C40 CITIES

ICLEI
Local Governments
for Sustainability
SOUTH ASIA

Climate Action Plan for Dhaka South City Corporation

Bangladesh


হর্ন
না
বাজাই

Climate Action Plan for Dhaka South City Corporation

Bangladesh

Acknowledgements

May 2024

Developing the Climate Action Plan (CAP) for Dhaka South City Corporation (DSCC) is a significant step towards advancing to a sustainable and climate resilient future for the city. This plan represents a united effort to address the impacts of climate change and enhance our city's resilience.

DSCC, with the help of technical support from C40 Cities and ICLEI - Local Governments for Sustainability, South Asia, has sought to develop a strategic framework that locally relevant. This collaborative effort has been instrumental in shaping this plan, bringing in internationally accepted and innovative climate action approaches that enhance our Climate Action plan's scope and feasibility, helping lay out ambitious yet attainable goals.

Heartfelt gratitude is extended to all departments and staff within the DSCC, as well as to all the stakeholders who contributed towards developing this plan. The DSCC is committed to leading by example, implementing the strategies outlined in this plan, and continuing our collaborative efforts to create a climate-resilient, sustainable Dhaka South for present and future generations.

Contributing team:

Dhaka South City Corporation (DSCC):

Barrister Sheikh Fazle Noor Taposh, Mayor

Md. Mizanur Rahman, Chief Executive Officer (CEO)

Md. Sirajul Islam, Chief Town Planner

Fatima Kabir Sharna, Assistant Town Planner

Kazi Nur Kowser, Assistant Town Planner

Md. Nazrul Islam Kazi, Assistant Engineer

Ibrahim Khalil, Assistant Engineer (Mechanical)

C40 Cities:

Shruti Narayan, Managing Director, Regions and Mayoral Engagement

Raina Singh, Deputy Director, South and West Asia

Saloni Gupta, Consultant South and West Asia

Julia Lipton, Director of Climate Action Planning & Innovation

Stephen Davis, Senior Technical Manager (Mitigation), Business Planning, Measurement and Innovation Team

Kirsty Griffin, Senior Technical Manager, Adaptation Planning

ICLEI South Asia:

Emani Kumar, Executive Director

Dr. Tariq Bin Yousuf, Advisor (Dhaka CAP)

Soumya Chaturvedula, Deputy Director

Bedoshruti Sadhukhan, Associate Director

Md. Jubaer Rashid, Country Representative

Nikhil Kolsepatil, Program Coordinator

Rahul, Manager

Souhardhya Chakraborty, Deputy Manager

Dipak Bhowmick, Project Officer

Makame Mahmud, Project Officer

Sadeque Mahmud, Project Officer

Basundhara Karki, Project Associate

Vasavi Yarram, Project Officer

Chaity Dev, Project Associate

Badri Chatterjee, Senior Manager Communications

Kaushani Banerjee, Manager Communications

Design: Sasi Madambi, ICLEI South Asia; Madre Design, Madhavan Laxmi Kumar and Aakriti Rajput

Edited by: Saira Kurup, Communications Consultant, ICLEI South Asia

Contact for more information:

Dhaka South City Corporation
Nagar Bhaban, Phoenix, Bangshal Dhaka, Bangladesh.
Tel: +88029556014| **Email:** info@dscc.gov.bd | **Web:** https://dscc.gov.bd/

ICLEI - Local Governments for Sustainability, South Asia
C-3, Lower Ground Floor, Green Park Extension,
New Delhi - 110016, India
Tel: +91 11 4974 7200 | **Email:** iclei-southasia@iclei.org | **Web:** http://southasia.iclei.org

ICLEI South Asia - Bangladesh Country Office
12, Road - 20 Nikunja - 2 Khilkhet, Dhaka - 1229, Bangladesh
Tel: +88 01881363333 | **Email:** iclei-bangladesh@iclei.org

Contents

List of Figures

List of Tables

Abbreviations

ACCCRN	Asian Cities Climate Change Resilience Network
BAU	Business As Usual
BBS	Bangladesh Bureau of Statistics
BCCSAP	Bangladesh Climate Change Strategy and Action Plan
BCCTF	Bangladesh Climate Change Trust Fund
BGMEA	Bangladesh Garment Manufacturers and Exporters Association
BIWTA	Bangladesh Inland Water Transportation Authority
BIWTC	Bangladesh Inland Water Transportation Corporation
BIWTC	Bangladesh Inland Water Transport Corporation
BKMEA	Bangladesh Knitwear Manufacturers and Exporters Association
BMD	Bangladesh Meteorological Department
BRTA	Bangladesh Road Transport Authority
BRTC	Bangladesh Road Transport Corporation
C&D	Construction and Demolition
CAP	Climate Action Plan
CCRA	Climate Change Risk Assessment
CEO	Chief Executive Officer
CNG	Compressed Natural Gas
CSOs	Civil society organisations
DDM	Department of Disaster Management
DESCO	Dhaka Electric Supply Company Limited
DGHS	Directorate General of Health Services
DMA	District Metered Area
DMP	Dhaka Metropolitan Police
DNCC	Dhaka North City Corporation
DoE	Department of Environment
DPDC	Dhaka Power Distribution Company Limited
DPP	Development of Proposal
DSCC	Dhaka South City Corporation
DSE	Dhaka Stock Exchange
DTCA	Dhaka Transport Coordination Authority

DTWs	Deep Tube Wells
DWASA	Dhaka Water Supply & Sewerage Authority
ECA	Ecological Critical Area
ECNEC	Executive Committee for Economic Council
EXT	Extreme Scenario
FY	Fiscal Year
GDP	Gross Domestic Product
GoB	Government of Bangladesh
IPH	Institute of Public Health
KPIs	Key Performance Indicators
LST	Land Surface Temperature
MoEFCC	Ministry of Environment, Forest and Climate Change
NA	Needs Assessment
NAP	National Adaptation Plan
NDCs	Nationally Determined Contributions
NGOs	Non-governmental organisations
NRW	Non-Revenue Water
PCSP	Primary Collection Service Providers
RAJUK	Rajdhani Unnayan Kartripakkha
RCC	Reinforced Cement Concrete
RSA	Rapid Strategic Appraisal
SC	Standing Committee
SCADA	Supervisory Control and Data Acquisition
Sq. km.	Square Kilometer
SREDA	Sustainable and Renewable Energy Development Authority
STS	Secondary Transfer Station
SUHII	Surface Urban Heat Island Intensity
SWTPs	Surface Water Treatment Plants
ToR	Terms of Reference
UFW	Unaccounted for water
UNFCCC	United Nations Framework Convention on Climate Change
WLCs	Ward Level Committees

Foreword from the Minister of Environment, Forest and Climate Change

Saber Hossain Chowdhury
Minister
Ministry of Environment,
Forest and Climate Change
Government of the People's
Republic of Bangladesh

It is with great pleasure and a profound sense of purpose that I introduce the Dhaka South City Climate Action Plan. I recognize the critical importance of addressing climate change, particularly in urban centers like Dhaka South City, where the impacts are deeply felt by millions of residents.

Climate change poses significant challenges to our city, including more frequent and intense natural disasters, rising temperatures, and deteriorating air and water quality. These challenges not only threaten the health and well-being of our citizens but also jeopardize the sustainability and resilience of our urban infrastructure.

However, in the face of these challenges lies an opportunity for transformation. The Dhaka South City Climate Action Plan represents a bold and forward-thinking approach to addressing climate change at the local level. It is a testament to our collective commitment to building a more sustainable, resilient, and inclusive city for all.

At the heart of this plan is the recognition that climate action requires a multi-faceted and collaborative approach. It is not enough for the government alone to take action; we must engage all stakeholders, including businesses, communities, and civil society organisations, in a concerted effort to combat climate change.

The Dhaka South City Climate Action Plan is a comprehensive and evidence-based strategy that leverages the latest scientific research and data to inform decision-making. It outlines a range of initiatives aimed at reducing greenhouse gas emissions, enhancing climate resilience, and promoting sustainable development across key sectors.

However, the success of this plan ultimately depends on its effective implementation. It requires strong political will, adequate resources, and active participation from all stakeholders. I urge all residents, businesses, and institutions of Dhaka South City to embrace this plan as a shared responsibility and to actively contribute to its realisation.

In closing, I would like to express my sincere gratitude to all those who have contributed to the development of the Dhaka South City Climate Action Plan. Your dedication, expertise, and collaboration have been instrumental in shaping this transformative strategy. Let us continue to work together with determination and resolve to build a more sustainable, resilient, and prosperous future for Dhaka South City and its residents.

Foreword from the Mayor

Barrister Sheikh Fazle Noor Taposh
Mayor
Dhaka South City Corporation (DSCC)

It gives me great pleasure to present Dhaka South City's Climate Action Plan, which describes the significant impacts climate change could have on our city and suggests ways to work together to address those challenges. As we experience more and more extreme weather events, it is essential that we become climate-ready to ensure the protection of our homes, natural surroundings, and overall well-being. Dhaka South City has, therefore, developed an action plan based on evidence that aligns with the Paris Agreement's goals of limiting global warming to 1.5°C.

Although Dhaka South's per-capita emission is much lower than the Global North and lower than the targeted emission per person by 2030, the city is experiencing the adverse effects of climate change driven by global warming. Furthermore, Bangladesh is one of the most climate-vulnerable countries in the world. Every day, climate migrants come to Dhaka to permanently reside and get involved in the economy's informal sectors. Therefore, it is crucial to understand the potential implications of climate change on the city and its dwellers.

Dhaka South City is relentlessly working to reduce city-wide emissions & aims that by 2050, the city will be more livable, climate resilient and environment friendly. The climate action plan outlines 26 measures across 7 sectors under three baseline scenarios to increase climate resilience and move towards a net-zero future. The city has already taken significant steps to achieve its emission reduction objective. As part of these efforts, massive tree plantation, restoration of water bodies & canals and development & improvement of parks, playgrounds & open spaces are continuously ongoing. DSCC also strives to achieve its "Zero waste acceleration" goal by improving solid waste management through technological innovation, waste reduction, and capacity building.

Furthermore, parallel activities are ongoing in other urban sectors, such as stormwater drainage, health sector, and disaster management.

DSCC is making a commendable effort to reduce its carbon footprint and promote sustainability. The city has set targets based on thorough analysis and pathway modelling using C40 tools, which will help achieve these goals. DSCC is promoting reducing individual private vehicles and making the the city more pedestrian-friendly. As part of promoting clean and green energy, DSCC intends to introduce environment-friendly electric vehicles in the city.

Furthermore, the city has also put in place plans to increase waste recycling, composting, and bio-methanation of wet waste, waste to energy initiative for supporting the national grid by providing electricity along with maximising wastewater treatment. To ensure the successful implementation of this plan, sectoral Key Performance Indicators (KPIs) have been developed to track the progress of the strategies outlined in the climate action plan. This will enable the city to monitor its progress and make necessary adjustments to achieve its goals. We believe these efforts will inspire others to follow suit and help us build a more sustainable future for all.

We look forward to implementing the interventions outlined in the climate action plan to make our city more climate-resilient. DSCC intends to work together to establish a project advisory or high-level steering committee with representatives of local and national governments to expedite project implementation. A prosperous and resilient city comes from acting on the plan, not just having it. I urge everyone to become aware of the city's actions to adapt to climate change and get involved.

We sincerely thank all those who worked hard to prepare the plan, especially C40 Cities and ICLEI South Asia. A more efficient and sustainable city won't happen overnight, and it won't happen without you. Together, we can create sustainable solutions that protect our way of life in the face of a changing climate.

Foreword from the CEO

Md. Mizanur Rahman
Chief Executive Officer (CEO)
Dhaka South City Corporation
(DSCC)

We are at a pivotal moment in the city of Dhaka South. To secure a successful future for all our residents, we must work together to address the impact of climate change. I am excited to present our Climate Action Plan, outlining our bold approach to climate action and our work towards a more sustainable future for all of us.

I am proud of the environmental leadership Dhaka South City has shown with this initiative. What is clear is that this will require an enormous amount of hard work and cooperation. It will require the commitment of not only the government, but every individual and business in the city. I thank everyone who reads this document and takes action to help heal our planet. Whether you are already engaged in this critical work, or new to the conversation, we depend on your continuing interest and dedication to meet the challenges ahead.

I extend my thanks to C40 and ICLEI South Asia for their stewardship in developing the Climate Action Plan for Dhaka South City. This plan ensures that no community is left behind as we develop a new blue-green economy that not only reduces emissions, but also helps ensure that our community has clean air to breathe, fresh water to drink, and a thriving ecosystem in which to live, work and play more resiliently. The plan will help us build a future-ready Dhaka South, sustainably and resiliently

Foreword from C40

Shruti Narayan
Managing Director, Regions and Mayoral Engagement,
C40 Cities

Dhaka South, a C40 city has developed an ambitious Climate Action Plan (CAP) laying out a blueprint towards becoming carbon neutral by 2050 in accordance with the Paris Agreement. Dhaka South City's Climate Action Plan serves as a roadmap for cities in Bangladesh in attaining sustainable urban development.

The Dhaka South City Climate Action Plan provides ambitious yet feasible measures to cut carbon emissions, increase resilience to climate impacts, and improve the quality of life for all Dhaka South citizens based on significant research, stakeholder participation, and data-driven analyses.

The CAP contains evaluations for key urban sectors such as water supply systems, wastewater and solid waste management, energy and construction, transportation, and general health systems. The plan sets ambitious but feasible targets for renewable energy, electric mobility, and grid decarbonisation. Building on Dhaka South City's waste management efforts, the plans set targets for 100% wet waste composting and bio-methanation, as well as 100% wastewater treatment to either anaerobic treatment with biogas capture or well-managed efficient aerobic treatment by 2050. The action plan also includes details on the governance structure, as well as a thorough evaluation and monitoring framework to ensure that the climate action plan is carried out seamlessly.

Key to the success of this plan is its inclusivity and participatory nature. Let us leverage the power of collaboration, innovation, and collective action to realise the vision of a greener, cleaner, and more vibrant Dhaka. Together, we have the opportunity to shape the future of our city and leave a lasting legacy for generations to come.

I commend Dhaka South's efforts on engaging with global and local stakeholders to expand access to green livelihood opportunities for both refugees and vulnerable residents. C40 also acknowledges the support provided by ICLEI for developing this plan.

C40 looks forward to working with Dhaka to implement and mainstream the CAP by developing solutions and implementing actions towards transformational, city-wide resilience to the impacts of climate change and build healthy, equitable and resilient communities to remain within a 1.5°C rise.

Foreword from ICLEI South Asia

Emani Kumar
Deputy Secretary General,
ICLEI, and Executive Director
ICLEI South Asia

Bangladesh figures among the countries that are most vulnerable to climate change and disasters, while being responsible for less than 1% of global GHG emissions. Significant effort is being made to implement policy, governance and systemic changes to bolster the resilience of local communities and reduce emissions. Supporting the national government's efforts, the Dhaka South Corporation has developed a Climate Action Plan (CAP) to transition to a sustainable, equitable, climate-resilient growth path, while moving towards net zero emissions.

ICLEI South Asia is honoured to have supported Dhaka South City Corporation in developing its Climate Action Plan, which aligns with the country's national and international commitments. The CAP presents an evidence-based climate action roadmap, steering Dhaka towards a net zero, climate resilient future by 2050, while responding to its unique challenges, context and opportunities. In line with this goal, the CAP identifies specific measures and strategies for improving adaptive capacities and reducing climate vulnerabilities, enhancing energy efficiency, increasing renewable energy deployment, promoting low-carbon transportation, as well as managing air quality, water and waste; all in line with the commitments in Bangladesh's NDC (2021). Effective policies, governance systems and stakeholder processes that will facilitate sustained implementation, monitoring and reporting of climate actions are also identified.

I thank Dhaka South City Corporation for this opportunity to collaborate in the preparation of this transformative document, and would like to acknowledge the efforts of all officials and professionals who were involved in this initiative for their commendable work. We intend to continue supporting the visionary leadership of the Dhaka South City Corporation in implementing its CAP, to accelerate net-zero, climate resilient development in the city.

1. Introduction

Dhaka, the capital city of Bangladesh, is highly vulnerable to natural disasters; and climate change is expected to exacerbate the situation with altered rainfall patterns, and increased temperatures. The city's topography makes it particularly susceptible to flooding, which poses a significant threat. Increasing land surface temperature causing heat stress is also a serious threat to the residents of the city. These risks impact not just the local population, but also the natural and urban systems of the city. Though the emissions from Dhaka are relatively lower than in cities in developed countries, such as London or Paris, the impacts are disproportionately felt by the citizens of Dhaka. Therefore, it is important to understand the potential impacts of climate change on the city and its systems.

The Dhaka municipality was upgraded to become the Dhaka Municipal Corporation in 1978, which was later renamed the Dhaka City Corporation in 1990. Subsequently, given the size of the city of Dhaka, in 2011, the Dhaka City Corporation was divided into two separate entities, namely the Dhaka South City Corporation (DSCC) and the Dhaka North City Corporation (DNCC). All operational activities of both the DSCC and DNCC are governed by the Local Government (City Corporation) Act, 2009.

Dhaka has grown rapidly in recent years, and the DSCC area is facing multiple challenges such as insufficient open space, unplanned development and inadequate solid waste and drainage management system. The impacts of climate change are expected to worsen the situation. Erratic rainfall and rising temperatures are climate risks that make Dhaka South susceptible to urban flooding and heat stress, impacting not only the people, but also the natural resources and crucial urban systems of the city. Hence, it is vital that urban planners, decision makers and DSCC officials prioritize the development of a Climate Action Plan for Dhaka South City to strengthen the resilience of urban systems, including related infrastructure, and the community in response to the impacts of climate change.

Both Dhaka North and Dhaka South cities have already started experiencing the impact of climate change. The entire Dhaka city has seen a significant observed increase in the average annual day temperature. From 2000 to 2019, the mean temperature of the annual daytime Surface Urban Heat Island Intensity (SUHII) rose from 2.20°C to 3.18°C[1]. The city is also reportedly one of the worst affected cities in the world in terms of urban heat[2]. Low-income groups and labourers are disproportionately affected by urban heat, which has led to health risks and reduced economic productivity.

Climate change has been significantly impacting the DSCC. The city is grappling with issues of heat stress as well as urban flooding due to clogged drains. The DSCC has also seen a sharp increase in vector-borne diseases such as dengue and malaria. The rapid pace of development and encroachment has reduced green spaces significantly. The capacity of the storm drainage system is not sufficient to tackle the runoff. As a result, flooding occurs frequently in the area. Rising population is also putting pressure on the DSCC's essential services such as reliable transportation, continuous water and energy supply, effective sanitation and solid waste management. Additionally, the economic and climate induced migration from different parts of the country has become a major concern for the DSCC.

In this context, the planners and decision makers of the DSCC have to urgently initiate a resilience-building journey for the city by assessing its climate risks and vulnerability, and by identifying actions to address the climate challenges. The development of the Climate Action Plan (CAP) for Dhaka South city is an important step in this direction. The CAP assesses the existing and potential climate risks to the city, its populations and its systems and promotes strategies to move towards a net zero development pathway, reducing emissions on one hand and adapting and building resilience to climate impacts on the other. The CAP has set an ambitious target for the DSCC to cut down its city-wide greenhouse gas (GHG) emissions through incremental reductions of 14.9% by 2030, 33.8% by 2040, and 70.6% by 2050, as compared to the levels recorded in 2021-22. Dhaka South is committed to achieving the Paris Agreement goals, and 1.5°C compatible net-zero GHG emissions by 2050, and will update its targets in future CAP revisions to advance towards this goal.

Dhaka South's per capita GHG emissions are relatively lower than cities of developed countries. As per C40's Deadline 2020 research[3], it is expected that per capita emissions of cities that fall in the 'Late Peak' group such as Dhaka South will remain lower than developed cities in the near term by 2030. The CAP provides Dhaka South a guiding framework to steer and ensure that its socio-economic growth and infrastructure and urban development are appropriately decarbonised and climate-resilient, ultimately contributing to global and national efforts to meet the Paris Agreement targets and the Sustainable Development Goals (SDGs).

Dhaka South's CAP serves as a blueprint for the city's climate-resilient and net-zero emissions transition, and the identified climate actions can also help to deliver several wider co-benefits such as better air quality, public health, increased access to and availability of sustainable energy, water and mobility, improved sanitation and waste management, and enhanced economic opportunities, among others. Thereby, the CAP offers opportunities to improve the quality of life and overall well-being of Dhaka South's residents, ultimately resulting in a liveable, sustainable, green and healthy city.

To effectively implement this ambitious CAP and achieve the outlined goals and targets across various sectors, it is crucial to prioritise key strategies. These strategies encompass rapid transitions to renewable energy sources in different sectors, widespread adoption of electric and non-motorised vehicles, increasing urban green cover, and the endorsement of climate-compatible sustainable practices. This comprehensive approach, which includes raising awareness among stakeholders at different levels, is essential for successfully reducing GHG emissions and enhancing adaptability to current climate impacts. The success of these efforts relies on a coordinated and comprehensive approach across multiple sectors, as indicated in this CAP.

1 Surface urban heat island intensity in five major cities of Bangladesh: Patterns, drivers and trends

2 https://www.tbsnews.net/bangladesh/dhaka-worst-affected-city-world-urban-heat-says-us-study-311839

3 https://www.c40.org/wp-content/uploads/2021/07/Deadline_2020.pdf

1.1 Methodology

Since joining C40 in 2018, the DSCC has remained committed to formulate a CAP, aimed at enhancing climate resilience and reducing emissions in alignment with the Paris Agreement. In 2018, the DSCC took a significant step by developing a GHG inventory adhering to international standards, specifically the Global Protocol Community-Scale (GPC) GHG inventories. Building on this foundation, the DSCC recognised the need to update its GHG inventory and formulate a comprehensive CAP to align with its vision, policies, and priorities.

The process of preparing the DSCC's CAP commenced in August 2022, guided by principles of inclusivity and active collaboration among a diverse array of stakeholders. The key steps of the DSCC's CAP preparation are outlined below:

1.1.1 Inception and Engagement

ICLEI South Asia collaborated with C40 to provide the technical support and scientific hand-holding necessary for preparation of the CAP. Strategic meetings such as the engagement meeting in September 2022 and the Kickoff Meeting in November 2022 facilitated a clear understanding among DSCC officials regarding the importance of updating their commitments and preparing a CAP.

A Climate Core Team and a list of priority stakeholders were identified for engagement throughout the CAP development process. The Climate Core Team includes key departments such as Urban Planning, Environment, Climate Change and Disaster Management, and Waste Management. The formation of the Climate Core Team aims to empower and lead the implementation of the CAP within the DSCC. The Core Team list as developed by the DSCC is attached as **Annexure 1**. Regular consultation meetings were organised with the Climate Core Team – including formal stakeholder consultations and informal one-to-one meetings – to keep different departments aware of the progress of the CAP preparation, for collection of data, validation of analysis, and in general generate momentum within the DSCC regarding the preparation of the CAP. A list of stakeholders was prepared for the city and consulted at intervals through workshops or one-on-one interactions – **Annexure 2**. A summary report of the formal stakeholder consultation organised on 12 September 2023 is attached in **Annexure 3**, along with a list of the stakeholders who were consulted through this event. Sectoral data for developing this GHG inventory was collected from entities such as the Dhaka Power Distribution Company Limited (DPDC), Sustainable Renewable Energy Development Authority (SREDA), Titas Gas Transmission and Distribution Company Limited, Bangladesh Petroleum Corporation (BPC), DSCC, Dhaka Water Supply and Sewerage Authority (DWASA) and reports from various sectoral departments.

1.1.2. Baseline Assessment - Strategic Climate Action Planning Appraisal, Climate Change Risk Assessment, Greenhouse Gas Emissions Baseline Inventory and Pathways/Emission Modeling

Based on C40's CAP Framework, a rapid Strategic Appraisal and Needs Assessment was conducted to identify existing city climate targets, plans, policies, data, programs and regulatory mechanisms. It identified the gaps in these aspects and the necessary interventions for addressing them. The Rapid Strategic Appraisal (RSA) and the Needs Assessment (NA) Report was developed in February 2023.

On the basis of C40's CCRA Framework and the ICLEI South Asia's ICLEI ACCCRN Process, a climate risk and vulnerability assessment was conducted for the DSCC. Data on climate risks, climate trends and projects, major climate hazards and their impacts, current and future impacts of climate risks on seven critical urban systems of the DSCC, climate vulnerable areas and the adaptive capacity of the urban actors and urban systems was collated from secondary sources as well as through consultations with the Core Team members, including one-on-one consultations with relevant departments outside the DSCC.

Using the City Inventory Reporting and Information System (CIRIS) tool developed by C40, a GHG emission inventory was prepared for the DSCC to understand the sectoral emissions and identify mitigation goals and actions. The process was fully aligned with the Global Protocol for Community-Scale Greenhouse Gas Emission Inventories (GPC) standard. For the preparation of the emission inventory, a review of the previous GHG emission inventory of 2018 for the DSCC was conducted and sectoral data collected from different entities in Dhaka South was used. Like most South Asian cities, inadequate data availability and management is observed in Dhaka South, and in case city specific GHG data was not available, scaled up or scaled down data was used for estimation of the sectoral emissions.

A GHG emissions scenario modeling exercise was first initiated by C40 in association with the DNCC and DSCC and finalised in 2021. These initial emission scenarios developed using C40's Pathways tool and stakeholder consultations, pertained to the Dhaka metropolitan region that spans an area of 1600 sq. km. and extends beyond Dhaka South. As part of the CAP development process for the DSCC, the previous emissions scenarios model was reviewed and updated between September and October 2023. The emissions scenarios were contextualised to the Dhaka city boundary of 305 sq. km, i.e., the combined area of Dhaka North and Dhaka South, while being informed by a review of existing national, regional and city-level policies and programs. Three distinct emissions scenarios were used to inform target setting and emission reduction action identification for Dhaka South's CAP, namely (i) BAU, (ii) Existing and Planned Actions scenario and (iii) 1.5°C Extended Actions scenario.

The overall process aims to demonstrate how emission levels are expected to look like in the future in different scenarios, and ultimately to help identify a basis for the levels of ambition and climate actions to achieve net zero goals.

1.1.3 Action Plan Development

This crucial stage collated the information on climate mitigation and adaptation, to identify goals, targets and strategies for each critical sector. Based on the strategies, a list of actions were identified to be implemented in the DSCC. The selected interventions have been prioritised based on their resilience potential, including an assessment of their techno-political and financial feasibility and the time necessary to create any significant impact on climate resilience while also placing an emphasis on resulting co-benefits during the identification and prioritisation process. Particular attention was given to ensuring co-benefits and to addressing the vulnerable areas and vulnerable populations in different sectors. The identification and prioritisation of climate actions and targets has involved consultations with DSCC officials and departments through the Climate Core Team and with stakeholders, including city and sub-national level government organisations, private organisations, institutions, associations, NGOs, and individual experts. The strategy and resilience interventions were validated through consultation with stakeholders in November 2023 to ensure that the CAP is not only effective, but also considerate of diverse community needs.

1.1.4. Governance and Monitoring

The CAP articulates a well-defined governance structure to suggest institutional and regulatory arrangements, including the composition and terms of reference of the Climate Core Team, for implementing the CAP in Dhaka South. Since a climate action plan is by nature cross sectoral and can only achieve its full benefits through a holistic implementation, the governance structure emphasizes coordination among both internal and external departments and enhances the DSCC's capacity to seamlessly integrate CAP into other development programs.

