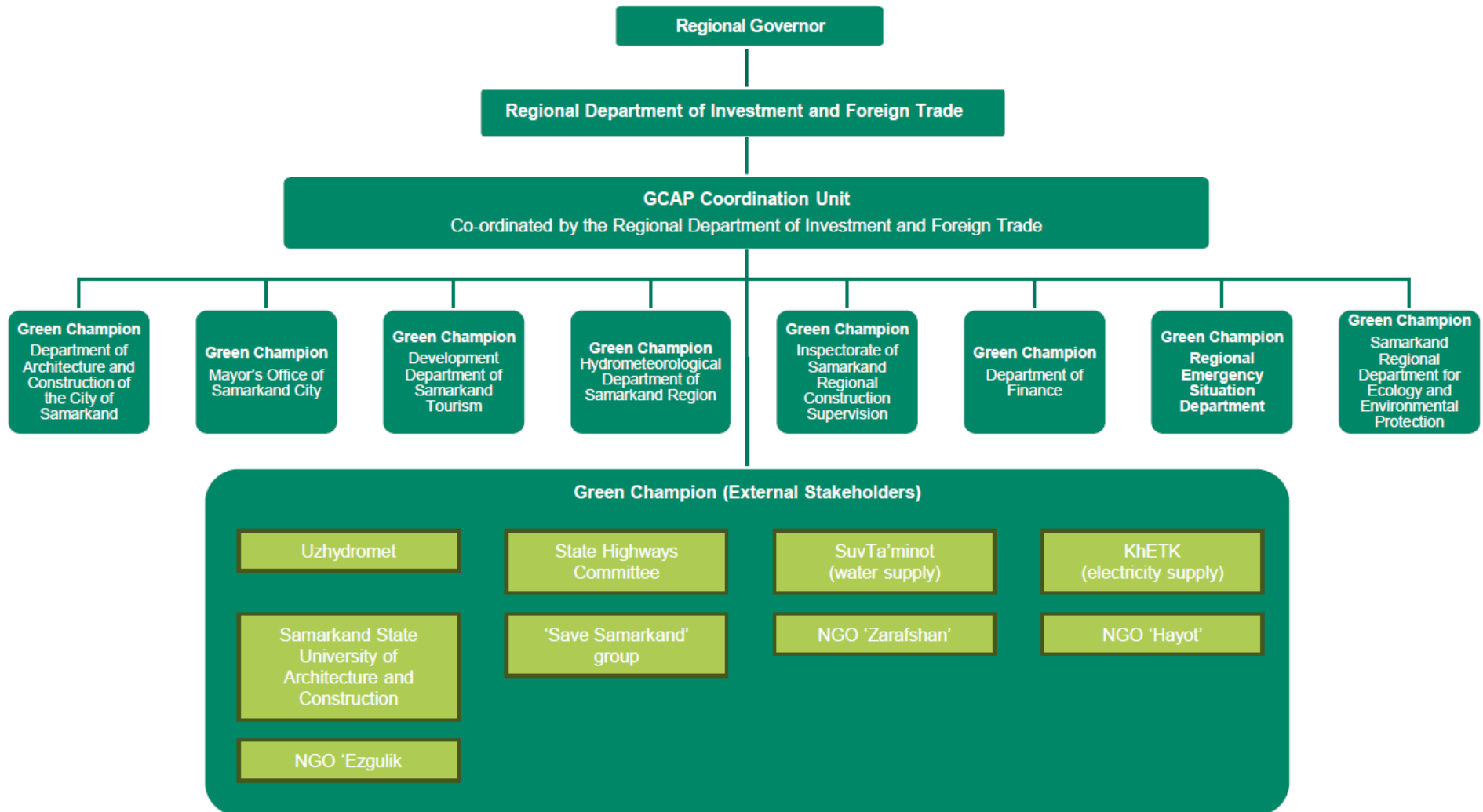
An **Annual Progress Report** will be produced to summarise the implementation status and any issues encountered and mitigated, as well as any revisions and/or new GCAP actions for consideration. A shareable version of this report will be made available on the Regional Government’s website and social media (subject to the approval of the Regional Government), in accordance with the Stakeholder Engagement Plan that has been prepared for this GCAP. A written approval will be obtained from the Regional Government for all documents to be shared by the consultant team and EBRD.

**Table 6-1. GCAP Monitoring and Implementation Roles**

Role	Role Details
<b>GCAP Coordination Unit</b>	The Coordination Unit will be responsible for overseeing the implementation and monitoring of Green City Actions, as well as general decision-making during the implementation period. It will be largely composed of representatives from Regional Government and city departments and implementation partners, as well as external institutions engaged in the GCAP design and delivery. It will inform departmental priorities and will identify opportunities for new Green City Actions. The GCAP Coordinator will oversee the Unit, ensuring its objectives are met.