A robust Monitoring and Evaluation Framework has been developed based on C40's MER Adaptation Framework. This framework defines sector-specific Key Performance Indicators (KPIs) that can be used by the Climate Core Team to track the progress of CAP implementation, facilitating continuous evaluation and adjustment as needed.

1.1.5 Finalisation of the DSCC CAP

The draft CAP has been discussed internally with different departments of the DSCC and as well as with key external stakeholders, such as sectoral departments (DPDC, DWASA, DTCA, BRTA, BPC, Titas Gas). Additionally, the draft was shared with the Department of Environment (DoE), UNDP, International Centre for Climate Change and Development (ICCCAD), Centre for Participatory Research and Development (CPRD) and Nature Conservation Management (NACOM) for expert reviews. All pertinent suggestions and feedback received were thoughtfully incorporated into the final CAP of the DSCC. The draft CAP has been ratified by the DSCC Mayor to give it full legitimacy and encourage its whole-hearted adoption by all departments of the DSCC.

1.2. Vision for the DSCC CAP

The DSCC CAP endeavours to shift towards a sustainable, climate-resilient development, and net zero emissions aligned to the Paris Agreement, by adopting good governance systems, improved service delivery and social equity. The CAP aligns with national and global climate goals and seeks to implement transformational actions that make the city resilient to climate change and improve the quality of life of its residents.

2. Dhaka South City Corporation

Bangladesh's capital city, Dhaka, is one of the fastest-growing megacities in the world and is the biggest city in the country. Rapid urban growth has made Dhaka city vulnerable to natural and man-made disasters. The city is also facing urban migration issues; economic and climate change are the major drivers for migration in Dhaka.

In 1947, the city was spread over an area of about 31 sq.km. with a population of some 250,000. Later, Dhaka's political, administrative, economic, industrial, educational and even military importance grew exponentially. Accordingly, its local government structure was also changed to suit the new situation. By 1983, Dhaka's population was more than 3.4 million spread over an area of about 400 sq. km. In 2011, Dhaka City Corporation was divided into two city corporations (DSCC and DNCC).

The DSCC serves a 109.25 sq. km.[4] area of Dhaka city, making it smaller (in terms of area coverage) than the DNCC. It provides municipal services to 75 wards in 10 city zones. The DSCC has 75 wards covering the thanas of Paltan, Motijheel, Sabujbagh, Khilgaon, Mugda, Shahjahanpur, Shampur, Jatrabari, Demra, Kadamtali, Gandaria, Wari, Ramna, Shahbag, Dhanmondi, Hazaribagh, Kalabagan, Kotwali, Sutrapur, Lalbagh, Bangsal, Chawkbazar, and Kamrangirchar. The official headquarters at 'Nagar Bhaban' has different offices and departments to serve their diversified functions, including the Office of the Mayor, Office of the Chief Executive Officer, Office of the Secretary, Engineering Department, Health Department, Revenue Department, Waste Management Department, Urban Planning Department, Estate Department, Transport, Accounts Department, Store and Purchase Department, Information Technology, Law Department, Public Relation, Social Welfare, Internal

4 Bangladesh Bureau of statistics,2022

Audit, Slum Improvement Development, Security Department, Electric Department, as well as offices of the zonal executive officers from Zone 1 to 10.

In addition, the DSCC has several Standing Committees and other Committees to monitor and guide its activities. The corporation, in its first meeting of the year, is responsible for forming standing committees in the following areas: finance and establishment; waste management; education, health, family planning and healthcare facilities; urban planning and development; audit and accounting; construction and maintenance of urban structures; water and electricity; social welfare and community centre; environment development; sports and culture; birth and death registration; communication; market monitoring and controlling; and disaster management. The committees are mandated to function for two years and six months, and after this period, new committees are required to be formed.

2.1. Location

The DSCC is located in south Dhaka, and has 75 wards covering 23 thanas and 10 zones. It covers an area of 109.25 sq. km. The DSCC area is surrounded by the DNCC in the north, Narayanganj in the south, Keraniganj in the west and Rupgonj Upazila in the east.

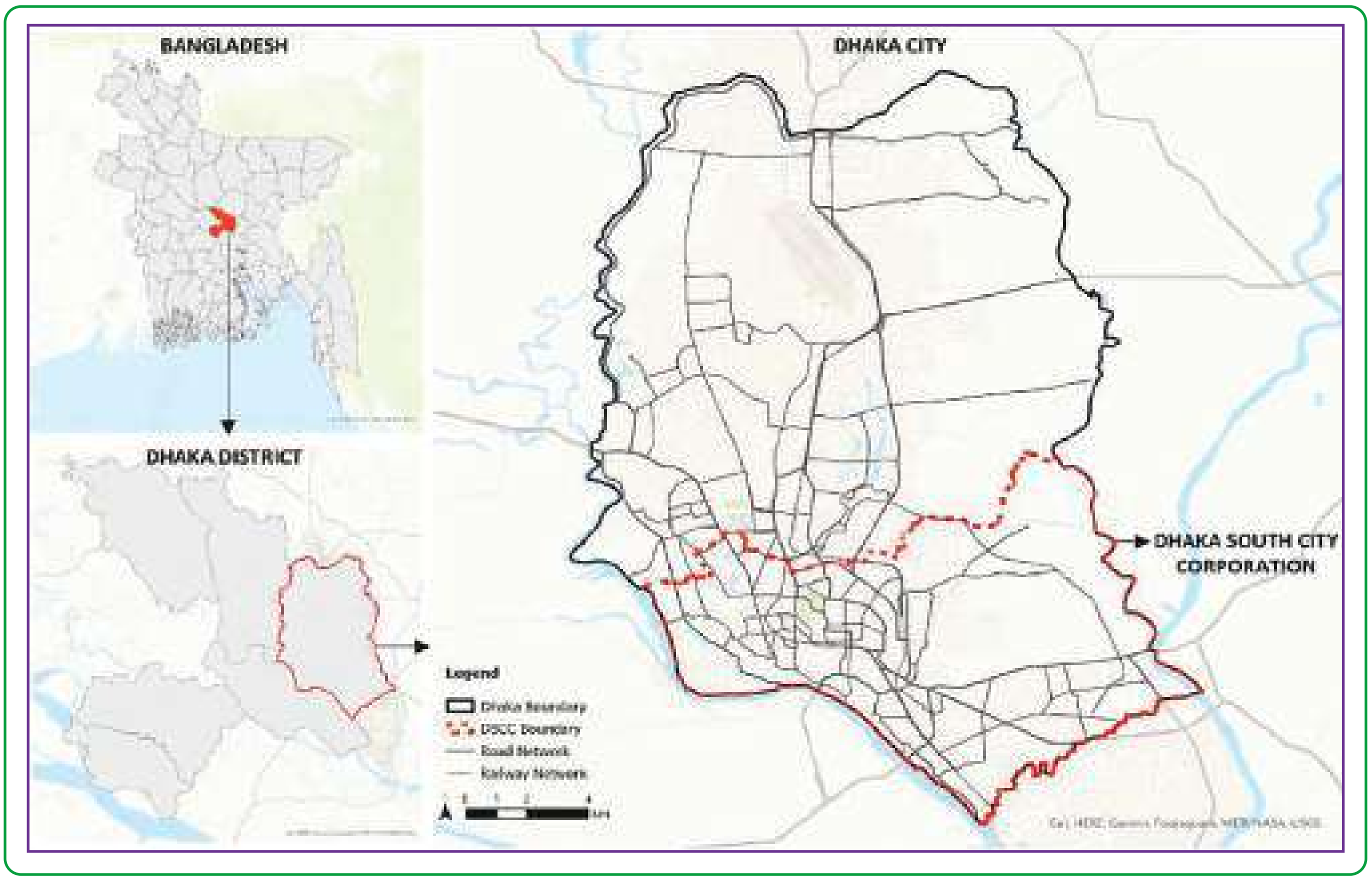


Figure 1: Location of Dhaka South City Corporation[5]

[5] ICLEI South Asia

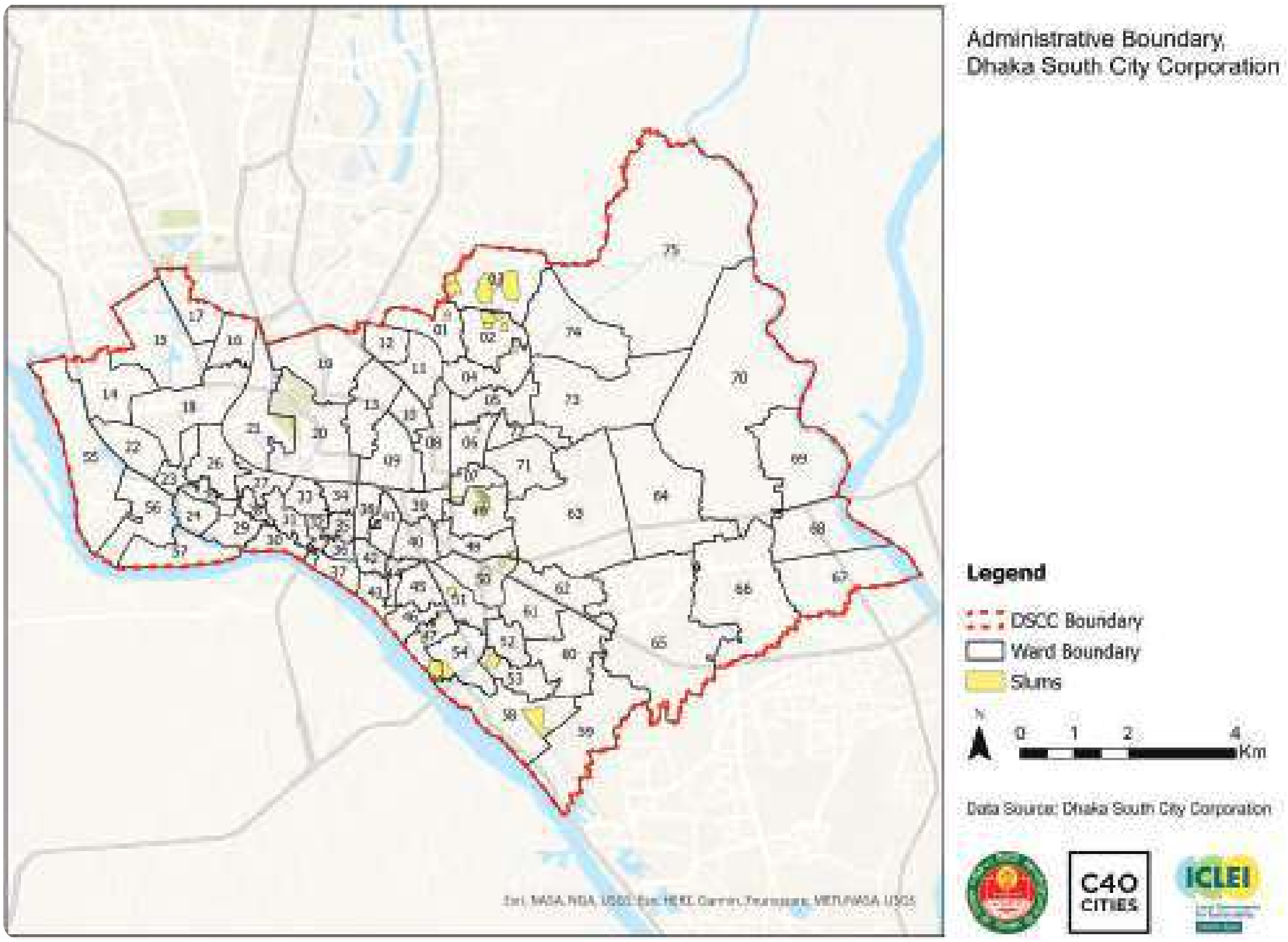


***Figure 2:** Administrative Map of Dhaka South City Corporation*[6]

2.2. Connectivity

The DSCC's multimodal connectivity via air, road, railway, and waterways ensures convenient access from various parts of the country, promoting accessibility and regional integration.

The closest airport is Hazrat Shahjalal International Airport, located 16.6 km away in Dhaka North. This airport operates both domestic and international flights on a daily basis.

Kamalapur railway station serves as a crucial transportation hub, providing excellent connectivity to DSCC. Additionally, the Metro Rail Transport (MRT) lines within the city encompass Shahbag, Dhaka University, Bangladesh Secretariat, and Motijheel areas, enhancing accessibility and mobility within the DSCC.

The DSCC boasts excellent a road network, with multiple bus routes to other places such as Bosila, Mohammadpur, Science Lab, Shahbag, Gulistan, Motijheel, Matuail, Shonir Akhra, Asad Gate, and Azimpur. Furthermore, the Saidabad Bus terminal is seamlessly linked to the DSCC boundary.

The Sadarghat River Port, located in the west, is another water transportation hub situated along the banks of the Buriganga River. It serves as a gateway for both passenger and cargo transport, connecting Dhaka with other regions of the country.

6 Dhaka South City Corporation (DSCC)and ICLEI South Asia

Figure 3: Transport Connectivity of Dhaka City[7]

2.3. Demographics

The DSCC, spreads over 109.251 sq km[8], has a population of 4,299, 345 (BBS, 2022) and an average population density of 39,352 person/sq. km.

Muslims constitute 90% of the Dhaka's population. Hinduism is the second most practiced religion, and Christianity and Buddhism are considered minority religions[9]. The primary language in Dhaka is Bengali, followed by English which is used largely for business purposes.

The population of Dhaka metro area is growing at an average annual growth rate of 1.83%, and may cross 5.4 million in the DSCC by 2035 at this rate. This increase in population will put further stress on the urban services and resources of Dhaka city.

7 Urban Planning Department of Dhaka South City Corporation
8 Dhaka South City Corporation
9 https://worldpopulationreview.com/world-cities/dhaka-population

Table 1: Demographic Analysis of Dhaka South City Corporation

Parameters	Data
Population (Year 2022)[10]	4,299, 345
Population Density[11]	39,352 person/sq. km.
Area of corporation jurisdiction in sq. km (Year 2022)	109.251[12]
Male[13] Female[14] Third gender[15]	2,334,858 1,963,834 653
Total Number of Wards[16]	75
Zone	10
Ward with Highest Population Density[17]	33 (234,875 Person/sq.km)
Ward with Minimum Population Density[18]	69 (2,466 Person/sq.km)
Number of slum areas in both Dhaka North and Dhaka South[19]	3,394
Number of Households (calculated)	1,120,396
Household Size (2022)[20]	3.9
Literacy Rate (Year 2022)	85.56% (above 7 years)[21]

10 Population and Housing Census 2022
11 Population and Housing Census 2022
12 Dhaka South City Corporation 2022
13 Population and Housing Census 2022, https://sid.portal.gov.bd/sites/default/files/files/sid.portal.gov.bd/publications/01ad1ffe_cfef_4811_af97_594b6c64d7c3/PHC_Preliminary_Report_(English)_August_2022.pdf#page=16&zoom=100,92,77
14 Population and Housing Census 2022
15 Population and Housing Census 2022
16 Waste Management Report 2019-2020 (DSCC)
17 Waste Management Report 2019-2020 (DSCC)
18 Waste Management Report 2019-2020 (DSCC)
19 http://www.dncc.gov.bd/sites/default/files/files/dncc.portal.gov.bd/annual_reports/826bcbc3_59aa_4eed_9cb7_16c254d180d1/2021-12-22-08-41
20 DSCC
21 Population and Housing Census, 2022, National Report - Volume 1, BBS

The Bangladesh Bureau of Statistics' census data shows that the population of Dhaka city (including North and South Dhaka) almost doubled from 2001 to 2022.

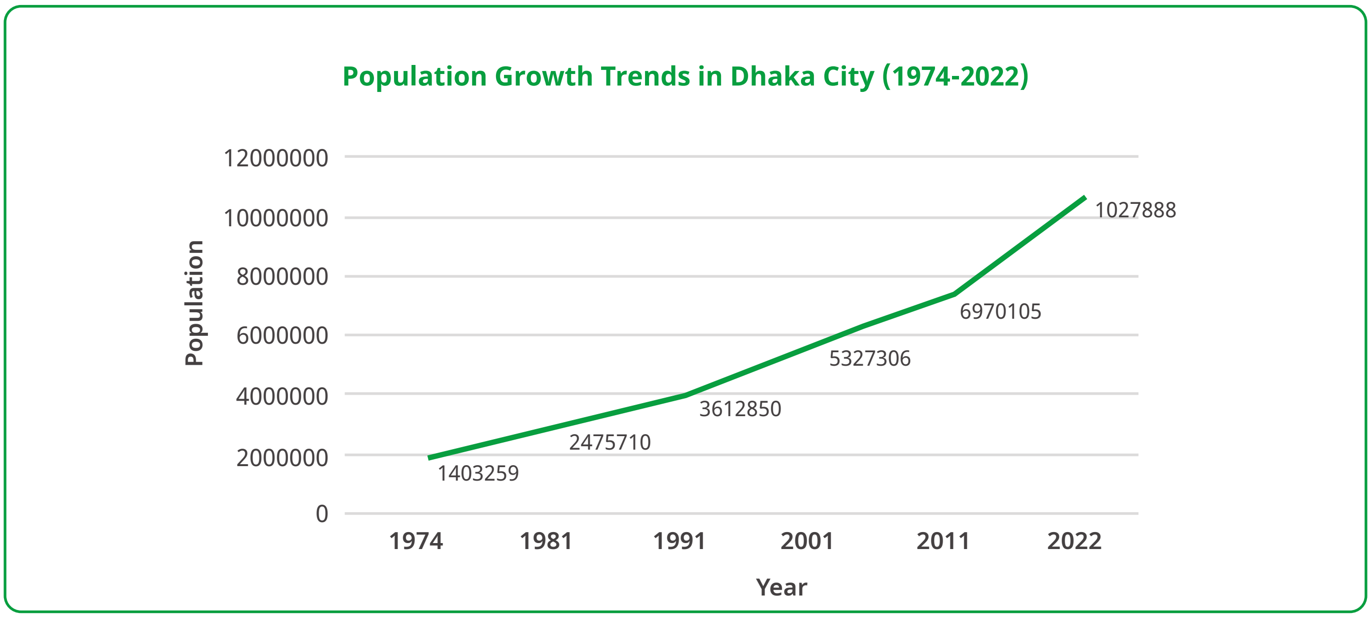


Figure 4: Population Growth Trends in Dhaka City (BBS Census data)[22]

Note: The figures for Dhaka North and Dhaka South are available after 2011. In 2022, Dhaka North had a population of 5,979,537 persons and Dhaka South's population stood at 4,299,345 persons.

2.4. Institutional Structure and City Corporation Budget

The city corporation consists of the mayor and ward councilors – male and female. The mayor is the elected head of the corporation with executive authority. The Chief Executive Officer (CEO), with the secretary's support, assists the mayor in executing all development plans. The CEO is in charge of all departments of the city corporation. The DSCC also establishes several standing committees to monitor the development activities.

The corporation is responsible for administering and providing basic infrastructure, and services such as healthcare, sanitation, water supply, urban planning, drainage, road construction and maintenance, animal welfare, and street to the citizens within its jurisdiction. All these functional and administrative activities are regulated by the Local Government (City Corporation) Act, 2009. Figure 5 shows the organisational chart of the DSCC.

[22] Population and Housing Census 2022

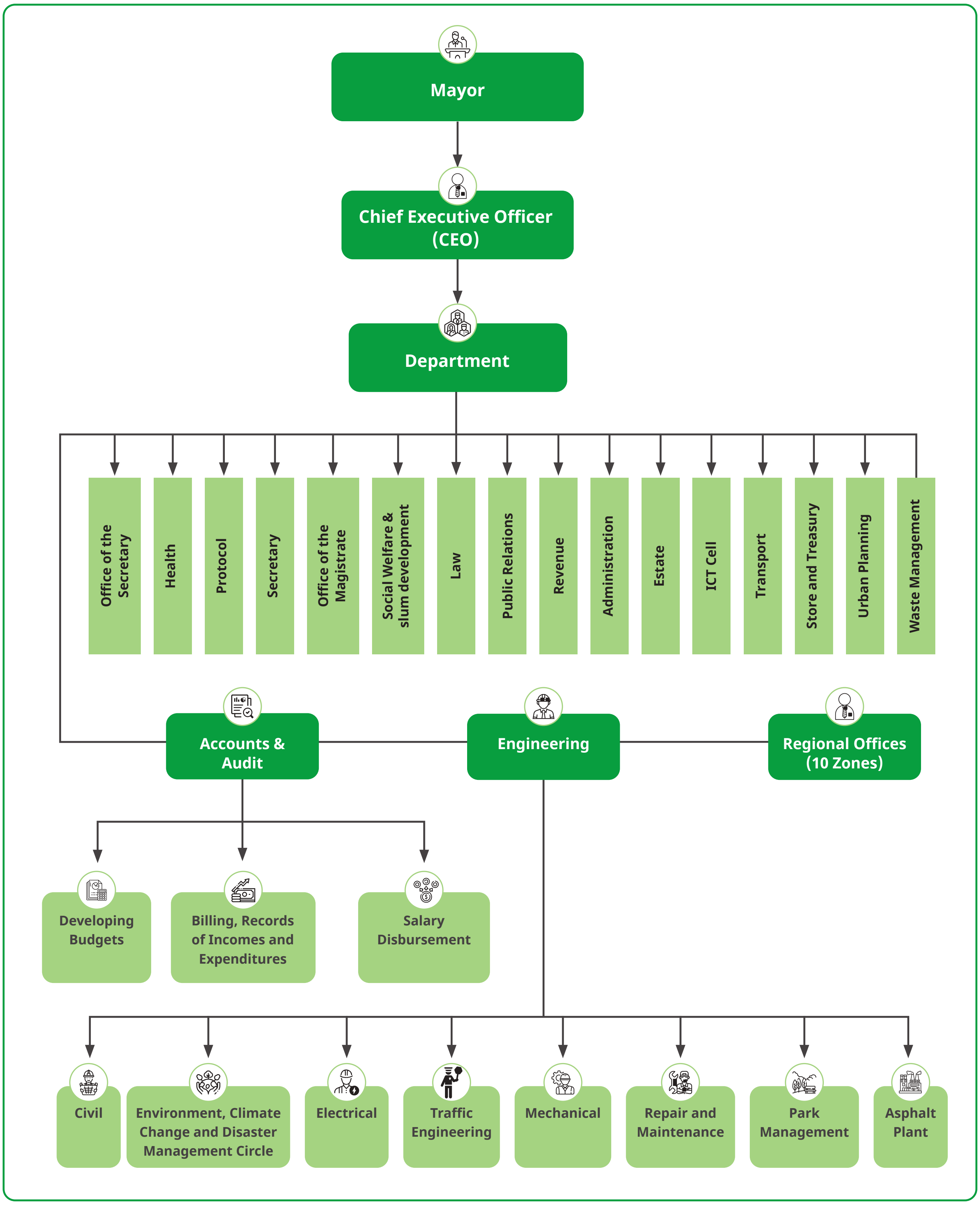


***Figure 5:** Organisation Chart of Dhaka South City Corporation*[23]

[23] Dhaka South City Corporation (DSCC)

The budget of the DSCC relies heavily on taxes, rates, fines, tolls, rents, profits from their property, and government grants. The revenue department is responsible for imposing taxes on buildings, issuing new holding numbers, and rectifying records during property transfers. Moreover, they issue trade licenses to Dhaka's business community, assign shops in DSCC-owned markets for non-motorised vehicles, and collect rent and amusement tax. The central portion of its revenue stems from taxes on holdings and tariffs on water, conservancy, and lights. The municipal Budget of the DSCC for 2022-23 stands at 6741.28 Crore BDT.[24]

2.5. Economic Activities

The DSCC is a commercial and administrative hub for the region. The city's economy is dependent on commercial institutions like shopping centers, vegetable markets and food markets. There are some large shopping malls in the DSCC like Motaleb Plaza, Multiplan Centre and Shimanto Square.

The vibrant business hub in Old Dhaka is renowned for its wholesale trading activities, with Islampur specialising in cloth trading, Moulvibazar in commodity goods, Chawkbazar in cosmetics, Babubazar in jewelry, Midford in medicines and chemicals, Bongshal in various parts of cars, motorcycles and bicycles, Nazirabazar in delicacies and Nawabpur in electric products and equipment. These areas have played a significant role, not only in Dhaka's economy, but also in contributing to the overall economic landscape of the entire country.

The city attracts migrant workers from all over the country, many of whom find work in small businesses, transportation, and vending. Additionally, Dhaka city (including Dhaka South) is experiencing a significant influx of rural-urban migration that is also increasing the slum population in the city. While migration for economic reasons remains the predominant factor, 8% of the slum dwellers cited river flooding, erosion, and natural disasters as their primary motivations for migrating.

The DSCC is also a hub of educational institutes like schools, colleges, and universities, and has some renowned hospitals like Sir Salimullah Medical College and Hospital, Dhaka Medical College and Hospital, Government Employee Hospital, and Central Police Hospital.

2.6. Physical and Ecological Landscape

Dhaka is located in the central-eastern part of Bangladesh, and in the extreme south of the Madhupur Tract. The soil is Pleistocene Madhupur clay, a yellowish-brown to oxidised reddish-brown silty clay, covering the central area. South Dhaka has Holocene sediments[25]. The drainage canals, green areas and water bodies that comprise the DSCC's infrastructure and environment are essential components of the region. These entities play a crucial role in managing water flow, providing recreational spaces, and preserving the natural beauty of the area. As such, their maintenance and protection are of the utmost importance for the health and well-being of residents and the sustainability of the city.

One notable green area in Dhaka South is Baldha Garden, which is spread over 3.15 acres (1.27 hectares) and has 672 plant species[26]. Another such area is Ramna Park, located near Shahbag and spread over 68.50 acres (277,200 square meters), including a lake that covers 8.76 acres (35,500 square meters). The park is home to 71 species of flowering trees, shrubs, perennials, and annuals, 36 species of fruit-bearing plants, 33 species of medicinal plants, 41 species of forestry, and 11 other species[27]. Other such parks are Chandrima Udyan and Gulistan Shahed Motiur Park.

Suhrawardy Udyan is another historical and ecological place in Shahbagh, Dhaka. Formerly known as the Ramna Race Course ground, it has an important memorial named after Huseyn Shaheed Suhrawardy. Originally the military club for British soldiers stationed in Dhaka, it was later transformed into the Ramna Race Course and subsequently the Ramna Gymkhana.

---

24 https://dscc.gov.bd/site/page/ca5cf302-e47f-467a-a355-7cde2c792d9c/%E0%A6%AC%E0%A6%BE%E0%A6%9C%E0%A7%87%E0%A6%9F

25 https://documents1.worldbank.org/curated/en/587651524722873910/pdf/Environmental-management-framework.pdf

26 https://dscc.portal.gov.bd/sites/default/files/files/dscc.portal.gov.bd/page/dd75e3a8_27ca_48a3_ac38_8a26208d3516/2019-12-29-15-45-f363dd995d282f9fde09d78c928944b1.pdf https://en.wikipedia.org/wiki/Baldha_Garden

27 https://en.wikipedia.org/wiki/Ramna_Park

In the post-colonial era, it became a venue for legal horse racing on Sundays.

Dhanmondi Lake is located in the Dhanmondi residential area and was initially a dead channel of the Kawran Bazar River, connected to the Turag River. The 37.37-hectare lake, partially linked to the Begunbari Canal, is over 3-km long, 35-100 metres wide and has a maximum depth of 4.77 metres. The lake has one box culvert near the Sukrabad area, which serves as its sole outlet. Excess floodwaters resulting from heavy rainfall are drained out through this outlet, keeping the water level in the lake relatively constant throughout the year[28].

2.7. Land Use

The land use pattern in Dhaka has changed significantly post-independence, when a frenzy of construction of residential, commercial and institutional buildings began in the city, at the expense of its green and blue wealth.

A large number of water bodies, low-lying areas and agricultural land were converted into built-up areas. Till five decades ago, the dominant land-use type was primarily agricultural land and water bodies, and the direction of development was mostly northward. After the roads and bridge connectivity improved, built-up areas became the dominant land use form; the city is now expanding in north, northwest, southern and western directions. This change was also partly due to the development of the New Master Plan of Dhaka in 1995. The green and blue cover of the city also declined sharply due to encroachment and urban development[29].

Research conducted in 2022 on "Urban Green-space Availability and Recommended Plantation Area in Dhaka South City Corporation (DSCC) using RS-GIS" made projections on the extent of the sparse and green vegetation in the DSCC area. The comprehensive findings indicate that the study area had 30.97 sq km of sparse vegetation, and 7.93 sq km of dense vegetation, representing 31.2% and 7.99% of the total area, respectively.

Table 2: Land Use Distribution in Dhaka South[30]

Land use category	Year 2022
Waterbodies	11.06%
Built-up areas	47.72%
Sparse vegetation	31.20%
Dense vegetation	7.99%
Bare soil	2.01%

2.8 Strategic Appraisal of City Powers

A rapid strategic appraisal of the administrative processes of Dhaka South for climate action in the city was carried out to understand the relationship among different government bodies engaged in the management of urban services. It was noted that most of the urban services were under the shared control of multiple government agencies. In fact, apart from solid waste management, green area development and the newly added drainage sector, none of the major urban services, including water, waste water, transport, energy, buildings or health services, are managed by the DSCC alone. There are a number of other agencies involved, such as DWASA, which manages water supply and wastewater management; Rajdhani Unnayan Kartripakkha, which looks after building construction and permissions and land-use management; Dhaka Power Distribution Company Limited (DPDC), Sustainable and Renewable Energy Development Authority, and the Bangladesh Power Development Board, which manage energy supply; and the Dhaka Transport Coordination Authority, Bangladesh Road Transport Authority, and the Bangladesh Road Transport Corporation, which manage the city transportation.

28 Sifatul Quader Chowdhury (2012). "Dhanmondi Lake". In Sirajul Islam and Ahmed A. Jamal (ed.)

29 Land Use expansion_https://dwasa.portal.gov.bd/sites/default/files/files/dwasa.portal.gov.bd/page/a7539482_676a_483a_b3d0_06c4a950e016/2021-01-17-16-54-efc40b4e53a82bae3513972a0dbc5c69.pdf

30 Rahman, Syed & Islam, Mahfuzul. (2022). Urban Green-space Availability and Recommended Plantation Area in Dhaka South City Corporation (DSCC) using RS-GIS. 13. 1-12.

Each of these agencies has different levels of authority over these urban services and different levels of technical or financial capacity. An assessment revealed that there are certain opportunities for improving these urban services. The assessment found the most important need to be enhanced coordination among the different agencies, such as the DSCC, DWASA, DPDC and Rajdhani Unnayan Kartripakkha. The section on Governance Structure (section 7.3) outlines a possible way of external coordination and vertical integration among multiple agencies. Another important need for the DSCC is engagement with civil society to garner support for actions it is implementing. This is particularly true for solid waste management and maintenance of drains and open parks, which largely depend on how these facilities are used by the general public. It is important to raise awareness among the public on their role in implementing actions that reduce emissions and enhance urban resilience. The process of engagement with the general public is also outlined in section 7.7. Some of the other actions that are needed is addressing gaps in technical and financial capacity of the agencies so that they can undertake resilience interventions and the enforcement of legal provisions, particularly for land use, transport and waste management in line with local policies and national laws to support resilience interventions in the city. Lastly, since a number of targets and goals identified later on in the CAP is common to Dhaka North and Dhaka South, the DSCC recognises the need for the two corporations to work together to achieve them.

The detailed assessment of the powers of the different government agencies are outlined in Annexure 4.

2.9. Major Urban Sectors

2.9.1. Stromwater Drainage System

The DSCC, along with DWASA, used to be responsible for managing the drainage system in the city. Since 2021, the DSCC is solely responsible for managing the stormwater drainage in the city. It has been working continuously to solve city drainage issues and, as part of that, 1182.16 km[31] drainage areas have been already constructed in the DSCC jurisdiction area. The urban drainage infrastructure consists of storm sewer lines and natural open channels or canals, locally called khals. Wetlands and ponds are also considered to be part of the natural drainage system of the city. Since Dhaka's clay soil composition hampers water's percolation into the ground, the city relies on natural drainage systems and storm sewer lines to efficiently drain stormwater from the city to avoid urban flooding[32]. However, these open channels are often blocked due to the dumping of solid waste, irregular maintenance and encroachments. Similar to the DNCC, the DSCC also has only 40 dedicated staff to manage its drainage system[33]. Heavy rainfall, when coupled with clogged drains, often leads to waterlogging and flooding in the city. The situation of the DSCC is comparatively more challenging than of the DNCC because the DSCC is more urbanised, with inadequate drained areas that are susceptible to waterlogging. Stagnating water may impact the health and well-being of residents and increase the risk of waterborne diseases.

The Madani Jirani, Shyampur, and Kalunagar canals have already been restored and many new pipelines for stormwater drainage systems are being installed.

Issues of Drainage System

- Indiscriminate dumping of solid waste in open spaces and natural drainage resulting in blockages of waterways reduce outflow of water during intense rainfall.
- Urban-rural migration and illegal settlements have led to encroachment of khals resulting in disturbance in the natural flow of stormwater.
- There is risk of mixing of sewage water with drinking water during heavy rain or flooding.
- Clogged drains due to open dumping, irregular cleanup, and unregulated construction activities result in waterlogging and urban flooding during rainfall.

2.9.2. Solid Waste Management

The DSCC is responsible for the overall solid waste management. The DSCC area generates around 3426 TPD municipal waste, with 2021-22 as the base year[34]. With a household waste collection coverage of 90% and collection efficiency of 90%[35], the total

31 Dhaka South City Corporation(DSCC), Engineering department, 2024

32 https://www.researchgate.net/publication/265941623_Readdressing_Dhaka's_Public_Water_Bodies_A_Design_Research_Readdressing_Dhaka's_Public_Water_Bodies_A_Design_Research/download

33 https://openknowledge.worldbank.org/server/api/core/bitstreams/4b511e5c-f20f-550c-902d-b828f8abb4c2/content

34 New Clean Dhaka Master plan (2018-2032)

35 New Clean Dhaka Master Plan (2018-2032) (The target waste collection rate was set as 90% of waste generation compared with % for the current waste collection rate.

MSW collected amounted to 2775 TPD in 2021-22. According to waste composition data from the DSCC, approximately 63% of the MSW is organic. Paper and cardboard account for 10% of the waste stream, inerts 8%, non-recyclables 10%, and plastic waste 2%, while other waste constitute 7% of the MSW. About 4346 cleaners are responsible for cleaning the streets, drains, roads and Secondary Transfer Stations (STS). The DSCC's secondary waste collection vehicles, including compactors, dumper placers, and arm loaders, collect waste from dustbins, containers, and secondary transfer stations and transfer it to the Matuail landfill site.

Households dump their waste in waste collection bins, containers, or STSs. In addition, a door-to-door waste collection system is in place in almost all wards of the DSCC, provided by companies known as Primary Waste Collection Service Providers (PWCSP) or Primary Collection Service Providers (PCSPs). In 2018, around 246 PCSPs – registered and non-registered - operated in the DSCC's area[36]. Waste is collected from households and buildings and disposed of at the Secondary Collection Points (SCPs) of the DSCC.

The PCSPs provide services through 2,450 fieldworkers, including 177 supervisory staff who collect the service charges. Waste is collected by PCSPs in their rickshaw vans and transferred to SCPs - designated spots such as containers, open spots, dustbins, and STSs. There are 502 SCPs identified in the DSCC. Recently constructed STS facilities in the DSCC have conventional and arm-roll containers. Once the containers are filled up, they are transported to the landfill site. The compactors receive waste from PCSPs and businesses and transport it directly for final disposal. Dustbins made of concrete blocks on roadsides are becoming increasingly obsolete, with only 26 functional dustbins in Wards 34, 35, 37, 38, 40, 42, and 50. In addition, there are 206 open spots and 270 containers that are currently functional in the DSCC.[37]

Table 3: Service Level Information – Solid Waste[38]

Indicator	Status
Coverage of solid waste collection	90%
Collection efficiency	90%
Total waste generated	3426 TPD
Extent of scientific disposal of waste	0%
Extent of segregation of waste	0%
No. of PSCPs	246
Waste collection vehicles	248
No. of landfill sites	1

The Matuail Landfill Site (LFS) is the only DSCC-designated landfill and has been operational since 1993[39]. It has been upgraded from an open dumping site to the first sanitary landfill in Bangladesh in 2007. Waste is transported mostly at night, with the busiest time being from 1:00 to 3:00 am[40]. However, the site has reached its capacity and the DSCC needs to look for alternative solutions to their waste issues. Therefore, the DSCC has acquired 81 acres of and is exploring more opportunities to expand the dumpsite under a development project where they want to follow a 'Reduce, Reuse, and Recycle' strategy and turn the existing dumpsite into a public space.

Issues of Solid Waste Management System

- There is a shortage of adequate and sanitary landfill sites to dispose of the increasing amount of solid waste generated by the city.
- The absence of source separation and recycling practices at the household level reduces the potential for resource recovery and waste minimisation.

[36] New Clean Dhaka Master plan (2018-2032) https://dscc.gov.bd/site/page/be1006a3-bd04-4af1-9488-9aa733bc6b70/-

[37] New Clean Dhaka Master plan (2018-2032) https://dscc.gov.bd/site/page/be1006a3-bd04-4af1-9488-9aa733bc6b70/-

[38] New Clean Dhaka Master plan (2018-2032)

[39] New Clean Dhaka Master plan (2018-2032)

[40] New Clean Dhaka Master plan (2018-2032)

- Huge potential in organic waste processing is yet to be tapped.
- Poor public awareness and participation in waste management issues leads to improper disposal, non-payment for services, lack of waste reduction, reuse, and recycling.

2.9.3. Health System

The DSCC's health systems play a crucial role in ensuring the well-being of its residents, as in the case in any major urban area. The DSCC has implemented several initiatives to address the people's healthcare needs, with a focus on improving accessibility, quality, and overall health outcomes.

There are 193 clinics, hospitals and healthcare services operating inside the DSCC[41]. The corporation is responsible for administering and providing basic infrastructure and services to the city, including health services. The DSCC operates 41 health facilities, including four hospitals, 16 maternity centres, 18 primary healthcare centres, and three specialised clinics[42]. The DSCC provides mobile healthcare services, school healthcare services, and community healthcare services through its health department and partner NGOs. It also collaborates with the Ministry of Health and Family Welfare, the Directorate General of Health Services, and other stakeholders to implement various health programmes and projects in the city.

According to the Urban Health Atlas, there were 1,047 health facilities in the DSCC, of which 36% were public, 59% private, and 5% NGO-run[43]. The total number of hospital beds in DSCC was 14,539, of which 46% were public, 51% private, and 3% NGO-run[44]. The bed-population ratio in the DSCC was 1.9 per 1000 population, which was lower than the national average of 2.3 per 1000 population[45]. There were 8,527 health workers in the DSCC area, of which 29% were doctors, 24% nurses, 11% paramedics, and 36% other health staff. The doctor-population ratio in DSCC was 0.3 per 1000 population, which was higher than the national average of 0.2 per 1000 population. The nurse-population ratio in DSCC was 0.2 per 1000 population, which was lower than the national average of 0.3 per 1000 population[46].

According to the urban health and demographic surveillance system (urban HDSS), a population-based cohort that monitors the primary healthcare services provided by non-government organisations and urban local bodies in selected slums of the DSCC, the crude birth rate in the slums was 18.9 per 1000 population, the crude death rate was 5.3 per 1000 population, and the infant mortality rate was 37.4 per 1000 live births in 2019[47].

The DSCC is also responsible for vector control activities, control of stray animals, registration of birth and death, routine immunisation, food testing, sanitation and veterinary services.[48]

Key Challenges of Health Sector

- Inadequate and unequal distribution of health facilities, services, and resources across the city, especially in the low-income and slum areas.
- Low quality and efficiency of health services, due to lack of equipment, supplies, staff, training, and supervision.
- High demand and low supply of health services, due to rapid population growth, urbanisation, and migration.
- High burden of disease, due to poor environmental and social determinants of health, such as water, sanitation, hygiene, nutrition, education, and gender.
- Limited coordination and collaboration among the different actors and stakeholders of the health sector, such as the government, the private sector, the NGOs, and the communities.
- Lack of data and information on the health status, needs, and preferences of the urban population, especially the urban poor.

---

41 https://dscc.gov.bd/site/page/c6818c61-93b4-4b91-97c9-ab814113a88b/-

42 https://mapcarta.com/W263621076

43 http://urbanhealthatlas.dghs.gov.bd/

44 http://urbanhealthatlas.dghs.gov.bd/

45 http://urbanhealthatlas.dghs.gov.bd/

46 http://urbanhealthatlas.dghs.gov.bd/

47 https://www.icddrb.org/research/platforms/health-and-demographic-surveillance-systems-hdss

48 https://dscc.gov.bd/site/page/7370d31c-77a2-4369-8d94-fe1f86004c96/%E0%A6%B8%E0%A7%8D%E0%A6%AC%E0%A6%BE%E0%A6%B8%E0%A7%8D%E0%A6%A5%E0%A7%8D%E0%A6%AF-%E0%A6%AC%E0%A6%BF%E0%A6%AD%E0%A6%BE%E0%A6%97

2.9.4. Water Supply System

The Dhaka Water Supply & Sewerage Authority (DWASA) provides water supply and sewerage services in Dhaka City, covering over 401 sq. km of the service area, having with around 12.5 million people[49].

Dhaka City heavily relies on groundwater extraction to meet its water supply needs. Over 78%[50] of the supplied water comes from groundwater extraction, while 22% comes from surface water sources such as rivers. The groundwater recharge process in Dhaka is complex due to the relationship between urbanisation and subsurface flow dynamics and surface/subsurface characteristics (geology, soil, vegetation, topography). This extensive reliance on groundwater extraction has resulted in a high rate of depletion of the groundwater table. The daily water demand of the city is estimated to be around 350 crore litres by 2023[51]. The water demand in Dhaka City is 2.25 million cubic meters per day (2250 MLD), which is just a little bit over the current supply of around 2.11 million cubic meters per day (2110 MLD)[52].

Ground Water

Data from the Bangladesh Water Development Board (BWDB) water -level monitoring stations reveals that the highest groundwater water level within the city is at a depth of 78 metres below the ground surface. Dhaka City lies under the Madhupur tract and most of the groundwater water for domestic and agricultural purposes is from the Dupi Tila aquifer. It contains less than 350 mg/l total dissolved solids and is oxygenated, resulting in a mildly acidic pH. These baseline groundwater conditions in the Dupi Tila aquifer have since been altered by the influence of recharge modification, which raised the concentrations of chloride, nitrate, and sulfate, the primary inorganic indicators of urban contamination.[53]

Currently, 906[54] deep tube wells are owned by Dhaka WASA,. Seventy-eight percent[55] of the water needed comes from groundwater extraction, which is significantly reliant on this source, which accelerates the groundwater table's rapid depletion at about 2/3 m/year[56] in central Dhaka. Therefore, the groundwater aquifers are no longer sustainable in the long term. The identification and utilisation of alternative sources to groundwater is essential to meet the water demand of Dhaka City. A project is being carried out by DWASA, which will bring 300 MLD of groundwater in two phases from a thriving field in Savar and Singair Upazilla.[57]

Surface Water

About 10-15% of Dhaka city's land comprises several rivers, canals and lakes. Significant surface water bodies of Dhaka city are Buriganga, Turag, Balu, Tongi Khal, Dhanmondi lake, Ramna Park Lake, Gulshan Lake and Crescent Lake, etc. Treatment of surface water provides about 22% of the total water demand.[58] Higher rates of encroachment, unlawful habitation, and urbanisation have reduced the volume and number of surface water bodies around the city that are aggravating the problem at the moment.[59]

Water Treatment Plant

Surface water is supplied by treating water of the rivers Shitalakshya and Buriganga through water treatment plants. There are 4 four water treatment plants in Dhaka city (both in the DNCC and the DSCC). Among them, the Saidabad Water treatment plant has the highest capacity, treating of 450 MLD to treat water.[60] The Godnail treatment plant has a capacity of 45 MLD, Sonakanda has capacity of 12 MLD and Chandnighat treatment has capacity of 39 MLD.[61] The Saidabad and Chandnighat plants are, fall under in the DSCC boundary and provide water to its residents.

---

49 http://dwasa.portal.gov.bd/sites/default/files/files/dwasa.portal.gov.bd/page/c0a3b947_9ad9_429a_8a3f_e320e33fea06/2021-01-17-16-51-f23ad05cc0f676fe25cca345e2def230.pdf

50 https://www.researchgate.net/publication/348752376_Analysis_of_Groundwater_Level_Fluctuations_in_Dhaka_City/link/607844c08ea909241efeaa67/download

51 https://www.researchgate.net/publication/348752376_Analysis_of_Groundwater_Level_Fluctuations_in_Dhaka_City/link/607844c08ea909241efeaa67/download

52 http://app.dwasa.org.bd/admin/news/Dhaka%20WASA%20Article-for%20BOOK.pdf

53 https://media.neliti.com/media/publications/429254-none-060a06a0.pdf

54 DWASA report 2020-21

55 https://www.researchgate.net/publication/348752376_Analysis_of_Groundwater_Level_Fluctuations_in_Dhaka_City

56 https://www.researchgate.net/publication/348752376_Analysis_of_Groundwater_Level_Fluctuations_in_Dhaka_City

57 Water Supply master plan for Dhaka City- https://dwasa.portal.gov.bd/sites/default/files/files/dwasa.portal.gov.bd/page/c0a3b947_9ad9_429a_8a3f_e320e33fea06/Water%20Master%20Plan.pdf

58 IBID

59 https://www.academia.edu/16645261/Water_Supply_System_at_Dhaka_city_Bangladesh

60 http://www.jwrc-net.or.jp/aswin/en/newtap/report/NewTap_037.pdf

61 Water supply master plan for Dhaka city

Additionally, an initiative has been taken to construct three more large water treatment plants are being constructed. The first one is at Gandharpur, which will treat 500 MLD water from the Meghna River. The second is Padma water treatment plant (Phase 1) at Josholdia which will collect and treat 450 MLD water from Padma River.[62] The third is Saidabad Water Treatment Plant (Phase-III) Project. Out of these three, Josholdia surface water treatment project was completed in 2019 and is supplying treated water to the western and north-western parts of Dhaka city dwellers.

Water distribution

The present water distribution network is inappropriate by problems such as due to illegal connections, pilferage, and poor construction material. The DWASA covers a large area of 401 sq. km. with and a population of 12.5 million people.[63] The District Metered Area (DMA) program had been planned to revive and replace the existing distribution network in 2007. It was designed to be a 24-hour pressurised system that would source water from local Deep Tube Wells (DTWs) and Surface Water Treatment Plants (SWTPs) i.e. conjunctive usage. DWASA started establishing DMAs in six zones, with a target of setting up about 145 DMAs and reducing NRW (non-revenue water) from 30% to 15%.[64] Among 145 DMAs, 78 DMAs[65] had been completed, as of 2022.

Table 4: Service Level Information – Water Supply[66]

Indicator	Status
Percentage of population coverage of water supply	70%[67]
Per capita supply	150 lpcd (Recommended by DWASA)
Extent of metering of water connection	100%
Current Supply of Water	2.11 MLD
Current Demand of Water	2.25 MLD
Share of groundwater and surface water in total supply	Groundwater – 78% Surface water – 22%
Water Treatment Plant Capacity	Saidabad Water treatment plant - 450 MLD

Key Challenges of the Water Sector

- Dhaka faces a significant influx of low-income migrants, leading to an unplanned growth and a rising demand for water[68].
- The current supply of 2.11 million cubic meters of water per day falls short of the total demand of 2.25 million cubic meters per day.
- To ensure ecological viability, DWASA needs to switch to using surface water and recharge the groundwater aquifer through rainwater harvesting[69]. Its current 10- year plan of DWASA to transport less polluted river waters over long distances is not viable because of the energy required for the purpose.

2.9.5. Waste Water System

The Dhaka South City Corporation faces significant challenges in wastewater management due to its high population density, insufficient infrastructure and substantial slum population. As a consequence of these limitations, untreated domestic sewage and industrial effluents are frequently discharged into rivers and canals, resulting in severe pollution and contributing to flooding. The existing sewer treatment plant is operating at a significantly reduced capacity due to damaged and clogged sewer lines.

DWASA operates the Pagla Sewage Treatment Plant (PSTP) in Dhaka City. It treats wastewater from the central sewerage system in the Dhaka South City Corporation area. The plant has been serving since 1978 and has a design capacity of 96 MLD for average flow rate and 120 MLD for peak flow rate[70].

62 DWASA annual Report 2018-2019
63 http://dwasa.portal.gov.bd/sites/default/files/files/dwasa.portal.gov.bd/page/c0a3b947_9ad9_429a_8a3f_e320e33fea06/2021-01-17-16-51-f23ad05cc0f676fe25cca345e2def230.pdf Water supply master plan for Dhaka city
64 Water supply master plan for Dhaka city
65 Introducing Model District Metered Areas (DMAs) to Improve Operational Excellence in Dhaka WASA
66 DWASA annual Report 2018-2019
67 Stormwater Drainage Master Plan for Dhaka City
68 Dhaka Wasa: Performance and challenges- https://www.thedailystar.net/news-detail-230659
69 Dhaka Wasa: Performance and challenges- https://www.thedailystar.net/news-detail-230659
70 Preparation of the Stormwater Drainage Master Plan for Dhaka City,2016

Although its design capacity is 96 MLD, however, due to damage in trunk sewer lines, the actual wastewater entering the Pagla STP is less than 40 MLD[71]. Thus, only 7.5% of the wastewater gets treated, while 24.5% of the wastewater gets collected through the piped sewers but does not get treated[72]. In the absence of an adequate wastewater treatment, 73% of the wastewater flows through stagnant sewers which can either be direct discharge (21%) into the stormwater drainage network or indirect discharge from a septic tank connected to the stormwater drainage network (52%)[73]. These stagnant sewers have eventual outfalls at various places within and outside the city. 2% of the wastewater is discharged into isolated septic tanks.

Issues of Waste Water System

- Lack of 100% coverage by the centralised sewer system, with majority of the wastewater being discharged into the open without any treatment
- Existing sewer lines are heavily damaged and requires repair
- The lifting stations have insufficient capacity for future needs and require augmentation
- Lack of sufficient operations and maintenance capability
- Limited septic tank sludge management facilities, with heavy dependence on manual cleaning
- Infiltration of rainwater during monsoon leading to sedimentation thereby, decreasing flow rate

Table 5: Service Level Information – Wastewater[74]

Indicator	Status
Length of Sewer line	882 km
Sewer lift station	27
Sewer Treatment Plant (STP)	1
On site sanitation	80%
Coverage under sewerage network	47% of area
Percentage of HH using on site sanitation	54%
Percentage of sewage safely managed	0%

2.9.6 Transportation

The Dhaka Transportation and Coordination Authority (DTCA) is responsible for public transportation in the Dhaka South City Corporation. The government-owned Bangladesh Road Transport Corporation (BRTC) operates the bus system, while water transportation in Dhaka City is managed by the Bangladesh Inland Water Transportation Authority (BIWTA) and the Bangladesh Inland Water Transportation Corporation (BIWTC). Millions of people commute daily using various modes of transportation, including buses, rickshaws, private cars, motorcycles, CNG, and ferries.

Road Network

Buses travelling to and from the eastern region of Bangladesh, which includes Sylhet and Chittagong Division, usually stop at Saidabad Bus Terminal. Additionally, Gulisthan, Jatrabari areas are crucial connecting points in the South region. The Dhaka South City Corporation (DSCC) has three flyovers, with the Mayor Mohammad Hanif Flyover being the most prominent one. It spans 11.7 kilometers and connects Jatrabari to Gulistan, providing a crucial route for traffic movement. The flyover also serves as a connector to the Central Business District (Motijheel area) and suburban area (Narayanganj area).[75]

Rail network

The main point of rail connectivity, Kamalapur Railway Station, is located in the exact centre of the Dhaka Metropolitan Area. This is the beginning and end of every train route.

Water transportation

Sadarghat River Terminal is one of the biggest interregional river ports in Bangladesh catering to launches, steamers and boats. On an average, there are around 300[76] large and small passenger river boats (powered) departing daily serving about 50,000[77] passengers that travel outside the city boundary. This terminal also manages a significant amount of freight movement that is transboundary.

---

71 Preparation of the Stormwater Drainage Master Plan for Dhaka City,2016

72 Preparation of the Stormwater Drainage Master Plan for Dhaka City,2016

73 Preparation of the Stormwater Drainage Master Plan for Dhaka City,2016

74 Preparation of the Stormwater Drainage Master Plan for Dhaka City,2016

75 https://www.researchgate.net/publication/326624055_Performance_Evaluation_of_Jatrabari-Gulistan_Flyover_Mayor_Mohammad_Hanif_Flyover

76 https://www.unescap.org/sites/default/files/SUTI%20Mobility%20Assessment%20Report%20-%20Dhaka.pdf

77 https://www.unescap.org/sites/default/files/SUTI%20Mobility%20Assessment%20Report%20-%20Dhaka.pdf

Public transport

The most commonly used means of transportation is the cycle rickshaw, very useful in the narrow lanes of the city and for short distances. According to the UNESCAP report on Sustainable Transportation Index for Dhaka, Bangladesh in 2018, 38%[78] of commuters used rickshaws, followed by public buses, walking, and auto rickshaws.

Buses and auto rickshaws, often known as CNGs, are typically utilised for more extended trips, while rickshaws are frequently employed for small distances. Young commuters and students find bus travel convenient, primarily because of the reasonable costs and accessibility. Some of these buses even give university and college students special discounts. According to the Bangladesh Road Transport Authority (BRTA), in DSCC jurisdiction there are around 2233 buses and 14946 private cars. Horse-drawn carriages, known as tomtom, are still used in the old part of the city. On the Sadarghat-Gulistan route, more than 30[79] tom-toms operate, while 40 operate in the Banga Bazar, Bakshibazar and Keraniganj areas.