	<p>The Coordination Unit will meet on a quarterly basis to:</p> <p>Track action implementation through monitoring reports, providing bi-annual updates on the Progress Monitoring Plan (PMP) and annual updates on the Impact Monitoring Plan (IMP)</p> <p>Review progress, identifying and mitigating technical and institutional barriers to GCAP uptake/success</p> <p>Work collectively to set standards and maintain data collection, sharing and storage</p> <p>Provide technical oversight and advice to the Green Champions and GCAP Coordinator</p> <p>Work collectively on delivering an Annual Action Progress Report.</p>
<p><b>GCAP Coordinator</b></p>	<p>Samarkand’s GCAP Coordinator will have overall responsibility for meeting the objectives of the Coordination Unit, ensuring all actions/decisions are aligned with its Terms of Reference. The Coordinator will:</p> <p>Have responsibility for the Coordination Unit deliverables and agreed milestones, including the Annual Action Progress Report, and ensuring that the PMP and IMP are updated</p> <p>Liaise with relevant Regional and city Government departments and external stakeholders, collaborating with Action leads to ensure monitoring and implementation of actions and identifying opportunities to influence departmental policies/programmes</p> <p>Communicate the progress of the GCAP and provide a focal point for internal and external stakeholders.</p>
<p><b>Departmental and External Stakeholder Green Champions</b></p>	<p>Each Regional and city Government department with responsibility for a GCAP action will appoint a Green Champion. The Champions will be responsible for:</p> <p>Implementing the GCAP actions relevant to their own departments and external stakeholders, working collaboratively with the Coordination Unit on cross-cutting issues</p> <p>Monitoring the progress of the relevant actions within their department and completing relevant sections of the PMP and IMP tools</p> <p>Liaising with appropriate stakeholders on data collection and Action implementation, troubleshooting any relevant issues so that any barriers can be mitigated efficiently</p> <p>Facilitating engagement with external stakeholders in accordance with the Stakeholder Engagement Plan, ensuring appropriate communication, consultation, and co-development to deliver respective GCAP actions</p> <p>Identifying opportunities to influence departmental policy and promoting those that will contribute to the goals and actions of the GCAP to the greatest extent.</p>

Figure 6-1. GCAP Monitoring and Evaluation Organisational Structure



Source: AECOM, 2023.

## Monitoring Progress in Implementation

The **Progress Monitoring Plan (PMP)** sets out every GCAP Action, including the stakeholder(s) responsible for implementation and key delivery milestones. The PMP also provides the sequence of delivery milestones over the lifetime of the Action.

The GCAP Coordinator will have overall responsibility for the PMP, providing bi-annual updates, with the Green Champions responsible for updating their respective actions. The PMP will be reviewed regularly at the GCAP Coordination Unit meeting, ensuring adequate progress has been made against each Action. The results of the monitoring will inform the planning of subsequent stages of each Action, as well as any required amendments to timeframes and resources needed for implementation.

The GCAP Coordinator will have overall responsibility for the **Annual Action Progress Report**, managing involvement and inputs from across the Coordination Unit.

The **Annual Action Progress Report** should include a summary of the following:

- Implementation status of each action, including any issues encountered, and mitigation measures
- Recommendations for revisions to any GCAP actions and any potential additional actions
- Changes in a 'dashboard' of key state and pressure indicators
- A shareable version of this report will be made available on the Regional Government's website and social media (subject to Regional Government approval), in accordance with the Stakeholder Engagement Plan that has been prepared for this GCAP. Prior to sharing any documents, the consultant team and EBRD will ensure that written approval is obtained from Regional Government.

## Monitoring Impact of Green City Actions

The **Impact Monitoring Plan (IMP)** is based on the **Indicators Database** used to inform the Technical Baseline Report that formed the first key element of the Samarkand GCAP process. 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 **Error! Reference source not found.**

The GCAP Coordinator will have overall responsibility for maintaining and updating the IMP, while each Green Champion will be responsible for monitoring the set of indicators that are linked to that department's and external stakeholder(s) actions. Progress will be reviewed periodically by means of GCAP Coordination Unit meetings.

Successful monitoring has to be grounded in **good quality data**. For the Samarkand GCAP, the **Indicator Database includes at least one data point measured between 2012 and 2022 for 110 out of EBRD's 135 core and optional indicators (therefore an 81% completion rate)**. Considering **only core indicators, the completion rate is 64 out of 74, thus 86%**, as illustrated in Table 6-2 below.