Dhaka Metro Mass Rapid Transit (MRT) is a new metro rail system developed by the Dhaka Mass Transit Company (DMTC) in Dhaka, Bangladesh. MRT Lines 1, 2, 4, 5, and 6 have been suggested for the project. The first segment of the line, a 12-kilometer railway connecting Diabari and Agargaon, was put into service in January 2023. The extension from Kamalapur to Motijheel, which makes up phase three of Line 6, is scheduled to open in 2025. The planned Line 1 and the capital's railway station will be connected to the extension.[80]

Key Challenges of Transport Sector

- Illegal vehicle parking
- Illegal commercial encroachment on the road
- Heavy traffic congestion in some particular areas of Dhaka South City Corporation
- Footpaths are mostly occupied by temporary hawkers illegally, forcing people to walk on the roads and slowing traffic
- Poor coordination among different government agencies and City Corporation, limiting sustainable traffic solutions

2.9.7. Energy

The main sources of energy consumption in Dhaka South are electricity, natural gas, diesel, petrol, Liquefied petroleum gas (LPG) and wood/wood waste. Electricity generation is the responsibility of Bangladesh Power Development Board (BPDB) and is supplied by Dhaka Power Distribution Company (DPDC). Electricity related policies are framed by the Power Division of the Ministry of Power, Energy and Mineral Resources, Government of Bangladesh. Natural gas is supplied by Titas Gas Transmission and Distribution Company, as piped natural gas (PNG) to the stationary sector and compressed natural gas (CNG) to the transport sector. It is regulated by the Bangladesh Petroleum Corporation (BPC). Diesel and petrol are supplied by Jamuna Oil Company Ltd, Padma Oil Company Ltd and Meghna Petroleum Limited, which are owned and regulated by the BPC. LPG is supplied by different private sector companies and regulated by the Energy and Mineral Resources Division of the national Ministry of Power, Energy and Mineral Resources, Government of Bangladesh. Wood/wood waste is locally sourced, mainly by the low-income groups and communities for cooking.

The total energy consumption of Dhaka South[81] is split across the stationary, accounting 77% and the transport sector, which has a share of 23%. The stationary sector energy consumption is driven by energy consumption in the residential sub sector, which accounts for 72% of total stationary energy consumption. It is followed by industrial, commercial/institutional, and non-specified sub sectors, accounting for 15%, 11% and 2% of total stationary energy consumption respectively. Natural gas and electricity account for the highest energy consumption in Dhaka South. The total electricity consumption in Dhaka south is 3,125 million kWh, of which residential sub-sector accounts for 50% of the total electricity consumption, followed by commercial/institutional sub-sector (23%), industrial sub-sector (22%) and non-specified sub-sector (5%). The total natural gas consumption in Dhaka South is 507 million

78 https://www.unescap.org/sites/default/files/16.%20Urban%20transport%20in%20Dhaka%20-%20Mr.Noor-e%20Alam.pdf

79 https://www.tbsnews.net/features/panorama/tomtoms-tradition-riding-cruelty-383188

80 https://www.railway-technology.com/projects/dhaka-metro-mass-rapid-transit-system/

81 Includes losses during storage, transmission and distribution from electricity and natural gas supply.

cubic meters of residential sub-sector accounts for 62% of the total consumption, followed by transport sector (20%), industrial sub-sector (16%), and commercial/ institutional sub-sector (2%)

Issues of Energy Sector

- The present electricity supply is inadequate to meet demand, resulting in frequent power outages. Rapid urbanisation and economic growth will increase the demand for electricity in the city, thereby further stressing the infrastructure. Generating electricity from renewable energy sources could be an option but till date the penetration of such initiatives have been lacking.
- The electricity supply issues are coupled with a general lack of penetration of energy efficiency measures.
- Dhaka South heavily relies on PNG for cooking. In recent years, backed by national policies, LPG is emerging as a primary cooking fuel, thereby, further increasing the city's dependence on conventional fuels.

Up to 35% of Bangladesh's economy is based in Dhaka, the nation's capital and the financial, commercial, and entertainment hub of the nation. The city is currently one of Bangladesh's most densely populated areas. In Bangladesh, where the GDP is growing steadily at a rate of about 7.1%[82] power demand is rising. The Government of Bangladesh (GoB), as outlined in its "Vision 2041," aims to address the existing demand gap by fulfilling new demands through the implementation of a 5-year Power Sector Master Plan. The overall goal is to achieve 100% electrification, and ensure a balance between transmission and distribution. Moreover, the current vision places a strong emphasis on increasing private sector participation in power generation, transmission and distribution

2.10. Climate

Dhaka has a tropical climate characterised by distinct monsoon patterns. The city typically has a dry period extending from November to March, followed by a rainy season from May to October. The average yearly temperature is 25°C[83] and the average annual rainfall is 2,000 mm[84], the majority of which falls between May and September.

Certain areas under the administration of the DSCC are currently regularly facing heatwave conditions. These areas are wards 1, 3, 14, 15, 19, 20, 55-57, 63, 64, 67-70, and 74. Meanwhile, urban flooding is a major concern in wards 52, 53, 60, 61, 62, 65-68, and 75.

2.10.1 Temperature

Dhaka City (including Dhaka North and Dhaka South) experiences some of the highest temperatures in the country. The city typically sees a maximum average temperature of around 34°C in the month of April, while in January, the temperatures drop significantly, with an average maximum of around 25°C[85] (observable climate data from 1988 to 2018). In the winter season, the city experiences an average minimum temperature of 11 to 12°C[86].

82 https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG?locations=BD

83 Climate Change Implication of Dhaka City: A need for immediate measures to reduce the vulnerability

84 https://www.researchgate.net/publication/251165788_Climate_Change_Implications_for_Dhaka_City_A_Need_for_Immediate_Measures_to_Reduce_Vulnerability

85 https://www.researchgate.net/publication/353495426_Effects_of_Global_Emission_of_Greenhouse_Gases-CO2_N2O_and_CH4_on_Climate_Change_of_Dhaka_City

86 https://www.climatestotravel.com/climate/bangladesh/dhaka

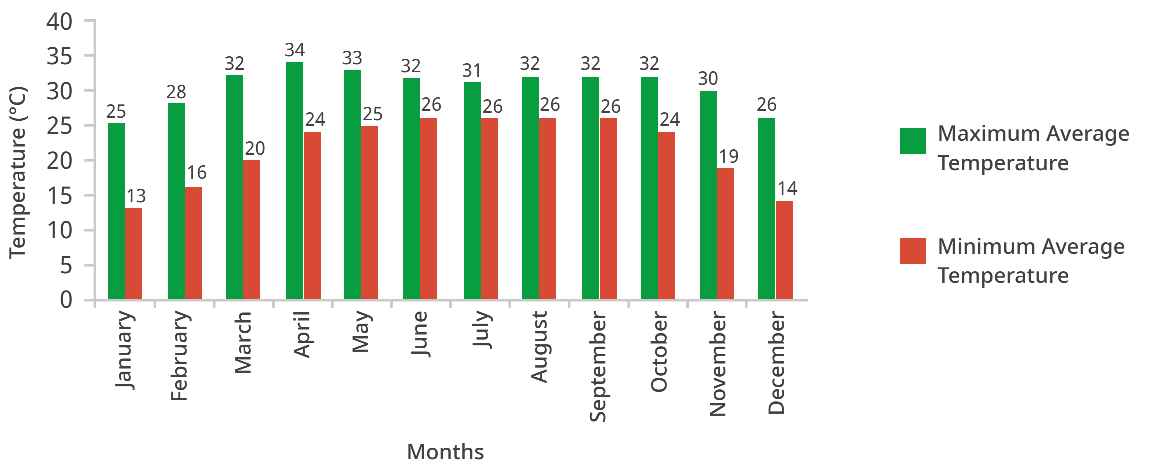


Figure 6: Maximum and Minimum Average Temperature of Dhaka City During the Span 1988 to 2018[87]

2.10.2 Rainfall Trend

Dhaka city receives the highest amount of rainfall in August (average rainfall of 338 mm)[88]. December and January are the driest months, with an average rainfall of 5 mm and 8 mm,[89] respectively.

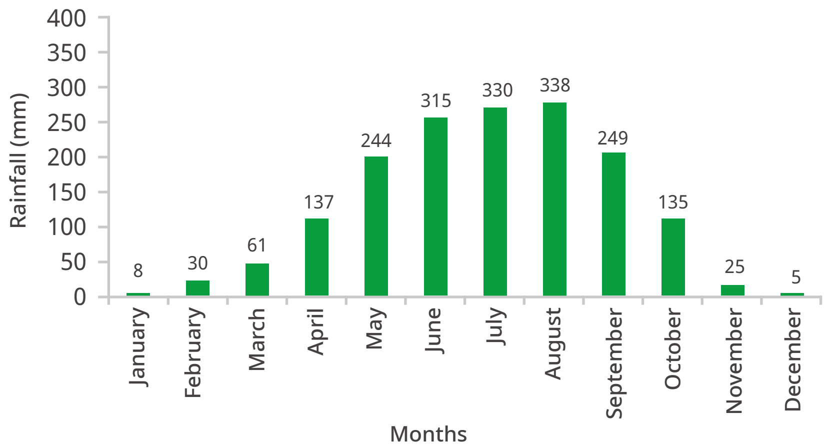


Figure 7: Average Rainfall (mm) in Dhaka City (1988 to 2018)[90]

[87] https://www.researchgate.net/publication/353495426_Effects_of_Global_Emission_of_Greenhouse_Gases-CO2_N2O_and_CH4_on_Climate_Change_of_Dhaka_City

[88] https://www.researchgate.net/publication/353495426_Effects_of_Global_Emission_of_Greenhouse_Gases-CO2_N2O_and_CH4_on_Climate_Change_of_Dhaka_City

[89] https://www.researchgate.net/publication/353495426_Effects_of_Global_Emission_of_Greenhouse_Gases-CO2_N2O_and_CH4_on_Climate_Change_of_Dhaka_City

[90] https://www.researchgate.net/publication/353495426_Effects_of_Global_Emission_of_Greenhouse_Gases-CO2_N2O_and_CH4_on_Climate_Change_of_Dhaka_City

3. Climate Change Risk Assessment (CCRA)

3.1. Past Hazards and Climate Events

The DSCC has been affected by climate change, leading to observable changes in temperature and rainfall patterns. A **rise in average temperature and increasingly erratic rainfall** are two major observed climate risks for the city, and the main reason behind heat stress and urban flooding in the city.

The DSCC is prone to **severe heat stress, fire hazards, urban flooding caused by river flooding and heavy rainfall and cyclones and storm surges**. The city's susceptibility to flooding is exacerbated by erratic rainfall patterns and its low-lying terrain. Table 6 provides an overview of the probability, frequency, intensity, and magnitude of these hazards. Since disaggregated data in terms of Dhaka North and Dhaka South particularly with regard to information on impacts of climate change events was not readily available, in most cases, city specific information is used for the assessment. However, this assessment is enough to understand the risks faced by the DSCC and their impacts on the population.

A brief overview of the likelihood, frequency, intensity and scale of the hazards are presented in Table 6:

Table 6: Overview of Hazardous Events in the Dhaka city (including DNCC and DSCC)

Hazard	Likelihood of occurrence	Frequency	Intensity/ Impact	Scale
Heat Waves	High (In case of increase of global temperature up to 2°C)[91]	Medium (Occurs every one to two years)[92]	High (In case of increase of global temperature up to 2°C)[93]	City Wide
Urban Flooding	High (Flood risk may increase 18-65% in 2050 without intervention[94])	High (occurs every year)	High (The elevation of Dhaka South is lower than the DNCC, and there is greater risk of flooding and waterlogging impacts.	Primarily low-lying areas of the city[95]
Cyclones	High[96]	High (Occurs every year, sometimes multiple times)	Low[97] as Dhaka is not a coastal city. However, this risk is likely to increase as per the Delta Plan 2100.	City Wide

Table 7 illustrates the consequences of some of the recorded climate-induced hazards on the city. It enables a better understanding of how climate hazards may impact the development sector, city areas, and the population.

Table 7: Past Hazardous Event and their Impact on Dhaka City

Past Hazardous Event	Year	Impacted Sectors	Impacted Area	Affected Population
Flooding and waterlogging[97]	1988	• Drainage system • Solid waste management system • Water supply.	85% of Dhaka city was impacted.[98]	Residents, slum population, children, Women
Flooding and waterlogging[99]	1998	• Drainage • Solid waste management • Water supply system	56% of Dhaka was inundated. Most of the city's eastern portion suffered from river flooding, and 23 % of its western part was affected by urban flooding	Residents, slum population, women

91 https://www.theweek.in/news/india/2023/05/17/heatwaves-in-india-to-get-more-frequent-and-longer.html

92 https://apnews.com/article/climate-change-heat-wave-south-asia-india-bangladesh-laos-thailand-9343bb3fafbbd1ca737129d43a2574f6

93 https://www.researchgate.net/publication/319877184_Future_developments_in_Bangladesh_urbanisation_scenarios_to_assess_flood_risk

94 https://www.researchgate.net/publication/319877184_Future_developments_in_Bangladesh_urbanisation_scenarios_to_assess_flood_risk

95 https://nhess.copernicus.org/articles/21/1313/2021/nhess-21-1313-2021.pdf

96 Saha, Manik & Khan, Niaz. (2014). Changing Profile of Cyclones in the Context of Climate Change and Adaptation Strategies in Bangladesh. Journal of Bangladesh Institute of Planners. 63-78.

97 https://documents1.worldbank.org/curated/en/683381468001782892/pdf/100228-PUB-REVISED-Box393232B-PUBLIC-PUBDATE-10-26-15-DOI-10-15969781464807107-EPI-1464807108.pdf

98 https://documents1.worldbank.org/curated/en/683381468001782892/pdf/100228-PUB-REVISED-Box393232B-PUBLIC-PUBDATE-10-26-15-DOI-10-15969781464807107-EPI-1464807108.pdf

99 https://documents1.worldbank.org/curated/en/683381468001782892/pdf/100228-PUB-REVISED-Box393232B-PUBLIC-PUBDATE-10-26-15-DOI-10-15969781464807107-EPI-1464807108.pdf

Past Hazardous Event	Year	Impacted Sectors	Impacted Area	Affected Population
Flooding and waterlogging[100]	2004	• Water pipelines were damaged • Drainage system was impacted	More than 5 million people— two-fifths of city residents—were affected. Out of the city's 22 thanas (subdistricts), 18 were inundated. Gulshan, Banani, Baridhara, and Nikunja experienced prolonged inundation, while the Motijheel commercial area, including Arambagh and Gopibagh, was underwater for a few days as a result of drainage congestion	Residents, slum population
Flooding and waterlogging	2009	• Drainage • Solid waste systems		Residents, slum population, Children, Women
Flooding due to heavy rain triggered by cyclone	2020	• Power supply	Washed away 7.5 km of embankments[101]	Residents, slum population, children, women
Flooding due to heavy rain triggered by cyclone	2022	• Power supply	9 people killed in Bangladesh. Dhaka is severely impacted due to heavy rain[102]	Residents, slum population, children, women
Heat stress/ heat waves	2003	• Transportation System • Water • Economy	62 people died due to the heat wave in Bangladesh, with feel-like temperatures reaching 40°C because of humidity of 50%.[103]	Residents, slum population, children, women, rickshaw pullers/ van puller, construction workers, agricultural labourers
Heat stress/ waves	2005	• Transportation system • Economy	The heat wave swept over Dhaka, Khulna, Rajshahi and Chittagong, claiming nearly 100 lives. The temperature reached 40°C.[104]	Residents, rickshaw pullers, van pullers, street hawkers, construction workers, agriculture labourers
Heat stress/wave	2023	• Agriculture • Water	Dhaka saw 40°C temperature in the month of April 2023.[105]	Residents, rickshaw pullers, van pullers, street hawkers, construction workers, agriculture labourers
Cyclone Sidr	2007	• Transportation • Power supply	Severe winds and flooding. Killed around 3000 people in different parts of Bangladesh. Dhaka city saw heavy rainfall.[106]	Residents, rickshaw pullers, van pullers, street hawkers,
Cyclone Roanu	2016	• Transportation • Power supply	Heavy rain in Dhaka city, 24 people killed in different part of Bangladesh. Dhaka city saw heavy rainfall and waterlogging.[107]	Residents, rickshaw pullers, van pullers, street hawkers,
Cyclone Sitrang	2022	• Transportation • Power	9 people died in Dhaka, Khulna and Barisal.[108]	Residents, farmers.

100 https://documents1.worldbank.org/curated/en/683381468001782892/pdf/100228-PUB-REVISED-Box393232B-PUBLIC-PUBDATE-10-26-15-DOI-10-15969781464807107-EPI-1464807108.pdf

101 https://www.sciencedirect.com/science/article/abs/pii/S2212420921001138

102 https://www.aljazeera.com/news/2022/10/25/bangladesh-cyclone-sitrang-bhola-coast

103 Feasibility Study of Heat Wave in Dhaka- Bangladesh Red Crescent Society- 2021

104 http://ikcest-drr.osgeo.cn/static/upload/2b/2b66a81c-366e-11ea-9a1b-00163e0618d6.pdf

105 http://ikcest-drr.osgeo.cn/static/upload/2b/2b66a81c-366e-11ea-9a1b-00163e0618d6.pdf

106 https://www.theweathernetwork.com/en/news/weather/severe/this-day-in-weather-history-november-15-2007-bangladesh-beaten-down-by-sidr

107 https://www.news18.com/news/world/24-killed-as-cyclone-roanu-hits-bangladesh-lakhs-evacuated-1246444.html

108 https://www.aljazeera.com/news/2022/10/25/bangladesh-cyclone-sitrang-bhola-coast

3.2. Climate Scenario in the City

The Climate Change Risk Assessment (CCRA) report for the DSCC consists of secondary information to evaluate climate risks, with a particular focus on climate trends and projection analysis for Dhaka City, encompassing both Dhaka South and Dhaka North. Due to the unavailability of city-level climate risk projection data and information, country-level projections for the region were used to understand the projected risks for Dhaka City. To support the assessment of climate change impacts on Dhaka City, encompassing both Dhaka North and Dhaka South, three key documents were consulted: the National Adaptation Plan for Bangladesh (2023-2050), the Bangladesh Delta Plan for 2100, and a Climate Change Information fact sheet specific to Bangladesh. While the report provides a comprehensive analysis **(Annexure 5)**, a brief outline of the climate trends and projections is given in this section for Dhaka.

3.2.1 Trend Analysis

Temperature

- Dhaka City typically sees a maximum average temperature of around 34°C in April while in January, the temperatures drop significantly, with an average maximum temperature of around 25°C (observable climate data from between 1988 and 2018). In the winter season, the city experiences an average minimum temperature of 11°C to 12°C[109].
- Between the years 1980 and 2008, Dhaka city experienced a noticeable rise in average temperatures, particularly between March and November. Additionally, a significant and rapid increase in temperature occurred explicitly between 2005 and 2009, at a rate of approximately 0.11°C per year[110].

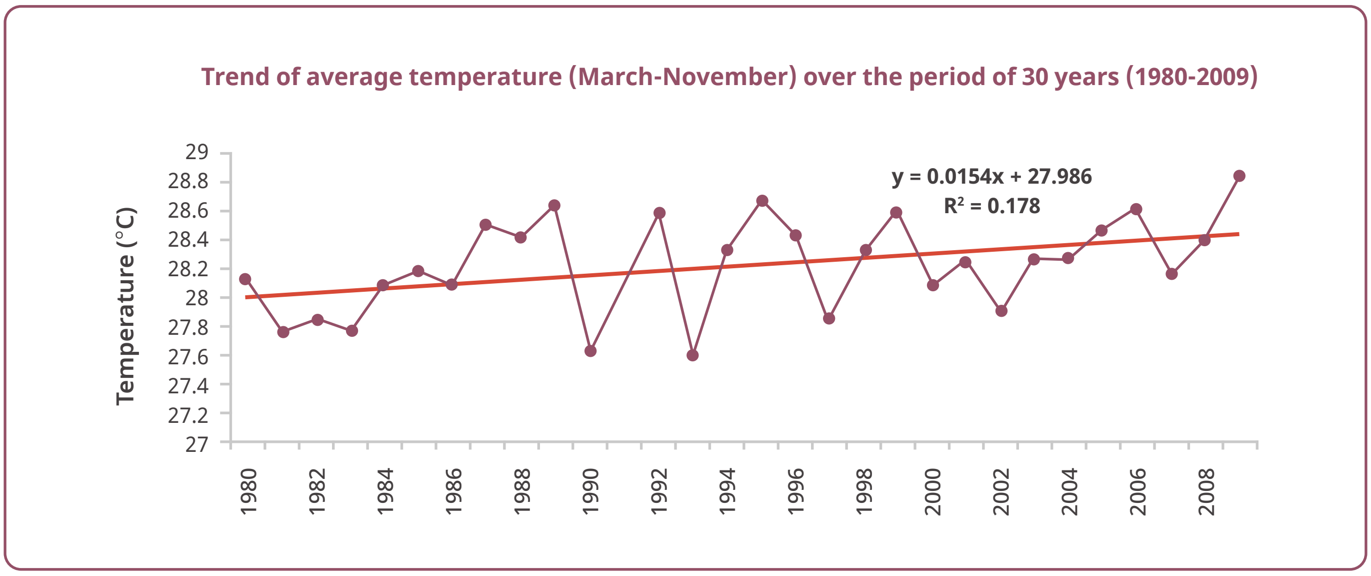


***Figure 8:** Trend of Average Temperature of Dhaka City (March to November) over 30 Years[110]*

- A comparative study of the temperatures of Dhaka city and its less populated and neighbouring built-up city (Tangail) reveals that Dhaka experienced a significant rise in its minimum temperature between 1988 and 2012[111], compared to other cities in the region. This indicates an increasing heat island effect within Dhaka City.

109 https://www.climatestotravel.com/climate/bangladesh/dhaka

110 Climate Change Implication of Dhaka City: A need for immediate measures to reduce the vulnerability

111 Shahid, Shamsuddin & Wang, Xiaojun & Minhans, Anil & Harun, Sobri & Shamsudin, Supiah & Ismail, Tarmizi. (2015). Climate variability and changes in the major cities of Bangladesh: observations, possible impacts and adaptation. Regional Environmental Change. 16. 10.1007/s10113-015-0757-6.

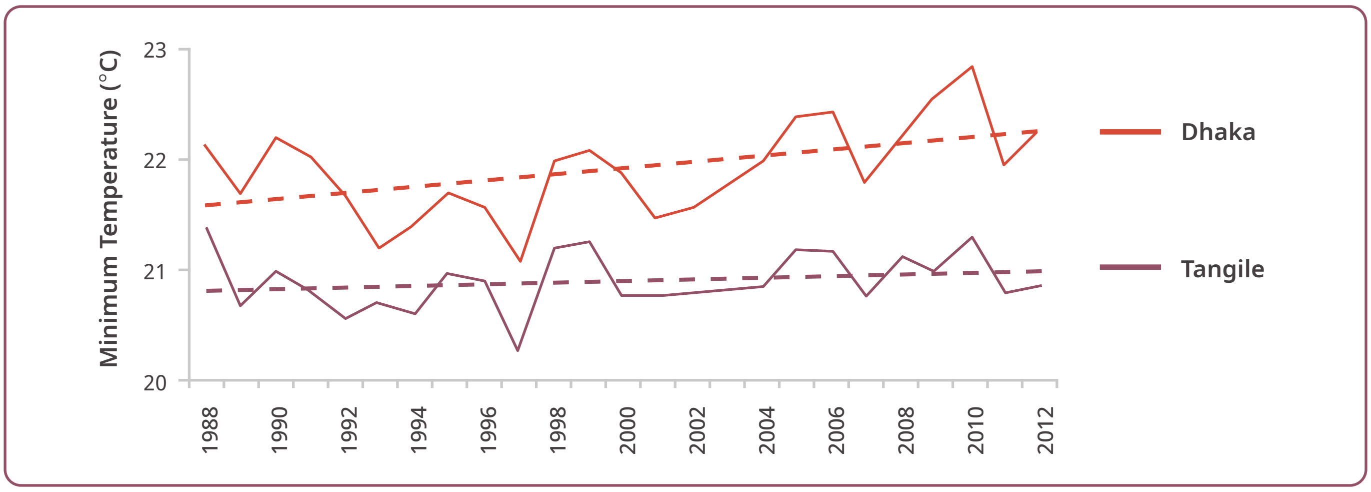


***Figure 9:** Comparison of Minimum Temperature between Dhaka and Tangile city*[112]

A comprehensive heat exposure map for DSCC was prepared by evaluating the Land Surface Temperature (LST) using Landsat 8 imagery for March from 2018 to 2022. The mean land surface temperature analysis shows that 57.6% of the DSCC area (57 sq km) has hotspots. High mean surface temperatures exceeding 36°C are evident in ward 63, attributed to the presence of landfill and waste processing units. In the period 2017-2022, the highest temperature of 44.3°C was recorded in March 2020 in ward 63 at dumpsites /landfills.[113]

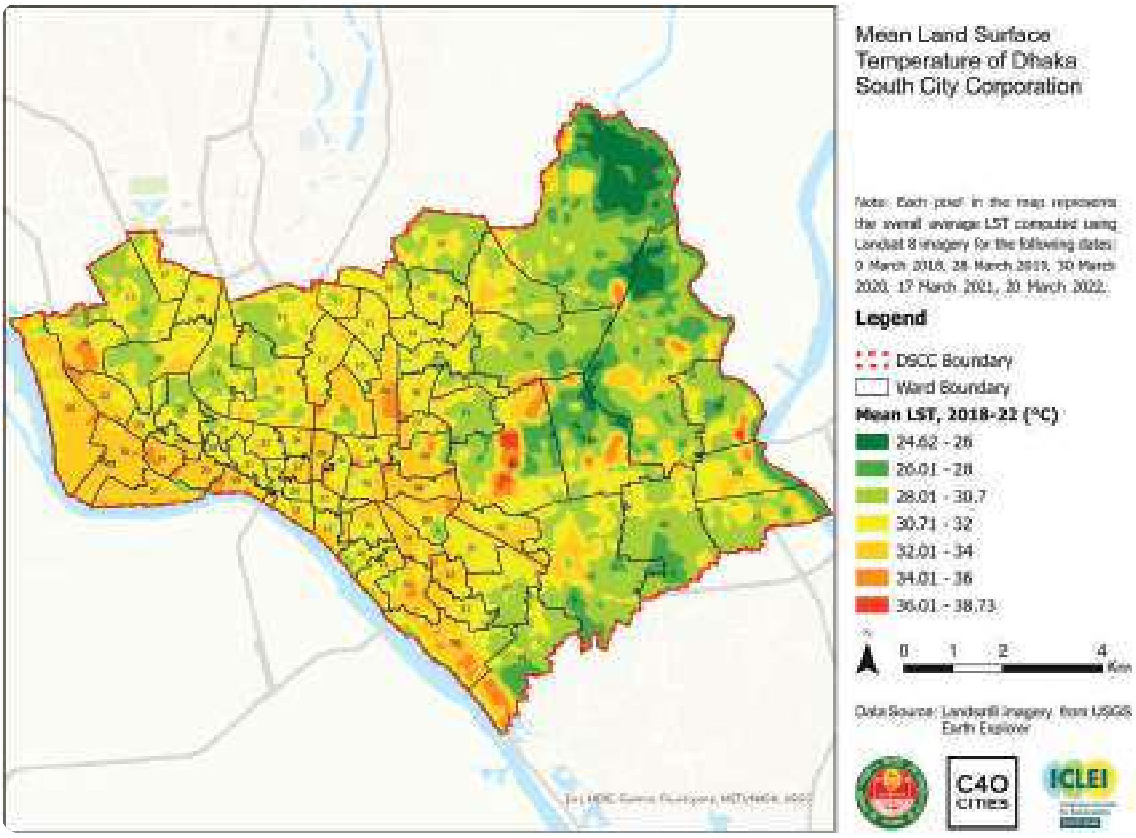


***Figure 10:** Heat Exposure Map of Dhaka North City Corporation (DSCC)*[114]

[112] Shahid, Shamsuddin & Wang, Xiaojun & Minhans, Anil & Harun, Sobri & Shamsudin, Supiah & Ismail, Tarmizi. (2015). Climate variability and changes in the major cities of Bangladesh: observations, possible impacts and adaptation. Regional Environmental Change. 16. 10.1007/s10113-015-0757-6.