**Table 6-2. Indicator Database – Summary of Data Collection**

	<b>Core</b> <i>Collected / Total</i> <i>(% collected)</i>	<b>Optional</b> <i>Collected / Total</i> <i>(% collected)</i>	<b>Total</b> <i>Collected / Total</i> <i>(% collected)</i>
<b>Overall</b>	<b>64 / 74</b> (86%)	<b>44 / 61</b> (72%)	<b>110 / 135</b> (81%)
<b>State Indicators</b>	8 / 9	8 / 15	17 / 24
<i>Quantitative</i>	(89%)	(53%)	(71%)
<b>Pressure Indicators</b>	18 / 27	36 / 46	55 / 73
<i>Quantitative</i>	(67%)	(78%)	(75%)
<b>Response Indicators</b>	38 / 38	n/a	38 / 38
<i>Qualitative</i>	(100%)		(100%)

Source: AECOM, GCAP Samarkand Indicators Database. Note: Dark green shading indicates very high completion (> 75%), light green shading indicates high completion (50-75%), orange shading indicates medium completion (25 - 50%), and red shading indicates low completion (< 25%).

**Key aspects related to data collection across State, Pressure and Response Indicators**, including implications for the development of the Monitoring Plan, is provided below.

## State Indicators

Overall, data was obtained or derived on 71% of all indicators categorised under State topics. Data exists from a combination of sources, including Samarkand Regional and city governments, the World Bank and UNECE. For open green space, a GIS analysis was performed using publicly available mapping from OpenStreetMap and Google Earth, combined with a range of statistics from other sources. State indicators using information from these sources and as further detailed in the Indicators Database should be monitored by those charged with GCAP implementation through the IMP over the course of the 5-year GCAP timeframe.

Significant data gaps are noted for Soil, where no data was collected on core (4: Number of Contaminated sites) or associated optional indicators. Data gaps were also apparent for Climate Change Risks (indicators 9.1 and 9.2) and for Water Bodies (indicator 2.2), but all of these indicators are optional.

## Pressure Indicators

Overall, data was obtained or derived on 75% of all indicators categorised under Pressure topics. Data was mostly obtained from Samarkand Regional/city governments and their delivery partners, central government, UNECE, the World Bank, International Energy Charter, and the International Energy Association. For urban development and green space, a GIS analysis was performed using publicly available mapping from OpenStreetMap and Google Earth. Pressure indicators using information from these sources and as further detailed in the Indicators Database should be monitored over the course of the 5-year GCAP timeframe by those charged with GCAP implementation using the IMP.

Significant data gaps are noted for Thermal Comfort Provision, Electricity Provision, Heat Consumption, Consumption of Fossil Fuels, Industrial Wastewater, Resilience to Floods and Use of Existing Built-up Areas, where no data was obtained on the following Core indicators:

- 15: Share of population with access to quality heating/cooling
- 17: Power outages by climate extremes
- 18: Electricity consumption in buildings
- 19: Fossil fuels consumption for heating and cooling
- 21: Heat productivity of industries
- 22: Heavy metals emission intensity of industries
- 24: Percentage of industrial wastewater that is treated according to applicable national standards
- 28: Percentage of dwellings damaged by the most intense flooding in the last ten years
- 35: Vacancy rates of commercial buildings

# Appendix A: Gender and Social Inclusion Assessment

## Gender and Social Inclusion Analysis

In recent years, Uzbekistan has made significant progress in improving gender equality and social inclusion. Newly adopted policies and regulations include Uzbekistan's ratification of the Convention on the Rights of Persons with Disabilities in 2021<sup>82</sup> and a new law in 2023 protecting women and children from domestic violence<sup>83</sup>. In 2020, UNICEF, ILO and UNDP collaborated as part of the UN Joint Programme on Social Protection in Uzbekistan to progress the issue further, considering the needs of vulnerable groups and working towards achievement of the SDGs<sup>84</sup>. Following this, the Joint UN Programme "Transformation of Social Service Delivery: Implementing Human Rights Based Approach for Children, Youth and Women with Disabilities" was launched in 2022, whereby participating UN entities worked with national partners to strengthen local capacity for formulating inclusive programmes, development strategies and budgets, and considering disability<sup>85</sup>.

Despite these positive developments, challenges remain, particularly regarding the decision-making power and influence of women and other excluded groups over the GCAP Action areas. For example, most policymakers in both Uzbekistan and Samarkand are male, with only 33% of seats in Uzbekistan's national parliament held by women<sup>86</sup>. This gender divide is even more pronounced in industry, with women comprising only 14% of industrial employment in Uzbekistan<sup>87</sup>.

The Green City baseline provides a comprehensive picture of current conditions in Samarkand, and the wider governance and policy frameworks that influence the city. Throughout the analysis, gender and social inclusion issues have been reviewed- where data and evidence are available. The key gender and social inclusion challenges Samarkand can address through its GCAP can be summarised by topic area as follows:

- **Energy:** In Uzbekistan, women tend to be the main domestic users of gas and electricity and therefore a lack of reliable energy (e.g. through interruptions in supply or network line losses) hinders access to essential services, adding pressure on managing household needs<sup>88</sup>. Furthermore, poorer residents may have to supplement, or substitute, electric or gas-powered appliances with indoor fires which are detrimental to health and less efficient, potentially resulting in women dedicating more time to domestic activities<sup>89</sup>.
- **Water:** A lack of reliable water supply in households can have a disproportionate impact on women, who are more likely to stay at home during the day than men and use water for washing/cleaning, cooking food and/or bathing children<sup>90</sup>; these time-consuming activities reduce the time available for education and/or income generation. Furthermore, open stormwater drains along roads in many parts of Samarkand, present obstacles to pedestrian crossing, e.g. for the elderly, disabled people and women with pushchairs.

<sup>82</sup> World Bank, (2023). Uzbekistan's First Steps Towards Implementing the Convention on the Rights of Persons with Disabilities. Available at [Uzbekistan's First Steps Towards Implementing the Convention on the Rights of Persons with Disabilities \(worldbank.org\)](https://www.worldbank.org/en/news/press-release/2023/04/11/uzbekistan-first-steps-towards-implementing-the-convention-on-the-rights-of-persons-with-disabilities)

<sup>83</sup> Kun.uz, (2023). President Signs a Law on Protection of Women and Children from Violence, available at <https://kun.uz/en/news/2023/04/11/president-signs-a-law-on-protection-of-women-and-children-from-violence>

<sup>84</sup> Joint Sustainable Development Goals (SDG) Fund, (2021), available at [Joint UN-Uzbekistan Achievements in Strengthening the Social Protection System Discussed | Joint SDG Fund](https://www.joint-sdg-fund.org/en/news/2021/04/21/joint-un-uzbekistan-achievements-in-strengthening-the-social-protection-system-discussed-joint-sdg-fund)

<sup>85</sup> United Nations, (2023). UN Joint Programme in Uzbekistan Enhances Social Services and Empowers Persons with Disabilities, available at [UN Joint Programme in Uzbekistan Enhances Social Services and Empowers Persons with Disabilities | United Nations in Uzbekistan](https://www.un.org/uzbekistan/en/news/2023/04/11/un-joint-programme-in-uzbekistan-enhances-social-services-and-empowers-persons-with-disabilities)

<sup>86</sup> World Bank, (2023). Proportion of seats held by women in national parliaments (%) - Uzbekistan, available at [https://data.worldbank.org/indicator/SG.GEN.PARL.ZS?end=2022&locations=UZ&most\\_recent\\_year\\_desc=false&start=2019](https://data.worldbank.org/indicator/SG.GEN.PARL.ZS?end=2022&locations=UZ&most_recent_year_desc=false&start=2019)

<sup>87</sup> World Bank, (2023). Employment in Industry, Female (% of female employment) (modelled ILO estimate), Uzbekistan, available at <https://data.worldbank.org/indicator/SL.IND.EMPL.FE.ZS?locations=UZ>

<sup>88</sup> Asian Development Bank, (2019). Gender in Infrastructure: Lessons from Central and West Asia, available at <https://www.adb.org/publications/gender-infrastructure-central-west-asia>

<sup>89</sup> Ibid.

<sup>90</sup> Asian Development Bank, (2021). CAREC Gender Assessment: Supplementary Document for the CAREC Gender Strategy 2030, available at <https://www.adb.org/documents/gender-assessment-supplementary-carec-gender-strategy-2030>

- **Transport:** Men are the primary users of vehicles in Samarkand; even in households with personal vehicles, women and children tend to rely more heavily on public transport<sup>91</sup>. Private transport options, such as minibuses and taxis, may present safety challenges for women<sup>92</sup> and public transportation (trains, trams, and buses) often present reduced accessibility for the elderly, disabled and those with pushchairs. There is also reduced availability of public transport options in Samarkand's outer urban area.
- **Buildings:** Older buildings, and many newer ones, particularly if illegally constructed, often lack dedicated disabled or pushchair access (e.g., ramps to street level). As Samarkand continues to grow, older buildings containing asbestos are being demolished to be replaced by new ones. This is often done in an unsafe way-creating risk of exposure to asbestos. This disproportionately impacts the lowest-income construction workers, leading to the risk of disability and even death<sup>93</sup>.
- **Industries:** Lower-income communities tend to live nearer to industrial areas; whilst this may enable communities to benefit from local employment, they are also at higher risk of impacts from contaminated water and soil, and poor air quality. Women, however, have less access to these employment opportunities, at present making up only 14% of industrial employment in Uzbekistan<sup>94</sup>.
- **Waste:** Informal waste collectors, who hand-sort waste for recyclable components for sale, are often from poor and socially excluded groups and/or live at waste collection points, exposing them to hazardous materials detrimental to human health.
- **Urban Development and Green Space:** The current low levels of access to large, quality green spaces has a potentially negative impact on women, children, families and elders- who are those sections of the population most impacted by the urban heat island effect and who may also benefit from additional greenery for leisure.