[113] ICLEI South Asia

[114] ICLEI South Asia

Rainfall

- Between 1978 and 2003, Dhaka city experienced a notable rise in its annual rainfall. However, there were contrasting trends observed in the seasonal distribution of rainfall. The monsoon season (June-August) and winter season (December-February) witnessed a decrease in rainfall amounts during this period, indicating a possible shift in rainfall patterns in the city[115]. On the other hand, there has been an increase in the occurrence of sporadic heavy rainfall events. Additionally, the frequency of sudden rainfall has been on the rise in Dhaka city.

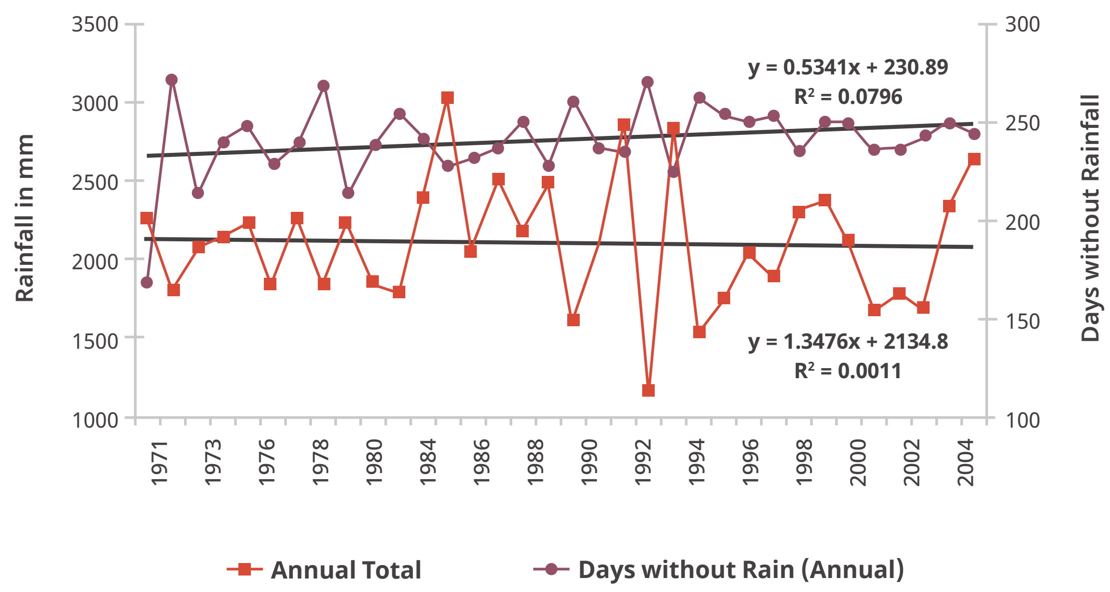


***Figure 11:** Trend of Rainfall and Number of Days without Rain in Dhaka City[116] (1970 -2004)*

[115] https://www.researchgate.net/publication/251165788_Climate_Change_Implications_for_Dhaka_City_A_Need_for_Immediate_Measures_to_Reduce_Vulnerability

[116] https://www.researchgate.net/publication/251165788_Climate_Change_Implications_for_Dhaka_City_A_Need_for_Immediate_Measures_to_Reduce_Vulnerability

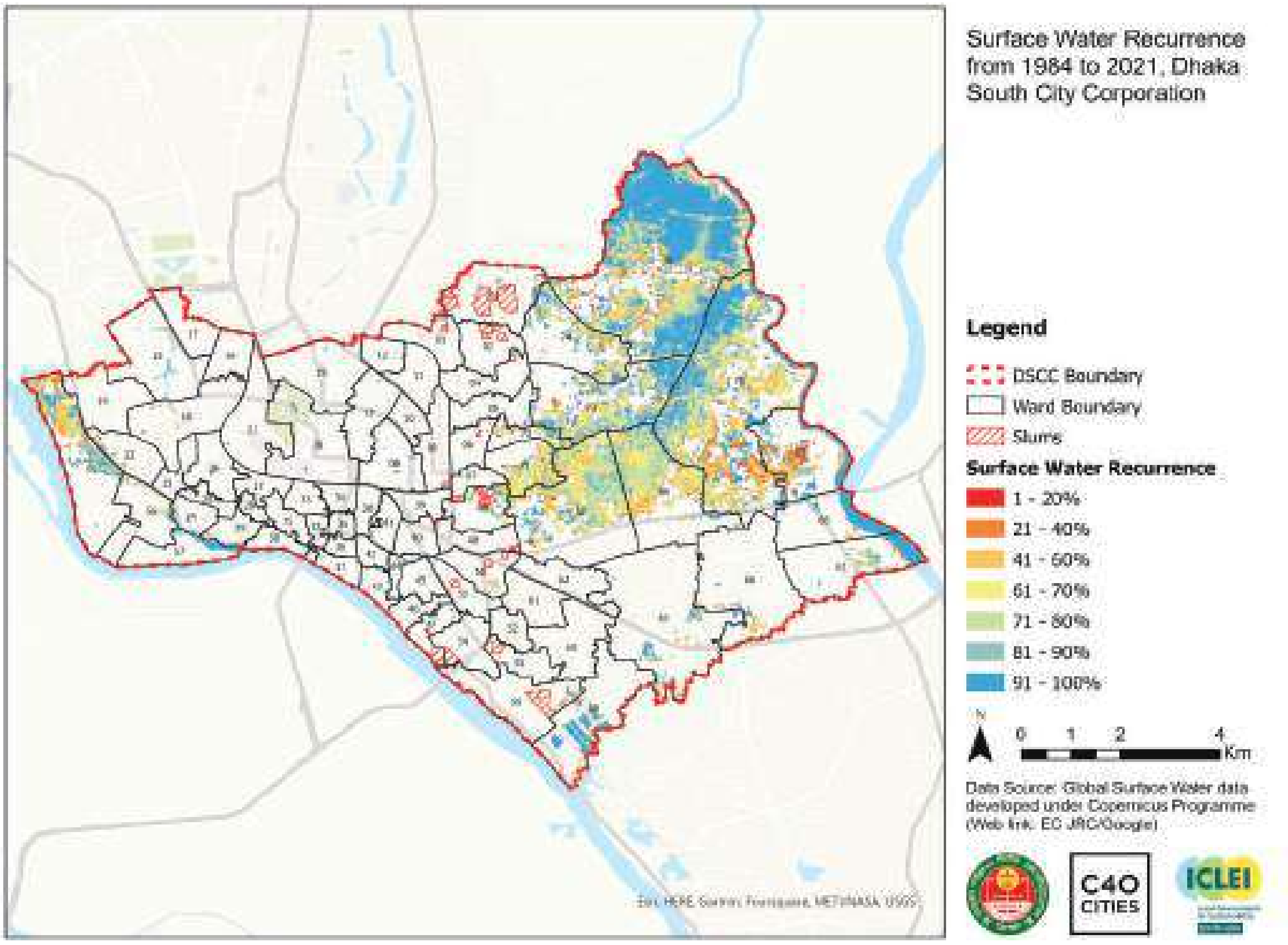


***Figure 12:** Flood Recurrence Map of the Dhaka South City Area117*

Due to unpredictable rainfall, the city has witnessed flooding in various areas. To illustrate the extent of flooding in Dhaka North City, a flood recurrence map was generated using data from the Global Surface Water Explore. In this map, areas experiencing regular inundation are depicted in varying shades of blue, while those with intermittent flooding are highlighted in shades of orange. Specifically, within the DNCC, wards 33, 37, 41, 42, 43, and 52 are consistently prone to flooding, attributed to their low-lying topography and the presence of wetlands in the eastern part of the city.[118]

3.2.2. Projections Analysis

Temperature Projections

- According to the Bangladesh Delta Plan 2100, the average temperature of the country is expected to rise about 1.4°C to 1.9°C in the Business as Usual (BAU) scenario, while it will likely increase by 2°C[119] in the Extreme scenario by 2050.
- According to the USAID report on Climate Projection of Bangladesh the mean annual temperature of the country is projected to

[117] https://global-surface-water.appspot.com/#
[118] https://global-surface-water.appspot.com/#
[119] Bangladesh Delta Plan 2100

increase by 0.23°C, 0.79°C, and 1.69°C for the 10th, 50th, and 90th percentiles, respectively, for the RCP4.5 model by 2030[120]; while the mean annual temperature is projected to increase by 0.54 °C, 1.23°C, and 2.16°C for the 10th, 50th, and 90th percentiles, respectively, for the RCP4.5 model by 2050[121]

- The mean annual temperature of the country is projected to increase by 0.23°C, 0.79°C, and 1.45°C for the 10th, 50th, and 90th percentiles, respectively, for the RCP8.5 model[122] by 2030. However, it will increase by 0.91°C, 1.69°C and 2.76°C for the 10th, 50th, and 90th percentiles, respectively, for the RCP8.5 model[123] by 2050.
- According to the Bangladesh Delta Plan 2100, it is projected that the country will experience a temperature rise ranging from 1.4°C to 1.9°C under BAU scenario by 2050. Additionally, in the Extreme Scenario (EXT), the temperature rise is expected to be around 2°C by the same year[124].
- According to the National Adaptation Plan (NAP-2023-2050), Bangladesh is expected to experience a rise in temperature from 0.44°C to 0.69°C by the 2030s under the SSP1 2.6 and SSP5 8.5 scenarios, while the country's projected temperature rise widens to a range of 1.3°C to 2°C under these scenarios, encompassing the potential extent of temperature change[125].

Rainfall Projections

According to the Bangladesh Delta Plan 2100, the country will experience an increase in pre-monsoon and monsoon rainfall during 2030 under the BAU scenario. However, the rainfall pattern will show a reduction by 2050.

- For RCP 4.5 and 8.5, the annual rainfall of the country is predicted to be increased by 0.2mm/day by 2030[126] (Climate Change Information Fact Sheet of Bangladesh, USAID).
- For RCP 4.5 and 8.5, the annual average rainfall of the country is projected to increase by 0.2mm/day and 0.4mm/day respectively by 2050[127] (Climate Change Information Fact Sheet).
- Pre-monsoon and monsoon rainfall in Bangladesh will increase under the BAU Scenario by 2030. Most regions of the country can expect a rise in rainfall. However, the southern part of the country along with the eastern hill region will see a reduction in rainfall by 2050[128] (Bangladesh Delta Plan-2100).
- According to the National Adaptation Plan (NAP-2023-2050), the projected rainfall pattern of Bangladesh will vary between 0.1%-0.4% in 2030 and 2.4% -3.5% in 2050. Moreover, the urban areas of the country will receive higher rainfall than all others except the south-east coastal areas, the Haor areas and the Chittagong hill tracts[129].

Projected Climate Hazards

As noted above, the **DSCC is highly vulnerable to heat stress, river and rain induced urban flooding and cyclones** and will continue to be at risk in the future due to increase in temperature and increasingly erratic rainfall. It is also likely to be at indirect risk from sea level rise, primarily through a stress on resources due to migration from areas that are directly impacted by the sea level rise. Given the limited availability of DSCC-level information regarding future projections, severity, intensity, and frequency of the aforementioned climate hazards, an assessment of the future projections and impact of these hazards are done by relying on regional and country-level information.

Heat Stress/Waves: According to the Think Hazard assessment, for Dhaka City prolonged exposure to extreme heat, resulting in heat stress is expected to occur at least once in the next five years[130]. According to DSCC, South Dhaka is highly susceptible to the urban heat island effect, resulting in hotspots within the

120 https://www.climatelinks.org/sites/default/files/asset/document/Bangladesh%20Climate%20Info%20Fact%20Sheet_FINAL.pdf
121 https://www.climatelinks.org/sites/default/files/asset/document/Bangladesh%20Climate%20Info%20Fact%20Sheet_FINAL.pdf
122 https://www.climatelinks.org/sites/default/files/asset/document/Bangladesh%20Climate%20Info%20Fact%20Sheet_FINAL.pdf
123 https://www.climatelinks.org/sites/default/files/asset/document/Bangladesh%20Climate%20Info%20Fact%20Sheet_FINAL.pdf
124 https://oldweb.lged.gov.bd/UploadedDocument/UnitPublication/1/756/BDP%202100%20Abridged%20Version%20English.pdf
125 https://www4.unfccc.int/sites/SubmissionsStaging/Documents/202211020942---National%20Adaptation%20Plan%20of%20Bangladesh%20(2023-2050).pdf
126 https://www.climatelinks.org/sites/default/files/asset/document/Bangladesh%20Climate%20Info%20Fact%20Sheet_FINAL.pdf
127 https://www.climatelinks.org/sites/default/files/asset/document/Bangladesh%20Climate%20Info%20Fact%20Sheet_FINAL.pdf
128 https://www.climatelinks.org/sites/default/files/asset/document/Bangladesh%20Climate%20Info%20Fact%20Sheet_FINAL.pdf
129 https://www4.unfccc.int/sites/SubmissionsStaging/Documents/202211020942---National%20Adaptation%20Plan%20of%20Bangladesh%20(2023-2050).pdf
130 https://thinkhazard.org/en/report/577-bangladesh-dhaka/EH

city that are over 10°C warmer than the surrounding rural areas. The extreme heat poses a threat to the lives of the slum population and is responsible for labour productivity losses that exceed 8% of the city's annual output[131]. According to the Feasibility Study on Heat Wave in Dhaka 2018, workers (who work outside such as rickshaw pullers, van pullers, street hawkers, construction workers, agriculture labourers) are the most vulnerable group from heat waves. It also highlights that the rickshaw pullers lose 25% of their daily income due to heat waves. If the current trend of increasingly dangerously hot days continues, it is estimated that the impacts of extreme heat will become more severe by 2050, with women and girls likely to bear a disproportionate burden[132].

In Bangladesh, under the BAU (RCP 8.5) scenario, heat stress is projected to increase in frequency, intensity and scale[133] (Choi et.al. 2021). According to another report, if the global average temperature increases by 2°C compared to the levels of the 1800s, Bangladesh is expected to encounter heatwaves approximately once every one to two years[134]. The frequency and intensity of heatwaves are significantly amplified by climate change.

Urban Flooding: In terms of vulnerability to flooding, Bangladesh holds sixth position among the most flood prone countries[135]. In the context of a changing climate, Bangladesh is particularly vulnerable, and Dhaka has been recognised as one of the leading Asian cities in terms of population susceptible to flooding by the year 2070[136]. The Think Hazard web-based tool[137] indicates that Dhaka is expected to **experience frequent urban floods and river floods**, posing significant risks to both property and lives. These damaging and potentially life-threatening events are projected to occur at least once every 10 years.

According to the National Adaptation Plan of Bangladesh-2030-2050, under the SSP5-8.5 Scenario, the projected mean annual flow of the Ganges, Brahmaputra and Meghna (GBM) river basins will likely increase by 17-28%, 2-5% and 1-4%, respectively, by 2050. The increase in the Ganges basins will elevate the likelihood of flooding in the country.

NAP-2030-2050 also highlighted that rapid urbanisation has already rendered various cities susceptible to urban flooding, especially low-lying cities (including Dhaka) and the risk is increased by the extreme rainfall events. As projected, an increase in sudden rainfall will amplify the hazard associated with urban flooding and water logging.

Cyclone: The impact of climate change is expected to result in an **increase of cyclone intensity** in Bangladesh, potentially leading to a more severe impact on the country. It is expected that 17 million people would be exposed to inundation depths exceeding 1 metre, while approximately 13.5 million people would encounter depths surpassing 3 metres[138]. According to the NAP-2030-2050 report, 50 cm of sea level rise could potentially inundate large parts (11%-12%) of the coastal area of Bangladesh. The cyclone's primary impact has been concentrated along the coastal regions of Bangladesh. Nonetheless, Dhaka city has been dealing with infrastructure damage caused by high wind speeds and waterlogging problems, which are often exacerbated by the heavy rainfall associated with cyclones. These downpours have disrupted both the city's power supply infrastructure and its transportation systems in the past even though the city does not experience any major impacts of high-speed winds.

According to Think Hazard[139], the cyclone risk in Dhaka City is categorised as high. This implies that there is a greater than 20% probability of infrastructure-damage due to wind speeds.

The coastal regions in Bangladesh (particularly in Cox's Bazar and Chittagong), face heightened vulnerability to super cyclonic conditions, which may happen as often as once every 20 to 100 years[140]. However, in Dhaka, the maximum gust speeds are

131 https://www.thedailystar.net/opinion/editorial/news/dhaka-cooked-it-the-poor-who-are-suffering-more-3133456

132 https://onebillionresilient.org/2023/05/03/bushra-afreen-dhaka-chief-heat-officer/

133 https://link.springer.com/article/10.1007/s00382-021-05856-z

134 https://apnews.com/article/climate-change-heat-wave-south-asia-india-bangladesh-laos-thailand-9343bb3fafbbd1ca737129d43a2574f6

135 https://link.springer.com/content/pdf/10.1007/s13753-013-0020-z.pdf

136 https://documents1.worldbank.org/curated/en/683381468001782892/pdf/100228-PUB-REVISED-Box393232B-PUBLIC-PUBDATE-10-26-15-DOI-10-15969781464807107-EPI-1464807108.pdf

137 https://thinkhazard.org/en/report/577-bangladesh-dhaka/CY

138 https://www.sciencedirect.com/science/article/pii/S2212094714000826#bib23

139 https://thinkhazard.org/en/report/577-bangladesh-dhaka/CY

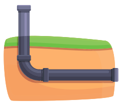
140 https://nhess.copernicus.org/articles/21/1313/2021/nhess-21-1313-2021.pdf

expected to reach 35 m/s (68 kn) in only 1% of weather events, and 25 m/s (48 kn) in a range from 5% to 50% of weather events, which makes the city susceptible to such extreme conditions[141].

3.3. Climate Impact Assessment of Key Urban Systems

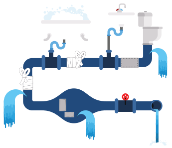
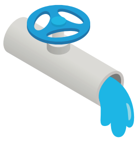
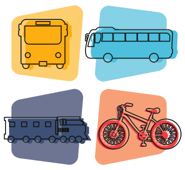
The analysis of urban services in Dhaka South reveals seven critical urban systems: **solid waste management, drainage system, health, water supply system, wastewater management, transportation, and energy and power.** These systems are currently grappling with service delivery, demand and supply gaps and infrastructure challenges, as outlined in the fragility statements in Table 8. Moreover, the situation is deteriorating further due to the effects of climate change and associated climate risks. While the details are provided in the CCRA report, the summary table is provided here for easy reference.

Table 8: Urban Systems Analysis[142]

Urban System	Fragility Statement	Climate Fragility Statement
Stormwater Drainage System 	Encroachment, poor condition of the natural drainage system (including khals, ponds, and wetlands), indiscriminate dumping of solid waste and liquid waste into the drains, inadequate coverage of the drainage system are resulting in many parts of the city being waterlogged and susceptible to diseases.	***Erratic Rainfall and Flooding:*** Increased rainfall coupled with clogged drains will lead to more incidence of waterlogging and flooding in the city. Since Dhaka South area is low-lying, it is more prone to damage due to urban flooding and waterlogging. Stagnating water may impact the health and well-being of residents and increase the incidence of waterborne diseases. ***Cyclone:*** Storm surges from cyclones may cause similar impacts from waterlogging and urban flooding.
Solid Waste Management 	Rapidly expanding population, economies, and urbanisation have put pressure on the existing waste management infrastructure. Inadequate waste management infrastructure can lead to various environmental and health issues.	***Increased Temperature and Heat Waves:*** Rising temperatures can impact the waste collection efficiency of the city. High temperatures and humidity can alter the waste decomposition rate, leachate production rate and chemical composition of the leachate, which will facilitate microenvironments that encourage the spread of infectious diseases. It can also increase the risk of fires in landfill sites. ***Erratic Rainfall and Flooding:*** Excessive rainfall can lead to waterlogging and urban flooding due to the obstruction of drains and water flow caused by improper disposal of solid waste. This can result in infrastructure damage and contamination of water bodies. ***Cyclone:*** Storm surges from cyclones may cause similar impacts from waterlogging and urban flooding.
Health System 	The DSCC has inadequate hospitals, shortage of healthcare professionals, and limited funds for healthcare infrastructure. Private healthcare facilities are not easily affordable for the urban poor.	***Increasing Temperatures, Heat Waves and Flooding:*** Increasing temperature and waterlogging can provide ideal conditions for the spread of vector-borne diseases such as dengue and malaria. They will also increase the risk of non-communicable diseases such as asthma and heart attacks.

[141] https://nhess.copernicus.org/articles/21/1313/2021/nhess-21-1313-2021.pdf

[142] ICLEI South Asia's analysis

Urban System	Fragility Statement	Climate Fragility Statement
Water Supply System 	The water supply distribution network in DSCC is struggling to keep up with the demands of the current population. The loss from unaccounted for water (UFW) due to leakages and unauthorised connections is high. Excessive groundwater use is leading to depletion of the water table, raising concerns among city planners and policymakers.	***Increasing Temperatures and Heat Waves:*** Due to rising temperatures, the water demand may increase in the city, putting stress on existing sources of water, particularly groundwater. Given that the groundwater table is depleting, this may result in acute water stress in the city. ***Erratic Rainfall and Flooding:*** Sudden, intense rainfall may cause urban flooding that can damage the infrastructure of the water supply system and contaminate water due to leakages, thus exacerbating water scarcity. Storm surges from cyclones may cause similar impacts from urban flooding.
Wastewater System 	The DSCC faces significant challenges in wastewater management due to its high population density, insufficient infrastructure, and substantial slum population. As a consequence of these limitations, untreated domestic sewage and industrial effluents are frequently discharged into rivers and canals, resulting in severe pollution and contributing to flooding.	***Increasing Temperatures and Heat Waves:*** Rising temperatures can exacerbate the release of noxious gases and foul odors from stagnant sewage, creating unfavourable conditions for the surrounding environment. Moreover, higher temperatures can also lead to the accelerated growth and proliferation of harmful microorganisms within the sewage. ***Erratic Rainfall and Flooding:*** Erratic rainfall can lead to more frequent waterlogging, which is a challenge for the sewerage management infrastructure. Additionally, during these periods, there is a higher likelihood of freshwater and rainwater mixing with sewage and sludge, resulting in pollution of rivers and contributing to the potential spread of diseases.
Transportation 	Illegal encroachment of footpaths, inadequate infrastructure and rapid urbanisation and population growth make the transportation system and related services of DSCC fragile. As a consequence, traffic congestion is very common in the city.	***Increasing Temperatures and Heat Waves:*** Higher temperatures may lead to greater use of private transport leading to an increase in traffic congestion and higher GHG emissions caused by the increase of private vehicles on the roads. It will also impact the economy and health of rickshaw pullers due to prolonged exposure to extreme heat. High temperatures can also damage transportation infrastructure such as roads and public buses. ***Erratic Rainfall and Flooding:*** Erratic rainfall will expedite the deterioration of transportation-related infrastructure, affecting road and rail transportation. As a result, the overall maintenance cost of such infrastructure will rise.
Energy and Power 	Illegal settlements and slum populations face major issues in power supply due to existing policies, leading to unauthorised connections. Weak distribution networks and old infrastructure are responsible for power disruption in the area.	***Increasing Temperatures and Heat Waves:*** The rising temperature in the DSCC will intensify the electricity demand. The need for cooling and air conditioning during heat stress strains the energy infrastructure, resulting in disruption of power supply and causing inconvenience to residents and textile and other industries of the city. ***Cyclone:*** Cyclones, with their strong winds and heavy rainfall, often inflict damage on the city's power infrastructure, leading to frequent power outages.

3.4. Adaptive Capacity Assessment

This section focuses on the analysis of the adaptive capacities of urban actors that are vulnerable to the climate impacts on the different urban systems analysed above. The adaptive capacity of fragile urban systems is also analysed in this section. The adaptive capacity assessment was conducted according to the ICLEI ACCCRN Process that provides a set of tools to conduct such an assessment in a simple objective manner in consultation with the Climate Core Team. The outcomes of this assessment were also shared during the stakeholder consultation held in September 2023.

3.4.1. Adaptive Capacity of Urban Actors

The adaptive capacity of the key stakeholders or urban actors are identified on the basis of their capacity to respond during a climatic hazard event, and their ability to access financial and human resources as well as relevant information at the right time to be able to take action. Urban actors with low adaptive capacity are considered to be vulnerable actors, who may be adversely impacted by climate change while those with high adaptive capacity are considered to be supporting actors, who may be able to assist the local government in taking action to reduce the impacts of climate change.

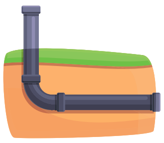
The assessment is done on three parameters:

1) Capacity to organize and respond,
2) Availability of resources,
3) Access to information.

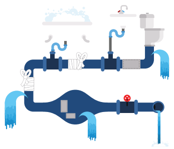
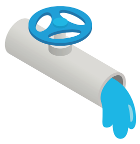
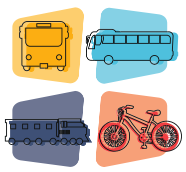
Each parameter is given a score between 1 and 3, 1 being the lowest score. Multiplying these scores gives the adaptive capacity of each actor for different urban systems. The adaptive capacity score determines which actors have high (score of 18-27), medium (score of 9-17) and low (score of 1-8) adaptive capacity. The process of scoring the adaptive capacity of actors is attached in **Annexure 6**.

For the DSCC, the adaptive capacities of actors were assessed in consultation with the Core Team and the outcomes were presented to the larger stakeholder group for vetting and verification.

Table 9: Adaptive Capacity of Urban Actors[143]

Urban Systems	Actors	Level of Adaptive Capacity
	Resident	Low
	Ward Councillor	Low
Stormwater Drainage System	Low Income Group	Low
	Elderly and Children	Low
	Migrants	Low
	People with disability	Low
	Informal Sector	Low
	DSCC	High
Solid Waste Management	Private Secondary Waste collection service provider	Low
	Resident	Low
	Sanitary Worker	Low
	Informal Sector	Low
	Migrants	Low
	Low Income Group	Low
	PCSPs	Medium
	DSCC	High
	Ward Councillors	High

[143] ICLEI ACCRN methodology

Urban Systems	Actors	Level of Adaptive Capacity
Health System 	Informal Sector	Low
	Low Income Group	Low
	DSCC	Medium
	Primary Health Centers	Medium
	Elderly and Children	Medium
	Ministry of Health and Public Welfare, GoB	High
	Public and Private Hospitals	High
Water Supply System 	DSCC	Low
	Low Income Group	Low
	Ward Councillors	Low
	Resident	Low
	Women	Low
	Migrants	Low
	DWASA	Medium
Wastewater System 	DSCC	Low
	Low Income group	Low
	Informal Sector	Low
	Women	Low
	Migrants	Low
	NGOs	Medium
	Elderly and Children	Medium
	DWASA	Medium
Transportation 	Rickshaw Puller/Informal Sector	Low
	Residents	Low
	Low Income Group	Low
	Elderly and Children	Low
	Migrants	Low
	Rajdhani Unnayan Kartripakkha (RAJUK)	Low
	Informal Sector	Low
	Women	Low
	Bangladesh Road Transport Corporation (BRTC)	Medium
	DSCC	Medium
	Bangladesh Police (Dhaka Range)- DMP	Medium
	Bangladesh Road Transportation Authority (BRTA)	Medium
	Dhaka Transportation Coordination Authority (DTCA)	High

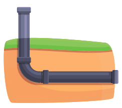
Urban Systems	Actors	Level of Adaptive Capacity
Energy 	Resident	Low
	Informal Sector	Low
	Low Income Group	Low
	Bangladesh Power Development Board (BPDB)	Medium
	Dhaka Power Distribution Company (DPDC)	Medium
	Ministry of Power, Energy and Mineral Resource, GoB	High

3.4.2. Adaptive Capacity of Urban Systems

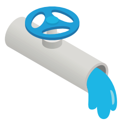
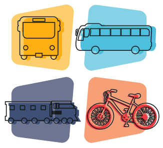
Based on the secondary data and inputs from relevant stakeholders, collected during the core team and stakeholder consultation, the adaptive capacity of fragile urban systems was assessed against the following six parameters:

1) **Economic:** Financial resources available within the system to respond to stresses or its ability to generate such financial resources through taxes or user charges or grants.
2) **Technological/ Infrastructure:** Technical and infrastructure resources available within the system and the ability to access such resources readily.
3) **GHG Emissions:** Level of emissions from the system or its ability to reduce emissions.
4) **Governance:** Regulations, policies, laws and rules that support resilience building in the system.
5) **Societal:** Support and resources from/for the general public regarding resilience building measures in the system.
6) **Ecosystem:** The level of involvement of ecosystems for the urban system or its impact on natural resources in the city.