## Gender and Social Inclusion Recommendations

Samarkand's GCAP takes a **cross-cutting approach to integrating gender equality and social inclusion**. Its relevance to each GCAP Action has been considered, including identification of potential socio-economic benefits and other impacts, as well as potential risks and mitigation options.

Across the **Actions developed in Samarkand's GCAP, almost all link to gender equality and social inclusion as a cross-cutting theme** and some directly target gender equality and social inclusion as a primary outcome. For example, many Actions are designed to improve access to local amenities and services such as utilities, transportation and green space (e.g. **T1: Public transport integration, T3: Cycling and walking network, UD1: Street tree planting** and **W3: Invest in potable water storage**), and may in particular benefit marginalised communities in Samarkand's poorer outer urban areas. Furthermore, **the majority of GCAP Actions seek to minimise health** impacts through reducing GHG emissions and other land, air and water pollutants (e.g. **E2: Renewable energy for households, I3: Strengthen industrial wastewater discharge laws**, and **SW3: Monitor and manage illegal waste dumping**). Such Actions will benefit low-income communities living near industrial areas and people with pre-existing respiratory illnesses, the elderly, and children.

Nearly all Actions have outlined impact measures which include **social inclusion benefits, in addition to wider socio-economic benefits which offer further opportunity for realising equality and inclusion outcomes**. The majority of Actions have **the potential to contribute to job creation** which could drive the gender equality agenda if employment programmes include gender-responsive adjustments and are designed in consultation with female beneficiaries<sup>95</sup>. Furthermore, Actions such as **SW1: Sorting of recyclables** provide an opportunity to create new roles for recycling specialists within the city's sanitation department (Maroqand Obod), providing formal and more stable employment to the currently informal collectors who hand-sort waste. Many of the Actions developed include **training and capacity building which could contribute to gender equality and social inclusion outcomes** if designed to target specific communities – ideally, to achieve this goal, they should be co-designed with beneficiaries.

<sup>91</sup> Egis (2023), Samarkand E-bus Project: Draft Environmental and Social Assessment Report, not available online.

<sup>92</sup> Asian Development Bank, (2021). CAREC Gender Assessment: Supplementary Document for the CAREC Gender Strategy 2030, available at <https://www.adb.org/documents/gender-assessment-supplementary-carec-gender-strategy-2030>

<sup>93</sup> Second technical meeting with Samarkand Regional Government Environment Department, June 2023.

<sup>94</sup> World Bank, (2023). Employment in Industry, Female (% of female employment) (modelled ILO estimate), Uzbekistan, available at <https://data.worldbank.org/indicator/SL.IND.EMPL.FE.ZS?locations=UZ>

<sup>95</sup> Asian Development Bank, (2021). CAREC Gender Assessment: Supplementary Document for the CAREC Gender Strategy 2030, available at <https://www.adb.org/documents/gender-assessment-supplementary-carec-gender-strategy-2030>

For example, improvements to digital literacy - a benefit of both **C2: Use GIS for climate and disaster analysis** and **C3: Digital reporting platform/system** - could target women, reducing the digital gender divide, and other groups with reduced ICT experience/access. Action **C1: Establish Data Team** will create a team for environmental data collection within the city government to gather and monitor data on buildings, industry, energy and DRR, acting as a first step towards evidence-based environmental policies. As these policies are expected to benefit particularly those most affected by air, water and soil pollution i.e. women, **the data team would benefit from a representative and reasonable proportion of women employees.**

Resilience to climate change is another cross-cutting theme included in Samarkand's GCAP. It often correlates strongly with gender equality and social inclusion, because evidence indicates that climate and natural disaster impacts fall disproportionately upon women and excluded/marginalised communities. Several Actions (e.g. **B3: Retrofit for seismic resilience**, **CR1: Disaster planning**, and **CR3: Participatory mapping of hazards**) have been designed to advance climate resilience but also have **explicit social inclusion benefits, including raising awareness of climate hazards, improved management of risks, and continuity of social and civic services in case of disaster**, particularly in underserved areas.

Every Action developed considers potential project risks (social, environmental, economic and other). **Nearly all Actions have identified social risks which could undermine gender equality and social inclusion outcomes if appropriate mitigation options are not applied.** One key risk area reflected across several Actions is a potential failure to engage communities, particularly vulnerable and excluded social groups (e.g. **UD3: Develop strategic land use plan**, **W1: Upgraded drainage**). This risk, if not mitigated appropriately, not only undermines gender equality and social inclusion outcomes, but also the wider goals of the Action. Examples of this include the potential for low uptake from residents or businesses offered renewable energy incentives (**E2: Renewable energy incentives for residents and businesses**) or residents not engaging with participatory data collection (**CR3: Participatory mapping of hazards**). Another key social risk relates to the adverse impact on residents and communities during works to construct or upgrade infrastructure (for example, **E1: Upgraded electricity infrastructure**).

The GCAP therefore **presents a variety of mitigation options which provide important recommendations to help minimise these risks.** For example, to mitigate the risks associated with constructing or upgrading infrastructure and minimise disruption, early engagement with affected communities should be deployed alongside other project design features such as restricted construction hours, noise and vibration. Action **E3: Energy efficient street lighting** recommends a feasibility study to identify areas where it is most appropriate to introduce LED lighting, focusing on social factors to avoid negative perceptions of the lighting roll-out; these include locations with low night-time visibility (and hence potentially perceived as less safe), residential areas, schools, universities, hospitals, and/or areas with higher crime rates. Furthermore, **awareness-raising of the benefits and associated opportunities of many of the proposed Actions is another critical social issue.** This might include tailored communications, capacity building and training and, where possible, conducting a social impact assessment and developing a stakeholder engagement plan (as recommended in **W3: Invest in potable water storage**). It is also essential that digital platforms and other interactive tools or processes (both online and offline) are designed to be inclusive. For example, **C3: Digital reporting platform/system** recognises the need to design the platform to maximise accuracy of citizen reporting by providing a user-friendly multi-choice interface rather than open questions. **This principle should be applied to all platforms and tools**, ensuring user interfaces are navigable, intuitive and accessible, follow best practice and, where possible, are co-designed with beneficiaries.

For some Actions, **mitigation of economic risks is also recommended** to help ensure equality and social inclusion results- for example, specifically designing Action implementation to ensure poorer residents can benefit. This is particularly the case for Buildings and Energy Actions. For example, Action **B1: Energy efficiency in buildings**, seeks to ensure the Action is deliverable and accessible for households on a wide range of incomes and experiencing a range of living conditions. **E2: Renewable energy for households and businesses** similarly aim for financial incentives to be accessible to all residents and small businesses, and recommends that the Action should be implemented in as simple as possible a way so that non-specialists understand its merits.

## Recommendations

EBRD defines a Green City as a city that ensures “environmental policies contribute to the social and economic wellbeing of residents, regardless of their gender, place of birth, age, sexual orientation, disabilities or other circumstances”<sup>96</sup>. This has been the guiding principle in the approach taken in the Samarkand GCAP to gender and social inclusion. In terms of how this principle can be maintained and further enhanced during the implementation

<sup>96</sup> EBRD Green Cities (2022) Green City Action Plan methodology, available at [GCAP\\_2-1\\_Methodology\\_January2022.pdf \(ebrdgreencities.com\)](https://www.ebrd.com/en/green-cities/gcap-2-1-methodology-january2022.pdf)

phase of the GCAP, the following strategic recommendations have been developed to support the Regional and city Governments, and their relevant partners and other implementing stakeholders.