Table 10: Adaptive Capacity of Urban Systems[144]

Urban System	Adaptive capacity of the system		
	Low	Medium	High
Stormwater Drainage 	Economic, Technological/ Infrastructure Societal	Governance	Ecosystem
Solid Waste Management 	Societal	Economic Technological /Infrastructure	Governance Ecosystem
Health 	Economic Societal Ecosystem	Technological/ Infrastructure	Governance

[144] ICLEI South Asia analysis based on the discussion with stakeholders

Urban System	Adaptive capacity of the system		
	Low	**Medium**	**High**
Water Supply 	Governance Societal	Economic Technological/ Infrastructure	Ecosystem
Wastewater 	Economic Societal Technological/ Infrastructure	Governance Ecosystem	
Transportation 	Societal Economic Ecosystem	Governance Technological/ Infrastructure	
Energy 	Ecosystem Societal	Economic Technological/ Infrastructure Governance	

3.5. Climate Vulnerability Assessment

To foster resilience, it's essential to comprehend the city's susceptibility and exposure to the impacts of climate change. As stated in the IPCC-AR5 report, risk is the function of Hazard, Exposure, and Vulnerability. Vulnerability encompasses the notions of sensitivity (proneness to potential harm) and adaptive capacity.

Using the data from previous sections and in consultation with the core team of the DSCC on hazard, exposure and vulnerability, an assessment of both current and future risks of DSCC and its infrastructure has been conducted. Additionally, the distinct wards/ areas have been identified in relation to various fragile systems that are currently exposed to risks due to the climate fragility of the urban systems and are vulnerable to anticipated climate impacts.

The vulnerability assessment helped to pinpoint areas or wards with heightened susceptibility to potential climate hazards, as indicated in the climate fragility statements for each urban system. These vulnerable areas have been clearly delineated on the city's ward map. Additionally, a vulnerability hotspot map has been created to evaluate wards that exhibit vulnerability in relation to the maximum number of urban systems.

3.5.1. Stormwater Drainage System

Wards that are affected by encroachments along water channels (khals) and the undesirable mixing of sewage in canals, leading to an increased susceptibility to urban flooding, have been classified as vulnerable wards in relation to the stormwater drainage system. The risk assessment seeks to identify the city wards that are already experiencing issues like urban flooding, encroachment, and the mixing of sewage with drainage systems, and are also at risk of being further affected by climate change.

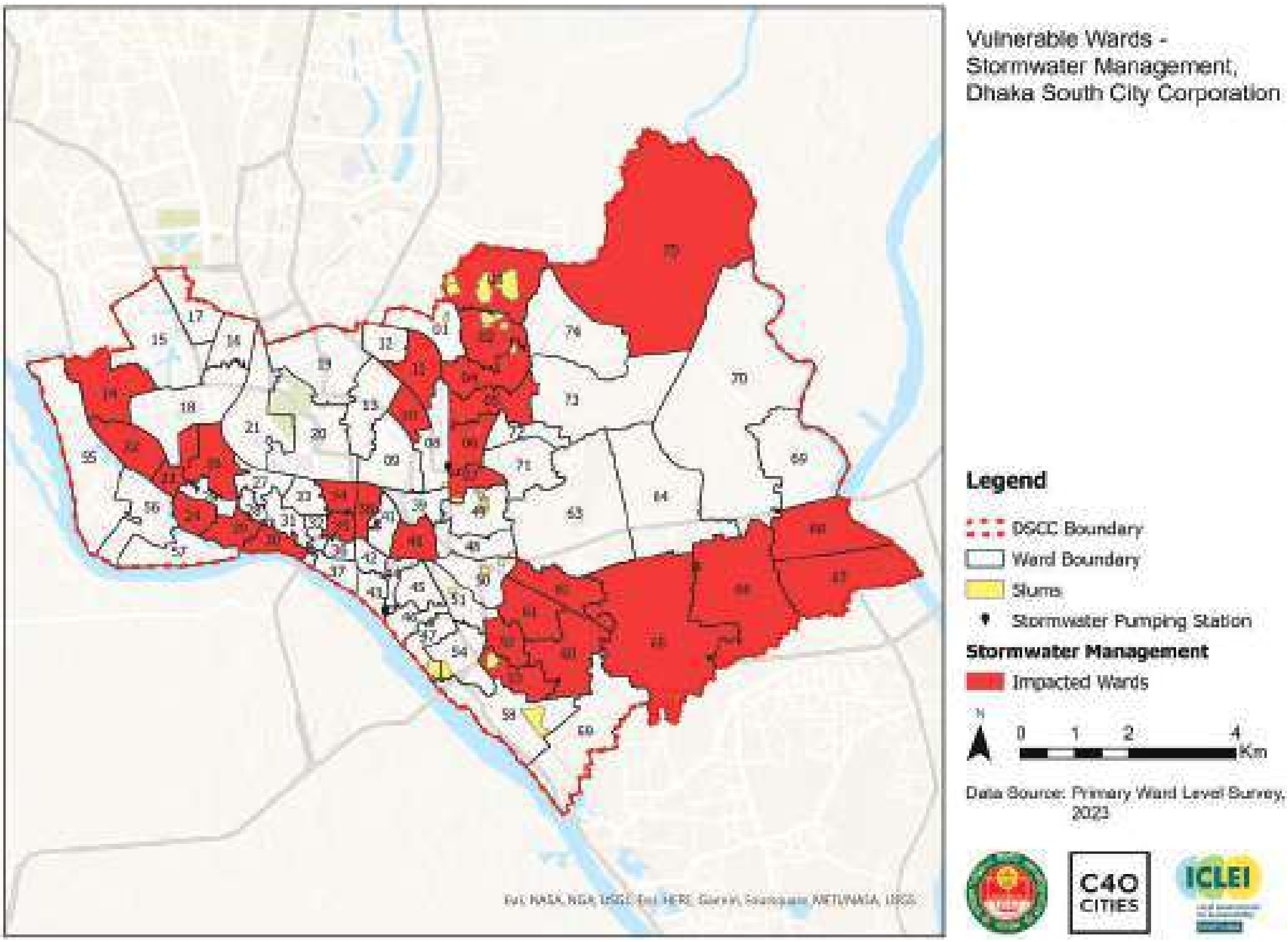


Figure 13: *Areas Most Vulnerable to Climate Risks in the Context of Stormwater Drainage (DSCC)*[145]

The map was created based on primary surveys and Key Informant Interviews (KIIs) with ward councillors. The map reveals that there are only two stormwater pumping stations serving the entire DSCC area. This single station is insufficient to effectively address the city's drainage issues, given the scale of the problem.

3.5.2. Solid Waste Management

Regarding climate-related risks to the solid waste management system in DSCC, vulnerable zones were established by scrutinising wards where there is open dumping of waste; infrastructure is lacking; and there is a slum population. This assessment was conducted with the goal of pinpointing areas that are at risk of experiencing adverse consequences from the identified climate-related risks.

[145] ICLEI South Asia

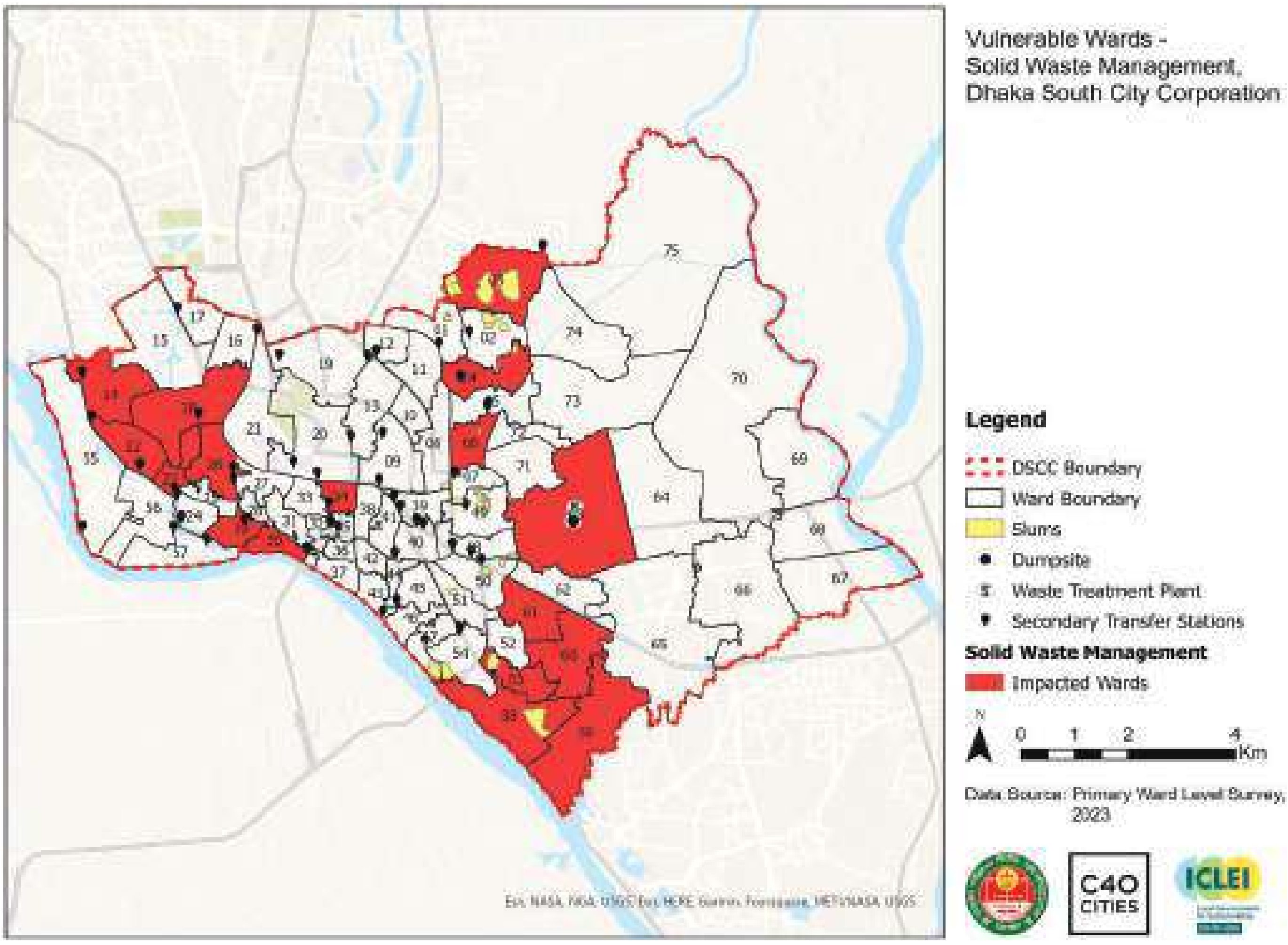


***Figure 14:** Areas Most Vulnerable to Climate Risks in the Context of Solid Waste Management (DSCC)*[146]

The map was created based on primary surveys and Key Informant Interviews (KIIs) with ward councillors. Wards 3, 4,6,14,18,22,23,26,29,30,34,53, 58, 60, 61, and 63 are identified as vulnerable to the climate change impacts with regards to solid waste management. The map indicates that wards 53, 54, 59, 60, and 61 still lack a secondary transfer station. These areas need special attention. According to DSCC, 63 STP's have already been constructed and it is expected that all of the wards will be under STP coverage by this year.

The DSCC has been actively working in solid waste management and, as part of this, has constructed in almost every ward Secondary Transfer Stations (STS) to completely end the practice of open dumping of waste in streets.

3.5.3. Health System

The map was created based on primary surveys and Key Informant Interviews (KIIs) with ward councillors. DSCC has identified certain wards as vulnerable wards because of their heightened susceptibility to heat stress and vector-borne diseases such as dengue and malaria. A significant portion of these wards has been identified as being affected by vector-borne and waterborne diseases. Moreover, the vulnerability and risk assessment revealed that a significant number of city wards are currently grappling with challenges related to both heat stress and vector-borne diseases. Some of these wards have a substantial population of low-income groups, underscoring the importance of addressing these issues with an equity-focused approach to enhance the overall resilience of the city's health system.

[146] ICLEI South Asia

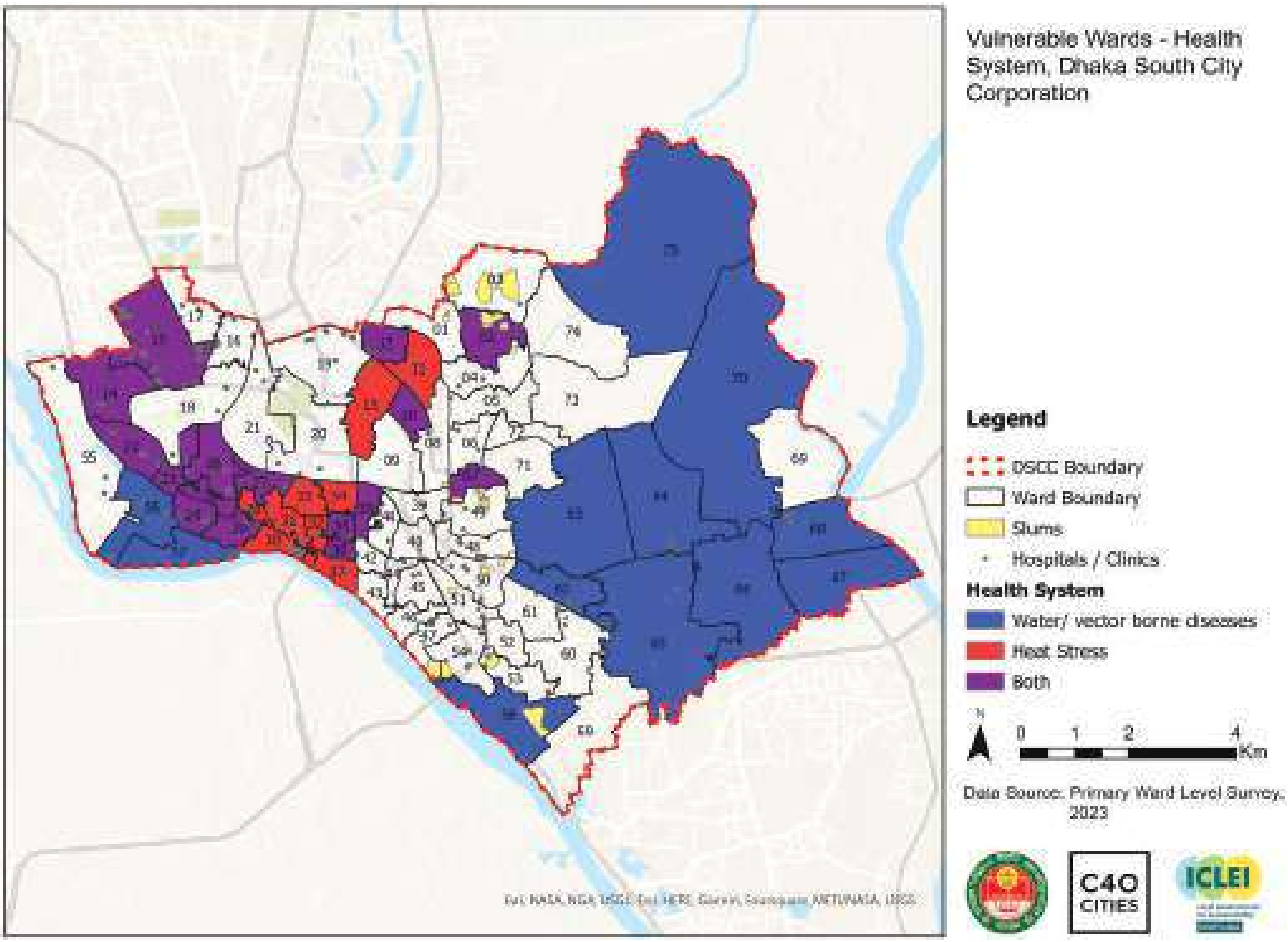


***Figure 15:** DSCC that are Susceptible to Heat Stress and Waterborne Diseases within the Framework of the Healthcare System[147].*

The assessment made to evaluate the impact of climate change on health systems and different areas of the DSCC city considered two key factors.

1. **Heat Stress:** The vulnerability of wards has been determined based on the impact of heat stress on the residents. Wards number 2,7 10, 11, 12, 13, 14, 15 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37 and 38 may experience more severe heat stress, which can have adverse effects on the health of the population.

2. **Vector-Borne Diseases:** Another aspect taken into account was the impact of vector-borne diseases in various wards. These diseases can be exacerbated by factors such as the cleaning of khals (canals) and ponds, especially when these water bodies are not properly maintained. Wards 2, 7, 10, 12, 14, 15, 22, 23, 24, 25, 26, 27, 29, 35, 36, 38 56, 57, 58, 62, 63, 64, 65, 66, 67, 68, 70, and 75 are likely to be more susceptible to the increased incidence of vector-borne diseases because of climate change.

3. **Wards impacted by heat stress and vector-borne diseases:** Wards 2, 7, 10, 12, 14, 15, 22, 23, 24, 25, 26, 27, 35, 36, and 38 are vulnerable to the combined effects of heat stress and vector-borne diseases due to the identified climate risks. This highlights the necessity for the city to implement measures that take into account the healthcare needs of these specific wards.

147 ICLEI South Asia

3.5.4. Water Supply System

The map was created based on primary surveys and Key Informant Interviews (KIIs) with ward councillors. Wards experiencing frequent water crises due to high demand and dry seasons are categorised as vulnerable areas within the water supply system. Significantly, many of these vulnerable wards are characterised by a substantial presence of slum areas. The assessment's primary focus was to pinpoint areas within the city that could be vulnerable to the negative consequences of the identified climate risks, given that the city heavily relies on groundwater extraction.

Due to the growing urbanisation and expanding population in both Dhaka North and South City Corporation areas, there has been a heightened reliance on groundwater for the water supply, thus putting strain on the available water resources. Consequently, due to the increasing demand and existing water scarcity issues, wards 2, 3, 4, 14, 22, 26, 52, 53, 54, and 58 have been identified as being particularly vulnerable in terms of their water supply systems. The map shows that a majority of these wards lack proper water supply infrastructure (such as water pumping stations and water tanks), particularly wards 14, 52, 53, 54 and 54, and are set to face significant challenges related to climate change if prompt measures are not implemented. They face an elevated risk because of climate-related factors like increasing temperatures and erratic rainfall patterns, which could worsen the already existing water supply problems in these regions.

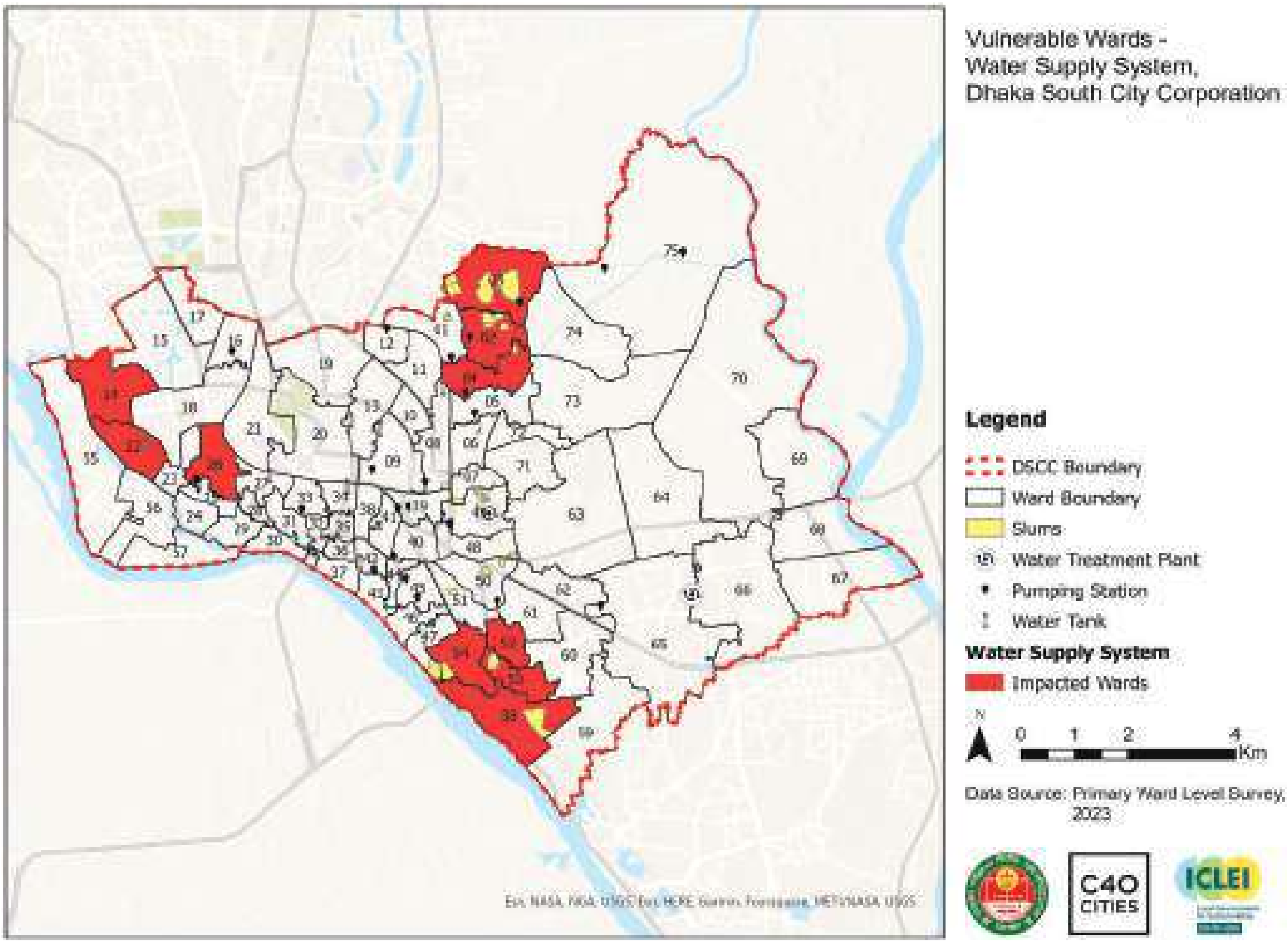


Figure 16: *Areas Most Vulnerable to Climate Risks in the Contextof Water Supply System (DSCC)*[148]

[148] ICLEI South Asia

3.5.5. Wastewater System

The map was created based on primary surveys and Key Informant Interviews (KIIs) with ward councillors. The wards that have poor or no access to the sewer system, and depend largely on septic tanks and open drains are the most vulnerable in the case of the waste water management system. This is because there is no means of septage management in Dhaka, and in many cases, septic tanks or even toilets directly open into drains, where the sewage mixes with storm water in the drains. This is often the case in informal settlements and slums.

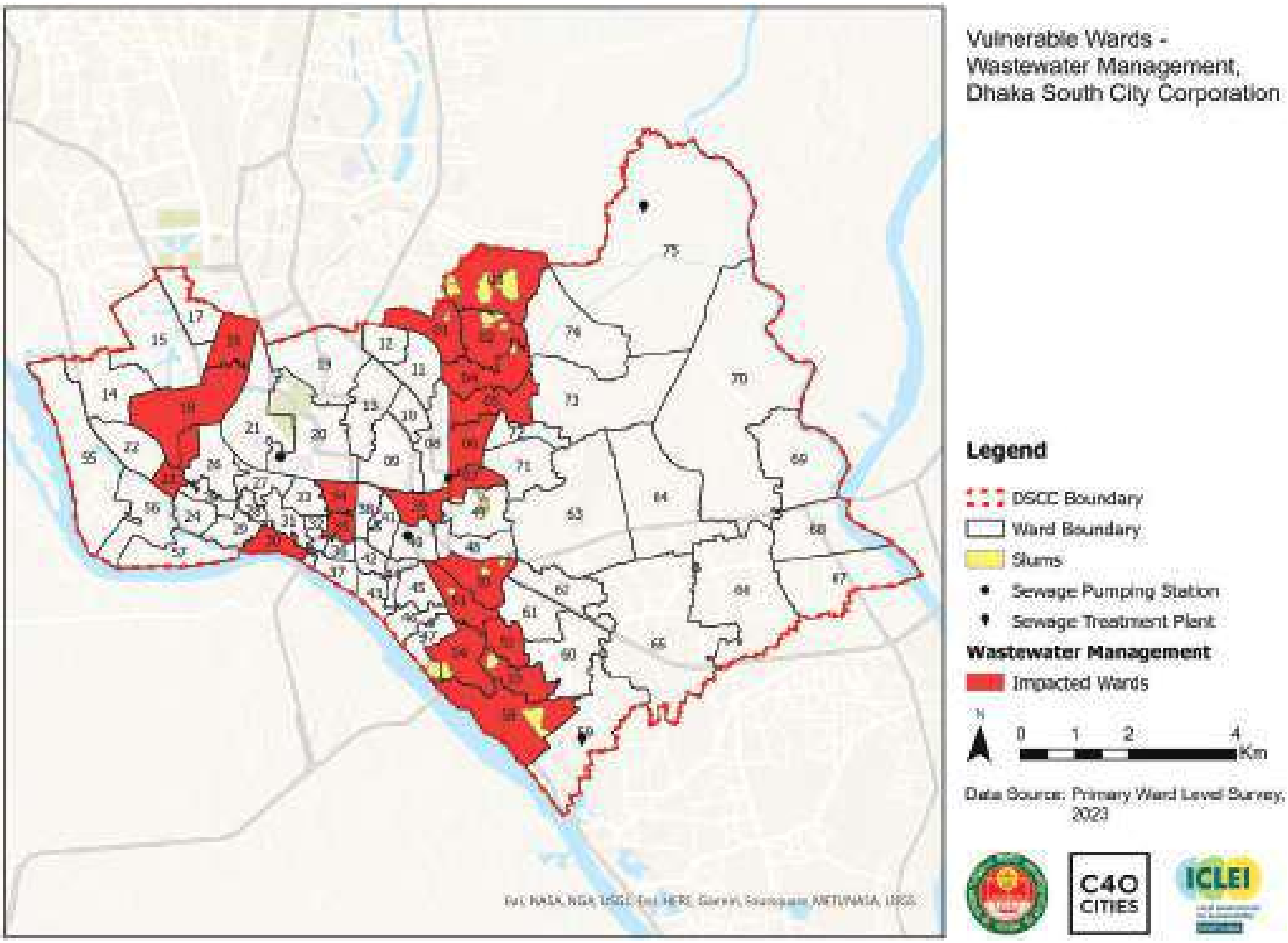


Figure 17: DSCC's Wwards/Aareas Most Vulnerable to Climate Risks in the Context of Wastewater[149]

[149] ICLEI South Asia

Wards 1, 2, 3, 4, 5, 6, 7, 16, 18, 23, 30, 34, 35, 39, 50, 51, 52, 53, 54, and 58 have been designated as vulnerable in the context of wastewater management. It is crucial to highlight that a significant number of these wards have slum areas, where a majority of toilets lack septic tanks or other proper scientific disposal facilities for sewage management. Additionally, in Kamrangir Char (Ward 55,56,57), there are no sewerage lines. Some residents have septic tanks, but most of the houses are directly connected to drains or rivers.