- **Develop and maintain special programmes of employment to engage and recruit those in socially excluded communities.** Job creation and similar workplace training schemes provide a significant opportunity to promote gender equality if staffing requirements can take full consideration of gender and equal rights for job opportunities. Employment programmes should include gender-responsive adjustments to recruitment strategy, ensure gender-equitable pay and promote equal access to workplace opportunities such as on-the-job training. Where possible, such programmes should be designed in collaboration with their intended beneficiaries.
- **Design and deliver training and other upskilling programmes to engage and recruit those in socially excluded communities.** Training and upskilling programmes should target women and other underrepresented groups. For example, capacity-building in internet and communications technology (ICT) can help close the digital gender divide. In the same way, training in science, technology, engineering and mathematics (STEM) subjects and ICT will improve women's access to the green and low-carbon economy and promote female entrepreneurship. In the longer term, it will increase the number of women in more senior and managerial roles. Again, where possible, such programmes should be designed in collaboration with their intended beneficiaries. It is also recommended that training on gender equality and economic and social inclusion be provided to all staff, partners and stakeholders with a role in the implementation of Samarkand's Green City Action Plan, thus building capacity in the field of social and gender analysis.
- **Design inclusive and accessible communications and engagement materials (including online and offline platforms and awareness campaigns),** taking into account the diverse needs and perspectives of the city's population, and the various channels different groups choose to use to receive and engage with information (for example, written documents, Telegram, VKontakte, WhatsApp and so on). By making public engagement truly accessible, activities delivered within the scope of the GCAP will benefit a representative cross-section of society, allowing improvements to the quality of life of a greater number of residents.
- **Ensure appropriately designed and resourced engagement and consultation exercises.** Stakeholder consultation and engagement is embedded across numerous GCAP Actions and is critical to understanding the specific needs of different social groups. It also helps ensure infrastructure/service design is grounded in gender-sensitive evidence and has been informed by representative consultative processes. The Regional Government already recognises the importance of stakeholder engagement, having selected it as the topic for one of the three capacity building sessions delivered by consultants AECOM alongside the GCAP itself. As was made clear at the capacity building session, designing and planning effective and inclusive stakeholder engagement can be resource-intensive and require careful consideration. It can include, for example, gender-sensitive participatory tools and/or collaborative input ahead of engagement from community representatives.
- **Conduct a social inclusion assessment at the outset of any detailed Action implementation, thus helping to ensure planning and implementation is evidence-based.** A social inclusion assessment will enable a better understanding of the needs and specific circumstances of women and other vulnerable or excluded groups. It will also support an understanding of the socio-cultural and economic dimensions of gender—vital for adapting and targeting approaches to realise mutual benefit or that, at the very least, implementation does no harm. Data from the assessment can be used to set key performance indicators (KPIs) and targets, for example, percentage of women's employment within a given sector, and create evidence for addressing gender equality and inclusion standards.
- **Embed good practice in infrastructure design, prioritising inclusive design standards to ensure social, economic and spatial accessibility and usability for all.** For example, design standards for new public spaces should consider ramps and non-slip footpaths for equitable access; lighting for safety, particularly for women, children, youth and elderly people; and other aspects of social inclusion, such as tactile paving for the visually impaired, suitable benches for those needing to rest while walking, and clear and legible signage. For transportation, it could include affordable or subsidised fares or tickets, carriages/spaces for women and adequate space and access on vehicles for wheelchairs, prams and pushchairs.
- **Introduce gender-disaggregated data collection systems for stakeholder engagement and project evaluation.** This will help identify any gender-specific barriers to accessing the benefits of the GCAP Actions and identify strategies to overcome them. Gender-disaggregated data on issues such as accessibility, affordability, and income generation can also be used by government officials to design further interventions and inform wider policy planning beyond the limited period of the GCAP.

- **Review and consider the social and economic risks listed for each Action as it is being implemented and monitored to help ensure low-income households and poorer residents benefit.** For example, as Action B1: Energy efficiency in buildings, is being implemented, the financial incentives should be designed to be specifically accessible to a wide range of households in terms of income and living conditions; this will help ensure the Action is supporting social inclusion and reducing energy poverty.

# Appendix B: Natural Capital Valuation Assessment Executive Summary

AECOM has been working with the European Bank for Reconstruction and Development (EBRD) to deliver a Green City Action Plan (GCAP) for the city of Samarkand, to help the city deliver sustainable development, striking a balance between economic growth and environmental stewardship.

Given the state of nature and the critical role it can play in the region's future climate resilience, this project has been set up to test EBRD's Natural Capital Valuation (NCV) model in the urban context and to understand how it can support the city GCAP make the investment case for nature. The NCV model has been developed to help policy makers identify and prioritise nature-related risks and investment opportunities, translating them into monetary terms. In so doing, it addresses a key challenge for financial institutions of the difficulty in pricing nature-related risks and opportunities into their project assessments.

The NCV model has three key outputs:

5. **A “nature-related risk heat map,”** which charts key nature-related risks in the landscape of interest against their anticipated impact and likelihood
6. **A quantitative scenario analysis,** which evaluates how the value of ecosystem services in the landscape of interest might evolve over time under a “business-as-usual” (BAU) as well as “sustainable future” scenarios.
7. **A list of priority nature-related risk management actions and investment opportunities,** which highlights the activities that would most effectively protect and enhance natural capital.

## Samarkand baseline and natural capital valuation assessment

To provide a foundation for the development of the three main outputs above, a **natural capital baseline and valuation assessment** for Samarkand was developed. This sets out the quality and quantity of the natural environment in Samarkand and their ability to provide ecosystem services. Overall, it provides a high-level demonstration of the value of natural assets in the Samarkand region to the city.

The land cover of the Samarkand Tuman region (59,000 ha) is predominantly characterised by herbaceous vegetation, cropland, and built-up areas with a small proportion accounted for by urban green space. The Zarafshan State Nature Reserve overlaps the northeast of the area, which is a critical biodiversity hotspot made up of important wetlands and tugai woodlands.