3.5.6. Transportation

The map was created based on primary surveys and Key Informant Interviews (KIIs) with ward councillors. Concerning climate-related risks to the transportation system, the process of identifying vulnerable areas within the DSCC involved analysing locations or wards that have consistently faced notably more traffic congestion (especially major crossings and junctions), as compared to other areas under the DSCC's authority.

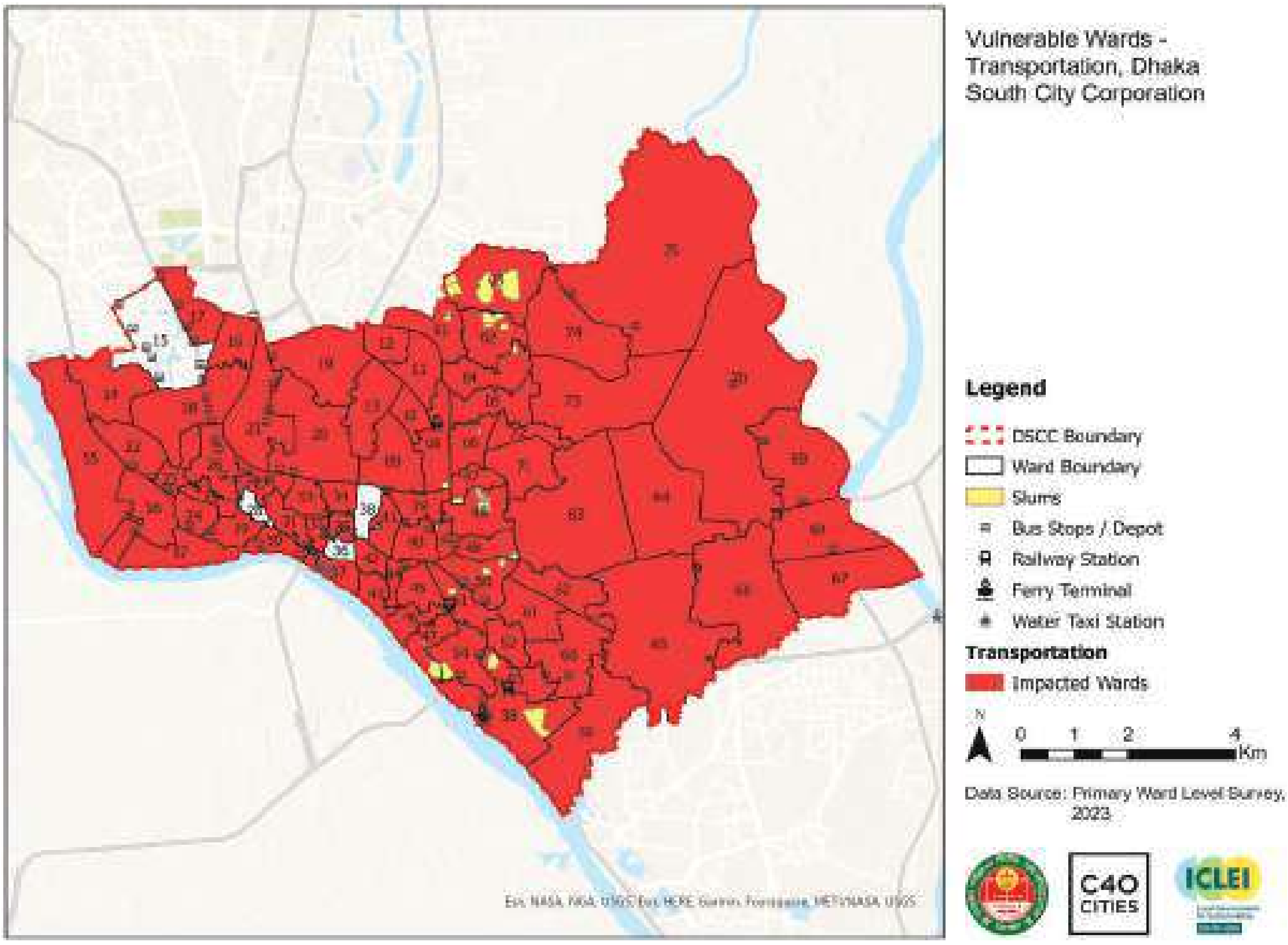


***Figure 18:** DSCC's Wards/ Areas Most Vulnerable to Climate Risks in the Context of Transportation*[150]

[150] ICLEI South Asia

With the exception of wards 15, 24, 25, 28, 36, and 38, all other wards, specifically ward number 2, 3, 9, 10,11, 13, 14, 16, 17, 19, 22, 23, 24, 25, 29, and 31, have been recognised as susceptible to the effects of climate change on the transportation system. These wards have already experienced occurrences of traffic congestion and road infrastructure damage, and these problems are anticipated to worsen due to the impacts of climate change.

3.5.7. Energy

The map was created based on primary surveys and Key Informant Interviews (KIIs) with ward councillors. The entire DSCC haka South City Corporation area is identified as susceptible to the effects of climate change, with a particular emphasis on the vulnerability of the power and energy infrastructure. Presently, an important challenge in the region is the availability of consistent power supply. The occurrence of power outages are majorly affecting the water supply of Dhaka city, as the water supply system relies on water pumps. Power outages are observed in all parts of the DSCC area, and therefore the entire city has been marked as vulnerable in this case.

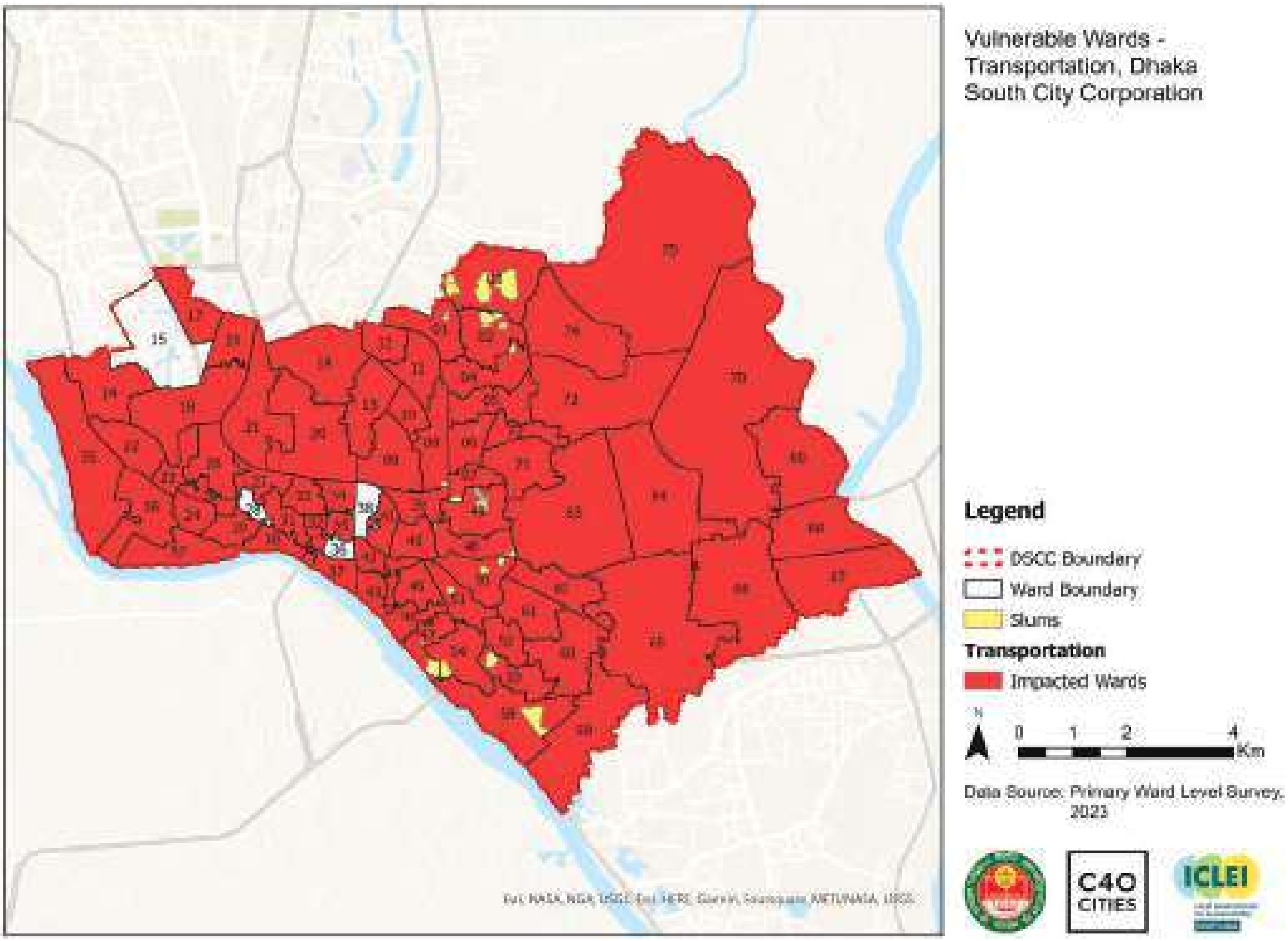


Figure 19: *DSCC's Wards/Areas Most Vulnerable to Climate Risks in the Context of Energy and Power System*[151].

[151] ICLEI South Asia

3.5.8. Vulnerable Hotspots

Numerous areas in the city are affected by multiple fragile urban systems, warranting increased attention and designation of vulnerability hotspots. The risk assessment indicates that approximately 11 wards in the DSCC, specifically wards 2, 3, 4, 14, 22, 23, 26, 30, 34, 53, and 58, are vulnerable or at risk across all six urban systems. Similarly, wards 6, 7, 29, 35, 53, and 58 are susceptible with regard to five urban systems. Importantly, no single ward is identified as a vulnerability hotspot for all seven urban systems. A majority of the remaining wards exhibit vulnerabilities with regard to either four or three urban systems. This underscores the need to give more attention to these areas, which are identified as vulnerability hotspots, and need focused mitigation efforts. The map was created based on primary surveys and Key Informant Interviews (KIIs) with ward councillors.

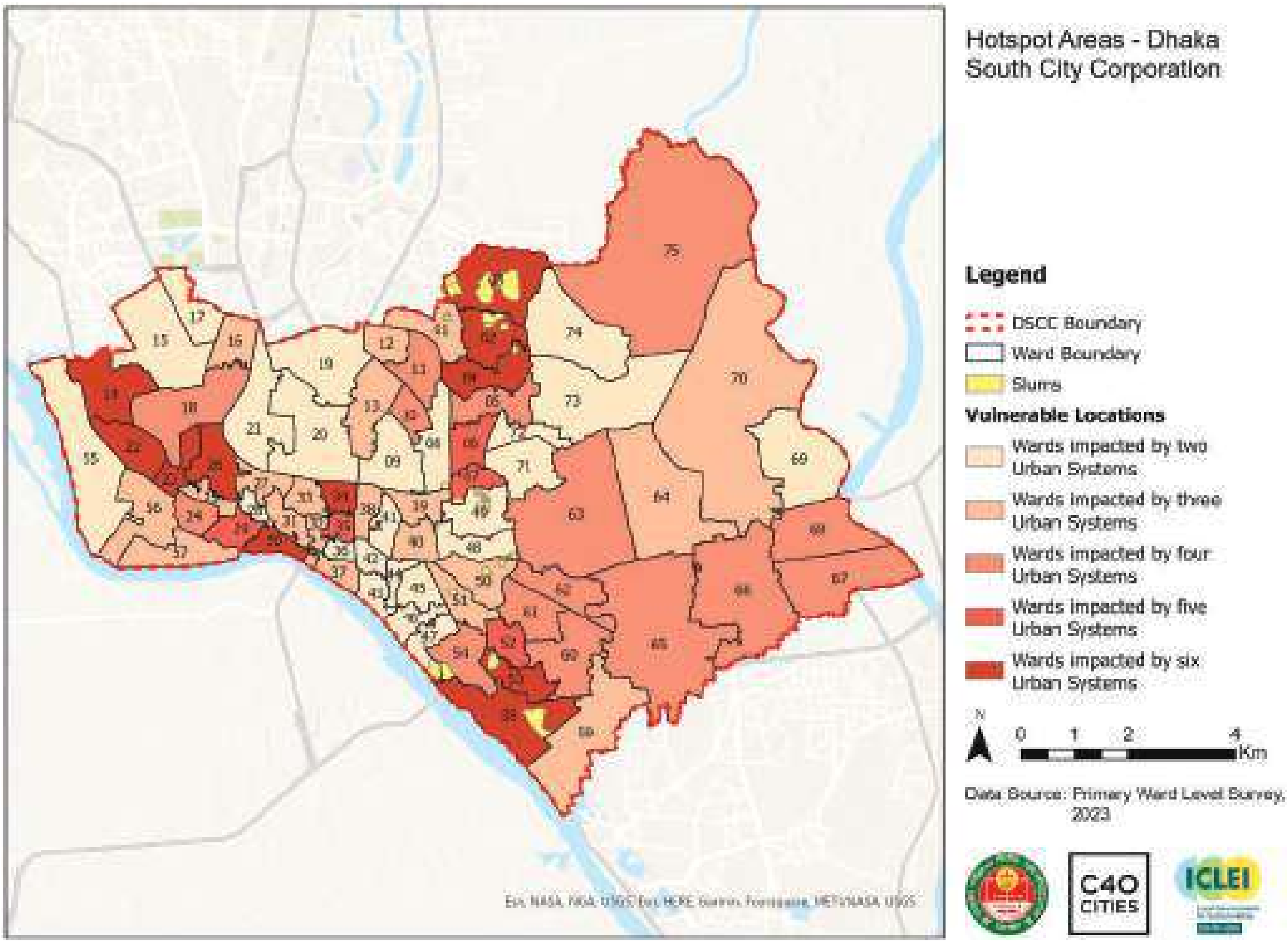


Figure 20: *Vulnerable Hotspot Map of DSCC*[152]

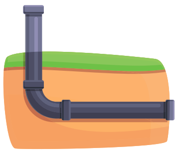
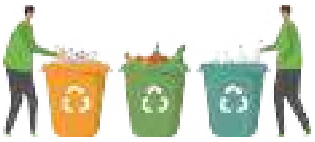
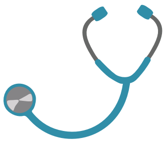
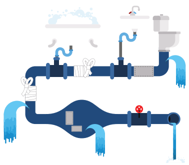
[152] ICLEI South Asia

3.6. Future Risk Assessment

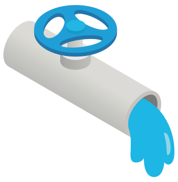
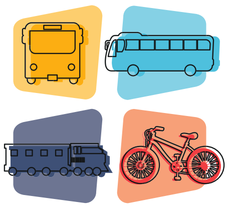
A comprehensive evaluation of potential climate change risks was conducted for the DSCC's urban systems and population through a comprehensive exercise by the DSCC Core team. The assessment of risk for each climate fragility statement is a result of merging two pivotal factors: likelihood - the probability of an event occurring; and consequences - the magnitude of the repercussions in case the event does unfold. The likelihood depends on the possibility of occurrence of a hazardous event in future, while the consequence depends on the vulnerability of the urban systems or population groups.

While the risk score, thus assigned, is somewhat dependent on the opinions and personal experiences of the participants present during the discussion, it is compared to the projection of climate risks as seen in secondary sources to corroborate the information. Climate risks on most urban systems are rated high to extreme. The assigned risk scores for the DSCC's urban systems are detailed below. For additional information, please refer to the CCRA report of the DSCC.

Table 11: Risk Assessment of Climate Fragility Statements[153]

Urban System	Impacts of Climate Change	Risk Status
Stormwater Drainage System 	Increased rainfall when coupled with clogged drains will lead to more incidence of waterlogging and flooding in the city. Since Dhaka South area is low lying, it is more prone to damage caused by urban flooding and waterlogging. Stagnating water may impact the health and well-being of residents and increase the incidence of waterborne diseases.	**Extremely High**
Solid Waste Management 	Rising temperatures can impact the waste collection efficiency of the city. High temperatures and humidity can alter the waste decomposition rate, leachate production rate and chemical composition of the leachate, which will facilitate microenvironments that encourage the spread of infectious diseases. It can also increase the risk of fires in landfill sites.	**High**
	Excessive rainfall can lead to waterlogging and urban flooding due to the obstruction of drains and water flow caused by improper disposal of solid waste. This can result in infrastructure damage and contamination of water bodies.	**High**
Health System 	Increasing temperature and waterlogging can provide a breeding ground to vector-borne diseases such as dengue and malaria. It will also increase the risk of non-communicable diseases such as asthma and heart attacks.	**High**
Water Supply 	Due to rising temperatures, the water demand may increase in the city, putting stress on existing sources of water, particularly groundwater. Given that the groundwater table is depleting, this may result in acute water stress within the city.	**Extremely High**
	Sudden, more intense rainfall may cause urban flooding that can damage the infrastructure of the water supply system and exacerbate water scarcity.	**Medium**

[153] ICLEI South Asia's analysis with discussion of stakeholders

Urban System	Impacts of Climate Change	Risk Status
Wastewater System 	Rising temperatures can exacerbate the release of noxious gases and foul odors from stagnant sewage, creating unfavorable conditions for the surrounding environment. Moreover, the higher temperatures can also lead to the accelerated growth and proliferation of harmful microorganisms within the sewage.	**Medium**
	Erratic rainfall can lead to more frequent waterlogging, which poses a challenge to the integrity of the sewerage management system infrastructure. Additionally, during these periods, there is a higher likelihood of freshwater and rainwater mixing with sewage and sludge, resulting in pollution in rivers and contributing to the potential spread of diseases.	**High**
Transportation 	Higher temperatures may lead to greater use of private transport, leading to increased traffic congestion and higher GHG emissions caused by the increase of private vehicles on the roads. It will also impact the economy and health of rickshaw pullers due to prolonged exposure to extreme heat. High temperatures can also damage transportation infrastructure such as roads and public buses.	**High**
	Erratic rainfall will expedite the deterioration of transportation-related infrastructure affecting road and rail transportation. As a result, the overall maintenance cost of roads and other infrastructure will be increased.	**High**
Energy 	The rising temperature in the DSCC area will intensify the electricity demand. The need for cooling and air conditioning during heat stress puts a strain on the energy infrastructure, resulting in disruption of power supply and leading to inconvenience to local residents and textile and other industries of the city.	**Extremely High**

4. GHG Emission Inventory

As part of the DSCC's commitment to tackling climate change, the city has compiled a GHG emissions inventory for the year 2021-22, following the Global Protocol for Community Scale GHG Emissions (GPC) (reflected in **Annexure 7**) created collaboratively by World Resources Institute (WRI), C40 Cities Climate Leadership Group and ICLEI - Local Governments for Sustainability. It is compliant with the GPC BASIC level reporting which covers Scope 1 and Scope 2 emissions from stationary energy and in-boundary transportation sources, as well as Scope 1 and Scope 3 emissions from waste.

Dhaka South's GHG emissions inventory for the year 2021-22 is compiled for the inventory boundary corresponding to the jurisdiction of DSCC, which is spread over 109.25 sq. km and has a population of 4.29 million persons. A GHG inventory for the base year 2018 was previously developed for Dhaka city with the support of C40, pertaining to the Dhaka metropolitan region which is spread over 1,600 sq. km and has a population of over 20 million people. This larger Dhaka Metropolitan region includes areas under DNCC and DSCC within its jurisdiction along with other areas outside DNCC and DSCC. The updated GHG inventory for 2021-22 has been compiled to reflect the geographical boundary of DSCC, using data at the city level rather than the metropolitan level. As part of the inventory updation process, data was collected from 2017-18 to 2021-22 to ensure consistency with the 2018 inventory and to help analyse the trend of GHG emissions from 2017-18 to 2021-22 for Dhaka South city.

As per the GPC BASIC framework, GHG emissions have been accounted for three sectors in Dhaka South, that cover:

i) Stationary Energy sector, including emissions from residential buildings, commercial and institutional buildings, manufacturing industries and construction, agriculture, forestry and fishing activities and non-specified sources[154];

ii) Transport sector, including on-road transport taking place within the DSCC boundary: and

iii) The waste sector, including solid waste and wastewater generated by the residents of the city.

4.1. Methodology and Process

The GHGs considered in the inventory are carbon dioxide (CO_2), methane (CH4) and nitrous oxide (N2O), gases which account for nearly 99% of the global GHG emissions. The GHG emissions inventory has been reported in terms of total tonnes of CO_2e equivalent (tCO_2) emission. To arrive at the tCO_2e values, the global warming potential (GWP) of each gas for a 100-year timeline is used based on the IPCC's Fourth Assessment Report (2007). To compute GHG emissions from various activities or sources, the corresponding emission factor and the relevant activity data have been used.

$$GHG_A = EF_A \times D_A$$

Where,

GHGA = GHG emissions resulting from activity A

EF_A = emission factor for activity A

D_A = data for activity A

The GHG emissions have been estimated using the City Inventory Reporting and Information System (CIRIS) tool[155] developed by C40. As noted earlier, the GHG emission inventory is compliant with the requirements of the GPC BASIC reporting framework, with emission sources accounted for and excluded as follows:

- GHG emissions from Stationary Energy, Transport within Dhaka South's boundary, and from Waste generated within the city boundary (including waste disposed outside the boundary) are included.
- In terms of in-boundary transport, most of the city's rail and water-borne transport is transboundary in nature, with only a marginal portion of trips occurring within the city boundaries. Furthermore, disaggregated data on fuel consumption for the rail network, water transport and off-road transport within city was not available and thereby related emissions are included in the emissions reported

[154] Non-specified sources include temporary electricity connections for social and cultural events, festivals, among others.

[155] C40 Cities Climate Leadership Group. (2022). City Inventory Reporting and Information System (CIRIS). Url: https://www.c40knowledgehub.org/s/article/City-Inventory-Reporting-and-Information-System-CIRIS?language=en_US. Date accessed 31.07.2023

under on-road transportation. Dhaka's aviation activity includes domestic and international flights that are mainly transboundary in nature. Aviation emissions within the city boundary have limited impact on city-level GHG emissions and are considered insignificant, and are not mentioned in Dhaka South's GPC BASIC inventory estimates.

- Emissions sources that fall outside the scope of the GPC BASIC framework such as industrial processes and product use (IPPU), agriculture, and forestry, and other land use (AFOLU), and from transboundary transport extending outside the city boundary through railways, water transport and aviation are excluded.
- Emissions from transmission and distribution losses associated with grid-supplied electricity and fugitive emissions from natural gas storage and distribution are additional to the scope of the GPC BASIC framework but have been accounted for in the GHG inventory, given data availability

Annexure 8 lists the sources of activity data collected for compilation of the GHG inventory. The results of the GHG emissions inventory for Dhaka South City were validated through a stakeholder consultation workshop in September 2023.

4.2 GHG Emission Inventory Results

The total carbon dioxide equivalent emissions of DSCC in the year 2021-22 have been estimated as **5,660,690 tCO_2e**, with emissions per capita of Dhaka South City standing at **1.32 t CO_2e**.

***Table 12: GHG Emissions by Sector in Dhaka South*[156]**

Sector	GHG Emissions (Million tCO_2e)	Share of Total
Stationary Energy	3.14	56%
Transportation	0.69	12%
Waste	1.83	32%
TOTAL	**5.66**	**100%**

[156] ICLEI South Asia

[157] ICLEI South Asia

GHG emissions comparison with national and other cities

Bangladesh's total GHG emission amounted to 169 million tCO_2e in 2012. Emissions from a few other cities of Bangladesh are presented for comparison with Dhaka South in Table 13 below.

***Table 13: Comparison of Dhaka South's GHG Emissions with Other Cities*[157]**

Country/City (Base Year)	GHG Emissions (Million tCO_2e)	Per Capita Emissions (tCO_2e per capita)
Bangladesh (2012)	169.05	1.17
Dhaka North (2021-22)	7.65	1.28
Dhaka South (2021-22)	5.66	1.32
Rajshahi (2017-18)	0.63	1.27
Narayanganj (2018 -19)	1.06	1.19

The following sections presents a detailed breakdown of DSCC's emissions by sector and sub-sector. A summary of Dhaka South's GHG inventory, reflected as per the GPC reporting framework, is provided in **Annexure 9**.

4.3. Sectoral GHG Emissions

The Stationary Energy sector is the largest contributor to Dhaka South's GHG emissions, accounting for more than half (56%) of the total emissions. These emissions are dominated by emissions caused by residential energy consumption (34%), followed by manufacturing industries and construction related activities (11%), commercial and institutional energy consumption activities (9%), and other energy consumption (non-specified sources, 2%). The waste sector emits 32% of the emissions in Dhaka South, of which 22% are from solid waste disposal and 10% from wastewater. The transport sector accounts for about 12% of the total emissions in the city.

The GHG emissions that occur within the city boundaries (i.e., Scope 1) are driven by stationary fuel combustion, transport and wastewater. Scope 2 emissions from electricity consumption are driven by the demand for grid electricity, provided by Dhaka Power Distribution Company Limited (DPDC). A small amount of scope 3 emissions occur in Dhaka South's stationary energy sector, associated with T&D losses from electricity consumption. The data has been collected from reliable primary sources : DPDC, DWASA, Titas, DSCC, BPC, and DTCA. Additionally, relevant secondary resources such as published journals, government websites, blogs, articles, national reports, etc. have also been used. The analysis was conducted by following the C40 and ICLEI South Asia methodology as mentioned above.