Samarkand's natural assets provide the following key ecosystem services:

- **Water supply:** 62,170,700 m<sup>3</sup> per annum of water supplied to the Samarkand region.
- **Local climate regulation:** 1,153 ha of urban green space reducing surface air temperatures.
- **Water quality regulation:** 319 ha of forest and wetland habitats filtering pollutants from water sources.
- **Recreation:** 1,153 ha of urban green space providing areas of active enjoyment, which can result in benefits such as improvement of physical and mental health.
- **Flood regulation:** 475 ha of natural assets (forest, wetlands and water) that have the potential for regulating flood risk.

In total, these services are estimated to deliver close to \$100 million (2022 prices) of benefits to the Samarkand region annually. However, these value estimates are based on high-level assumptions and should be seen as a starting point for further consideration of the benefits provided by the region's natural assets.

While only an estimated 2% of land cover is urban green space, proximity to the population means that it is important in delivering key benefits to the city. In particular, urban greenspace can play an important role in the provision of local climate regulation, delivering benefits through cooling the urban environment. Green space also delivers recreational services, providing a space for the Samarkand public to enjoy nature, improving physical and mental health, and providing potential cost savings to public health systems.

## Nature-related heat map for Samarkand

The heat map for Samarkand identifies water related risks (both water supply and water quality) as of particular importance, with many sectors reliant on the Zarafshan River. With climate change, the risks associated with extreme events (for example flash flooding) and increasing summer temperatures are also material in terms of their expected significance in Samarkand. The NCV approach can help to inform integrated approaches to addressing these nature-related risks as it can help policy makers prioritise solutions that address a number of these important risk areas. For

instance, nature-based solutions could result in positive outcomes for water as well as address habitat loss and fragmentation.

### Nature-related scenario analysis for Samarkand

The scenario analysis considers potential investments that the city and wider stakeholders could take to address these nature-related risks and how these investments fare under sustainable future scenarios ('Greening Samarkand' and 'Landscape Approach') compared to Business as Usual (BAU). The key distinction between these scenarios is that Greening Samarkand focuses on interventions within the city boundaries while a Landscape Approach focuses on catchment-based interventions outside of the Samarkand City Boundaries.

The potential investment areas range from catchment management, climate adaptation, conservation and restoration of biodiversity and strategic green infrastructure. All showed the potential for targeted natural capital actions to deliver improvements in ecosystem services which could deliver substantial benefits compared to BAU.

The analysis found each scenario has distinct benefits tied to targeted investments:

**Greening Samarkand:** by focusing on strategic investments in urban green infrastructure within the Samarkand administrative boundary, investments aim to increase the quantity, quality, and accessibility of urban greenspaces. This could lead to notable improvement in recreational opportunities, public health enhancements, local climate regulation, and stormwater management. This scenario can be more directly influenced through delivery from the Samarkand Regional Government.

**Landscape approach:** this focuses investments on expanding and restoring the riparian habitats along the Zarafshan river and wider catchment management. The focus would be typically outside of the city administrative boundaries, working with key stakeholder such as landowners. This could result in wider biodiversity improvements, improving resilience to climate change particularly in relation to water supply and flood risk management. Through actions such as restoration of natural habitats, this could bolster the capacity of wetlands and tugai woodland in flood regulation and water purification.

### Priority Nature-related Risk Management Actions and Investment Opportunities

The list of priority natural capital related actions could be considered as further opportunities to help Samarkand achieve EBRD's key characteristics of a Green City.

Examples of key potential nature-based actions and investment opportunities include restoring wetlands and tugai forests to deliver multiple benefits; re-naturalising rivers and streams and implementing nature-based solutions; embedding biodiversity and green infrastructure into urban development and green space policy and exploring opportunities for accessible green spaces across the city and more urban greening.

Given the Samarkand administrative boundaries and influence of the regional government, a starting assumption would be that focusing on green infrastructure related actions and investment in the city will be much more achievable through the GCAP framework. However, recognising the importance of the wider catchment outside the city boundaries and these key natural assets that deliver benefits to the city population, efforts should also be made to engage with key stakeholders, particularly with the agricultural sector, on wider catchment management, to address the threats around water supply and water quality in particular.

### Concluding points

In general, the strength of the EBRD's NCV approach is that it highlights the value and reliance on natural assets and services delivered to Samarkand. This can demonstrate the importance of developing policy or targeting of nature-related investments to city planners and policy makers.

The NCV approach is high level and broad: it helps present the narrative and an indication of the importance of natural assets and the ecosystem services they deliver. This provides a platform whereby city officials can consider the benefits of different ecosystem services and embed the protection and enhancement of these services into strategic planning and investment decisions.

The assessment serves as a preliminary demonstration tool rather than a precise valuation mechanism. In particular, to inform business cases and investment decisions for specific natural capital improvements, a more detailed modelling approach for quantifying and valuing the benefits of ecosystem service improvements would be required and also would benefit from more Samarkand-specific valuation research.