Table 14: Breakup of GHG Emissions by Sub-sector in Dhaka South[158]

Sector and Sub-sector	GHG Emissions (metric tCO_2e[159])	Share of Total
Stationary Energy		
Residential buildings	1,898,673	33.54%
Commercial and institutional buildings and facilities	509,937	9.01%
Manufacturing industries and construction	626,482	11.07%
Agriculture, forestry, and fishing activities	46	<1%
Non-specified sources[160]	103,896	1.84%
Fugitive emissions from oil and natural gas systems	0.9	<1%
Transportation		
On-road transportation	686,173	12.12%
Waste		
Solid waste generated in the city	1,260,044	22.26%
Wastewater generated in the city	575,439	10.17%
TOTAL	**5,660,690**	**100%**

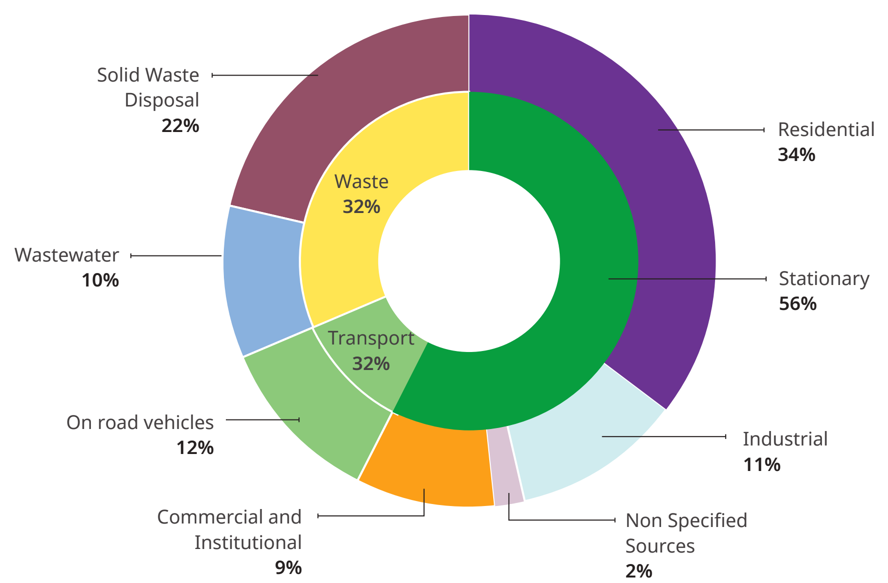


***Figure 21:** Break-up of Sectoral GHG Emissions in Dhaka South, 2021-22*[161]

[158] The data has been collected from reliable primary sources : DPDC, DWASA, Titas, DSCC, BPC, and DTCA. Additionally, relevant secondary resources such as published journals, government websites, blogs, articles, national reports, etc. have also been used. The analysis was conducted by following the C40 and ICLEI South Asia methodology as mentioned above.

[159] Figures have been reported in metric tonnes of CO2e instead of million t CO2e since emissions from certain sub-sectors are relatively low.

[160] Note: Non-specified sources include temporary electricity connections for social and cultural events, festivals, among others

[161] The data has been collected from reliable primary sources : DPDC, DWASA, Titas, DSCC, BPC, and DTCA. Additionally, relevant secondary resources such as published journals, government websites, blogs, articles, national reports, etc. have also been used. The analysis was conducted by following the C40 and ICLEI South Asia methodology as mentioned above.

When analysing the breakdown of emissions by energy source or fuel in the stationary energy and transport sectors, grid electricity is seen to be the largest contributor, with a share of 54.74%, excluding emissions from the waste sector. It is followed by emissions associated with PNG consumption in buildings (22.74%) and from diesel and CNG consumption (contributing more than 15% of the emissions) which plays a key role in the energy demand of the transport sector.

4.3.1. Stationary Energy

Stationary energy is the largest contributor to Dhaka South's GHG emissions. These emissions occur due to fuel combustion to produce electricity, for other end-uses in buildings such as cooking, as well as fugitive emissions and those from technical losses (transmission and distribution) from other useful forms of energy (such as electricity and gas).

Residential buildings produce the highest emissions from stationary energy, with a share of 61%, followed by industrial units accounting for 20%, and commercial and institutional buildings and facilities with 16%.

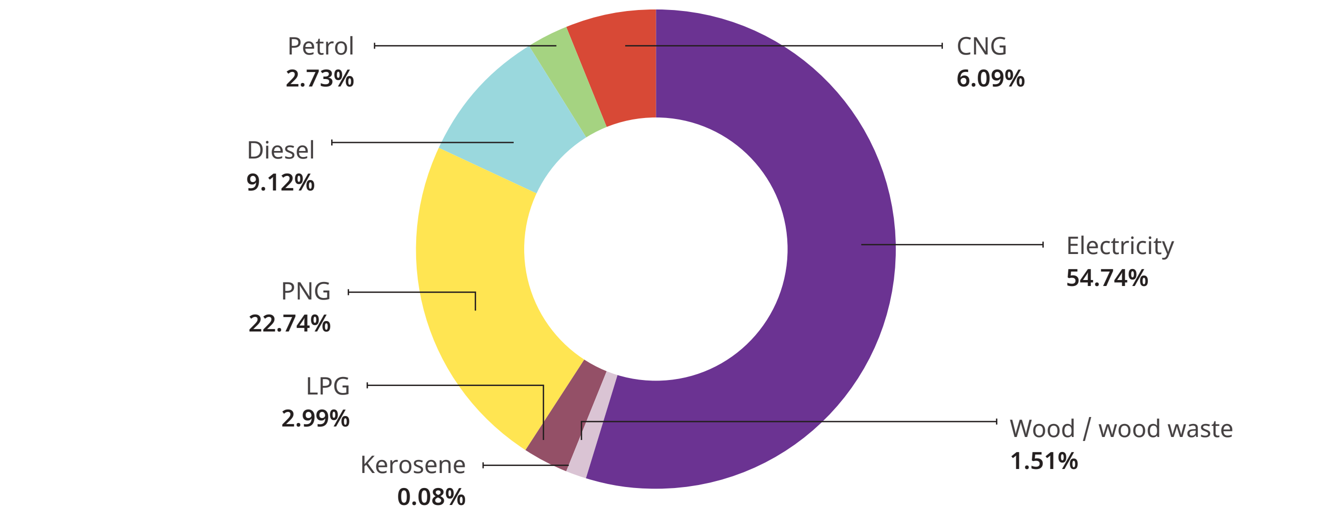


Figure 22: *Energy Source or Fuel Wise GHG Emissions in Dhaka South, 2021-22*[162]

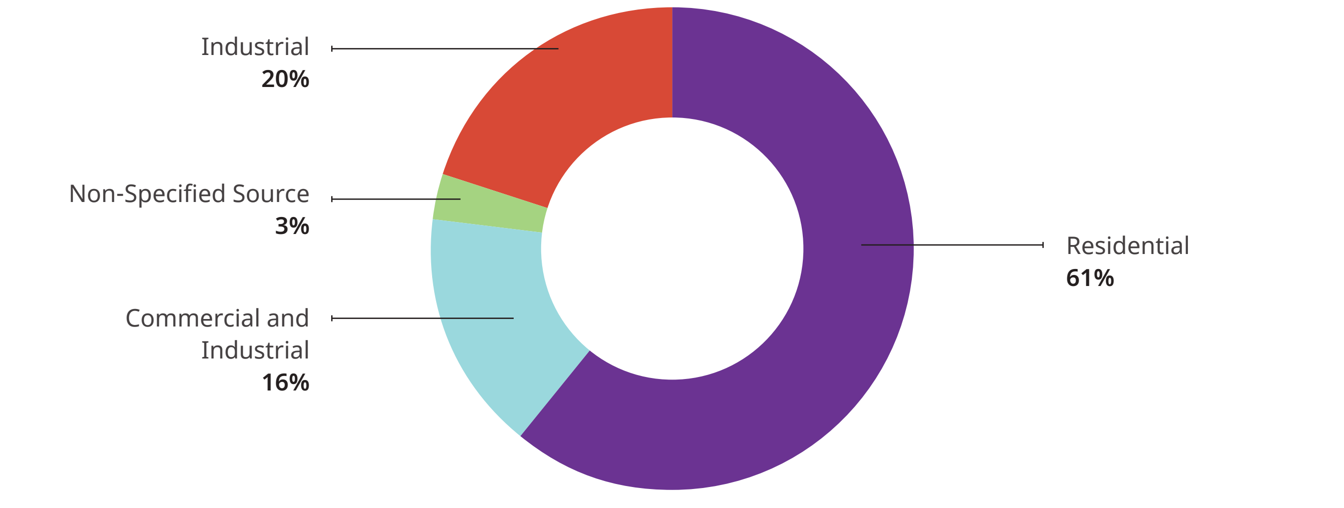


Figure 23: *Stationary Energy Emissions by Sub-sector*[163]

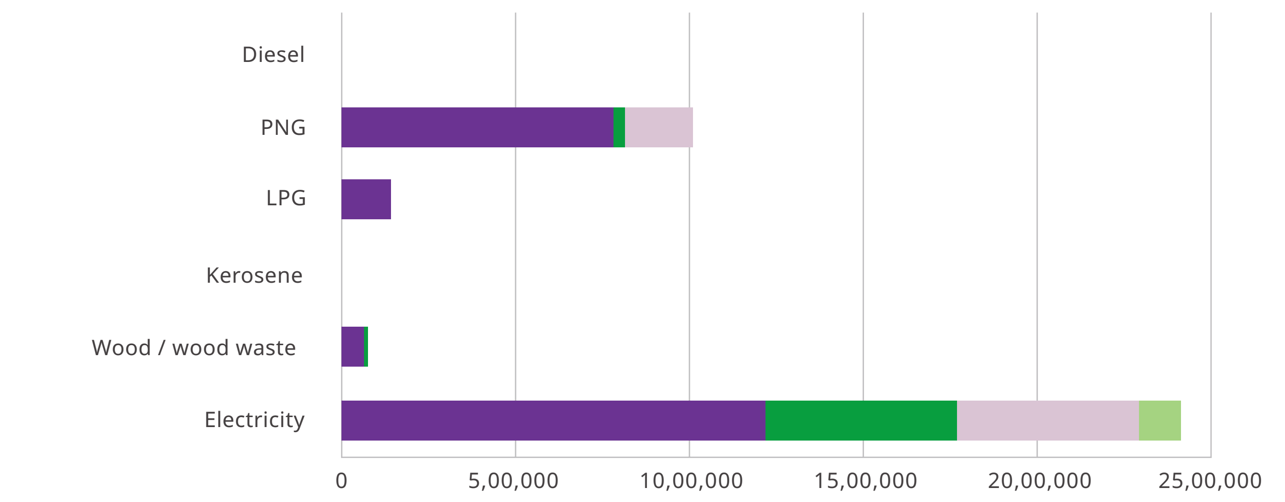
[162] The data has been collected from reliable primary sources : DPDC, DWASA, Titas, DSCC, BPC, and DTCA. Additionally, relevant secondary resources such as published journals, government websites, blogs, articles, national reports, etc. have also been used. The analysis was conducted by following the C40 and ICLEI South Asia methodology as mentioned above.

[163] The data has been collected from reliable primary sources : DPDC, DWASA, Titas, DSCC, BPC, and DTCA. Additionally, relevant secondary resources such as published journals, government websites, blogs, articles, national reports, etc. have also been used. The analysis was conducted by following the C40 and ICLEI South Asia methodology as mentioned above.

Figure 24 reflects the sub-sector wise emissions from consumption of different fuels in the stationary energy sector. Electricity and natural gas are the key drivers of the city's energy consumption and GHG emissions. Of the total grid electricity consumption and associated emissions, 50% result from residential buildings, 23% from commercial and institutional buildings and facilities, 22% from industrial sub-sector, and 5% from non-specified sources that primarily include temporary connections for different purposes. With regard to natural gas, the residential sector emits 78% of the total emissions from PNG consumption, followed by industries and the commercial and institutional sub-sectors, which contribute 20% and 3%, respectively. Emissions from LPG and kerosene use largely occur in the residential sub-sector, while industries produce emissions from diesel consumption. Burning of wood/wood waste takes place to meet cooking energy requirements of low-income communities and has negative implications on indoor and outdoor air quality and human health. 87% of the emissions from wood/ waste result from the residential sub-sector and 13% from the commercial and institutional sub-sector.

4.3.2. Transport

Emissions from transportation systems in Dhaka South occur primarily due to on-road movement of vehicles. Combustion of fuel or indirect consumption of grid-electricity in transport vehicles and mobile equipment or machinery leads to GHG emissions in the transport sector. It is estimated that Dhaka South, with an average per capita trip generation rate of 1.72[165], generates a little more than 10 million trips every day, making up about 58% of the total trips generated in Dhaka[166]. Trips by bus constitute 56% of the total passenger trips, followed by non-motorised



	Electricity	Wood / wood waste	Kerosene	LPG	PNG	Diesel
Residential	10,55,607	50,494	2,929	1,14,471	6,75,173	
Commercial / Institutional	4,78,193	7,373			24,371	
Industrial / Construction	4,56,117				1,70,364	-
Non Specified	1,03,895					

GHG emissions (tCO_2e)

Figure 24: *Stationary Energy Emissions by Sub-sector and by Fuel Type*[164]

[164] The data has been collected from reliable primary sources : DPDC, DWASA, Titas, DSCC, BPC, and DTCA. Additionally, relevant secondary resources such as published journals, government websites, blogs, articles, national reports, etc. have also been used. The analysis was conducted by following the C40 and ICLEI South Asia methodology as mentioned above.

[165] Dhaka Transport Coordination Authority. 2015. The Project on the Revision and Updating of the Strategic Transport Plan for Dhaka (Draft Final Report). Prepared by JICA. Page 10-2. Url: dtca.portal.gov.bd/sites/default/files/files/dtca.portal.gov.bd/page/3e3ae325_4494_4fea_b709_b5729cc8ab43/DFR_C99_All (3).pdf. Date accessed: 31.07.2023

[166] The central part of Dhaka Metropolitan Area which comprises of Dhaka North and Dhaka South municipal corporations.

transit (18%) which includes walking, cycling, and use of cycle rickshaws and manually pulled carts. Intermediate public transport modes are responsible for 13% of the trips, while private transport, inclusive of two and four wheelers, comprises 13% of the total trips[167]. Dhaka's transport datasets mainly report on passenger transport and information on freight is not available.

The total number of registered vehicles has increased by almost a million over the past decade, from 0.65 million vehicles in 2011 to 1.63 million vehicles in 2020. It is important to note that this increase was largely driven by the rapid increase of individual private vehicles, which increased from 0.4 million in 2011 to 1.2 million in 2020, registering an average annual growth rate of 8% in the process. On the other hand, intermediate public transport barely increased from 0.08 million to 0.13 million during the same period. On-road vehicles typically include cars, buses, trucks, taxis and motorcycles. A fuel sales approach has been used to estimate the GHG emissions based on the

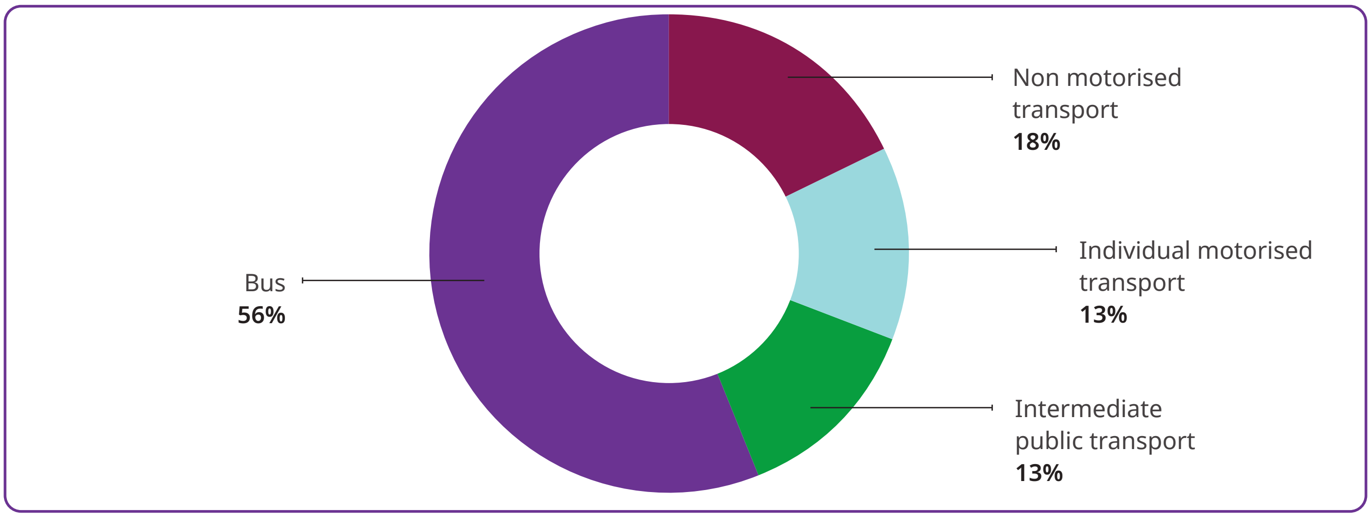


Figure 25: *Mode Share of Total Trips in Dhaka, 2015[168]*

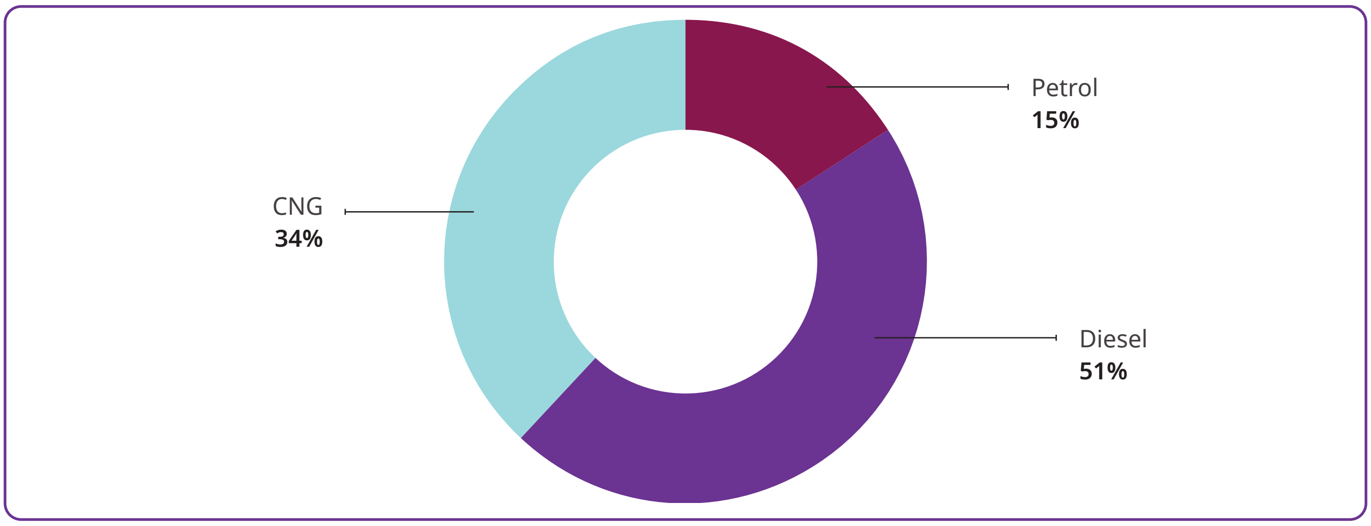


Figure 26: *Transportation Emissions by Fuel Type in Dhaka South, 2021-22[169]*

[167] (i) Dhaka Transport Coordination Authority. 2015. The Project on the Revision and Updating of the Strategic Transport Plan for Dhaka (Draft Final Report). Prepared by JICA. Url: dtca.portal.gov.bd/sites/default/files/files/dtca.portal.gov.bd/page/3e3ae325_4494_4fea_b709_b5729cc8ab43/DFR_C99_All (3).pdf. Date accessed: 31.07.2023 (ii) UNESCAP. 2018. Final Report on Sustainable Urban Transport Index (SUTI) for Dhaka, Bangladesh. Prepared by Noor-e-Alam, Superintending Engineer, Roads and Highways Department, Dhaka, Bangladesh. Url: https://www.unescap.org/sites/default/files/SUTI%20Mobility%20Assessment%20Report%20-%20Dhaka.pdf. Date accessed: 31.07.2023

[168] Ibid

[169] The data has been collected from reliable primary sources : DPDC, DWASA, Titas, DSCC, BPC, and DTCA. Additionally, relevant secondary resources such as published journals, government websites, blogs, articles, national reports, etc. have also been used. The analysis was conducted by following the C40 and ICLEI South Asia methodology as mentioned above.

consumption of fuel across different types of on-road vehicles. Consumption of diesel causes the largest amount of overall road transportation emissions, followed by use of CNG and gasoline/petrol (Figure 26).

Direct emissions resulting from in-boundary trips of the transport sub-sectors of railways and water transport have been accounted for under on-road transportation Due to the unavailability of disaggregated data on fuel consumption in off-road transport, railways and water transport, direct emissions resulting from in-boundary trips of these transport sub-sectors have been accounted for under on-road transportation. The length of the rail network within the city boundary extends to only a few kilometres, with a majority portion of the rail journeys being transboundary in nature and going to other areas of the country. Water transport within the Dhaka South city is insignificant. Aviation-related emissions in Dhaka are primarily transboundary in nature, resulting from domestic or international flights, as opposed to flights originating and landing in the city.

4.3.3. Waste

The waste sector includes solid waste and wastewater that may be disposed of and/or treated at facilities inside the city boundary or transported to locations outside for treatment. Waste disposal and treatment produces GHG emissions through aerobic or anaerobic decomposition, or incineration.

The total emissions from the waste sector in Dhaka South were 1,835,483 tCO_2e. Overall, the waste sector contributes 32% of the total emissions in Dhaka South.

DSCC's solid waste disposal accounts for 69% of Dhaka South's total waste sector emissions while domestic wastewater has a share of 31%.

Solid Waste

Dhaka South city generates 3,426 tonnes per day (TPD) of solid waste (MSW) based on 2021-22 base year, with per capita generation estimated to be 0.73 kg per day. With a household waste collection coverage level of 90% and collection efficiency of 90%, the total MSW collected amounted to 2775 TPD in 2021-22. MSW processing facilities such as composting and bio-methanation are not available in Dhaka South, hence the waste collected is disposed of, without any treatment at Matuail landfill site. The uncollected MSW is scattered across the city, leading to negligible GHG emissions but posing challenges of sanitation and public health.

Annual solid waste disposed in 2021-22 amounted to 1,012,897 tonnes, based on the daily quantum of 2,775 TPD. The Matuail landfill site is located in Dhaka South, with waste that is disposed of left to decay anaerobically, emitting CH4 into the atmosphere over time. Facilities for controlled capture and recovery of CH4 are not present at the site and the depth of the

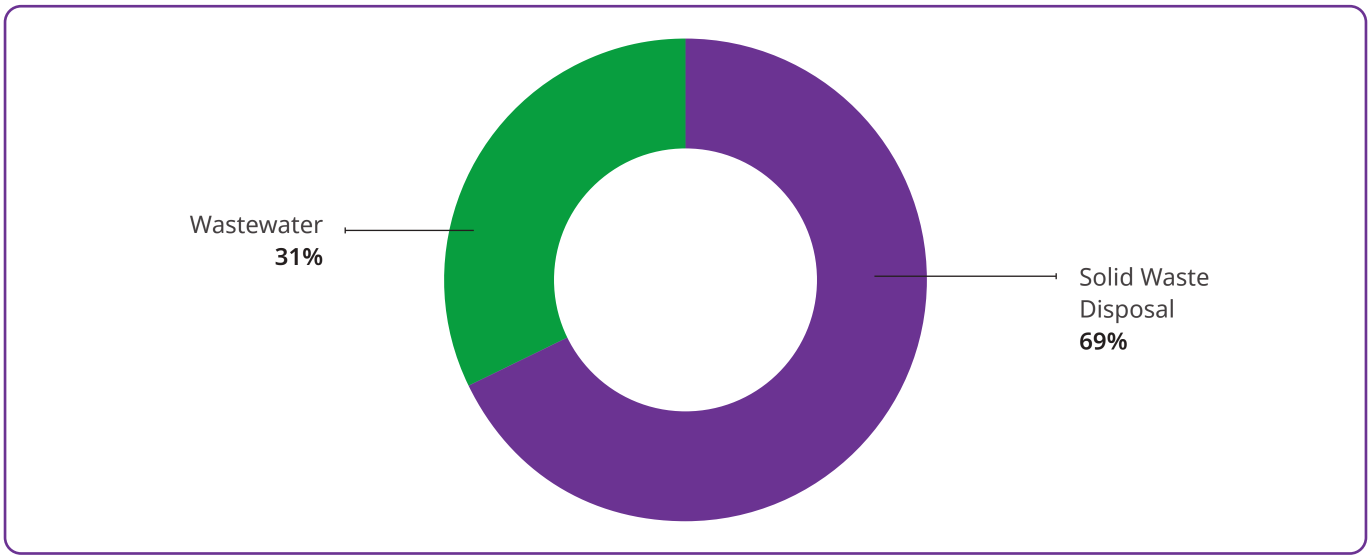


Figure 27: Waste Sub-sector Share of GHG Emissions[170]

[170] The data has been collected from reliable primary sources : DPDC, DWASA, Titas, DSCC, BPC, and DTCA. Additionally, relevant secondary resources such as published journals, government websites, blogs, articles, national reports, etc. have also been used. The analysis was conducted by following the C40 and ICLEI South Asia methodology as mentioned above.

waste dump is 34 m. Regarding waste composition, 63% of the waste is organic in nature and thereby has a significant proportion of emission generating constituents (Table 15). GHG emission from solid waste disposal was estimated to be 1,260,044 tonnes CO2e, amounting to 22% of the city's total emissions. As the disposal site is located inside the city boundary, these emissions are considered as scope 1 emissions in this GHG inventory.

Table 15: Physical Composition of Waste in Dhaka South, 2021-22[171]

Waste Component	Composition
Biodegradable	60%
Paper	5%
Cardboard	5%
Plastics	2%
Packing materials	2%
Rags	1%
Rubber/leathers	2%
Glass	1%
Cloth	1%
Non recyclables	10%
Stones and mortar	2%
Wood	3%
Bricks	1%
Concrete	5%
Total	**100%**

Wastewater discharge and treatment

7.5% of the total wastewater generated is treated at Pagla Sewage Treatment Plant (STP). A large portion of the wastewater generated (73%) is let out through storm water or sewer networks or open drains, without pre-treatment, while 17.5 % is openly discharged into water bodies such as lakes, rivers and sea without treatment[172]. Only 2% of the households use on-site sanitation in the form of septic tanks to discharge and collect wastewater for pre-treatment.

4.4. Time-Series Trend of GHG Emissions

The 2021-22 GHG inventory is an update of the 2018 inventory prepared by C40 in association with DSCC. As mentioned above, data was collected from 2017-18 to 2021-22 to validate the 2018 inventory and make comparative analysis over the years. Consequently, it has been observed that the GHG emissions in Dhaka South have increased from 4.1 million tCO_2e in 2017-18 to 5.66 million tCO_2e (Figure 28). The average annual growth of GHG emissions in Dhaka South was 9% from 2017-18 to 2021-22. Emissions are observed to have decreased slightly in 2019-20 linked to the onset of the COVID-19 pandemic, following which it has increased continually.

Among all the sectors, the increase of emissions from the waste sector has been the most noticeable, wherein the emissions increased from 0.88 million tCO_2e in 2017-18 to 1.84 million tCO_2e 2021-22, growing at an average annual rate of 21%. Emissions from stationary energy consumption contributed to the bulk of emissions each year and have increased at an average rate of 6% from 2017-18 to 2021-22. Emissions from the transport sector have decreased by 7% since 2017-18.

[171] Data received from Waste Department, DSCC.

[172] Wastewater discharge to lakes and rivers results in low emissions as decomposition is largely aerobic, while the remaining wastewater let out through sewer or drains in Dhaka South represents stagnant sewers that results in higher emissions as anaerobic decomposition takes place.

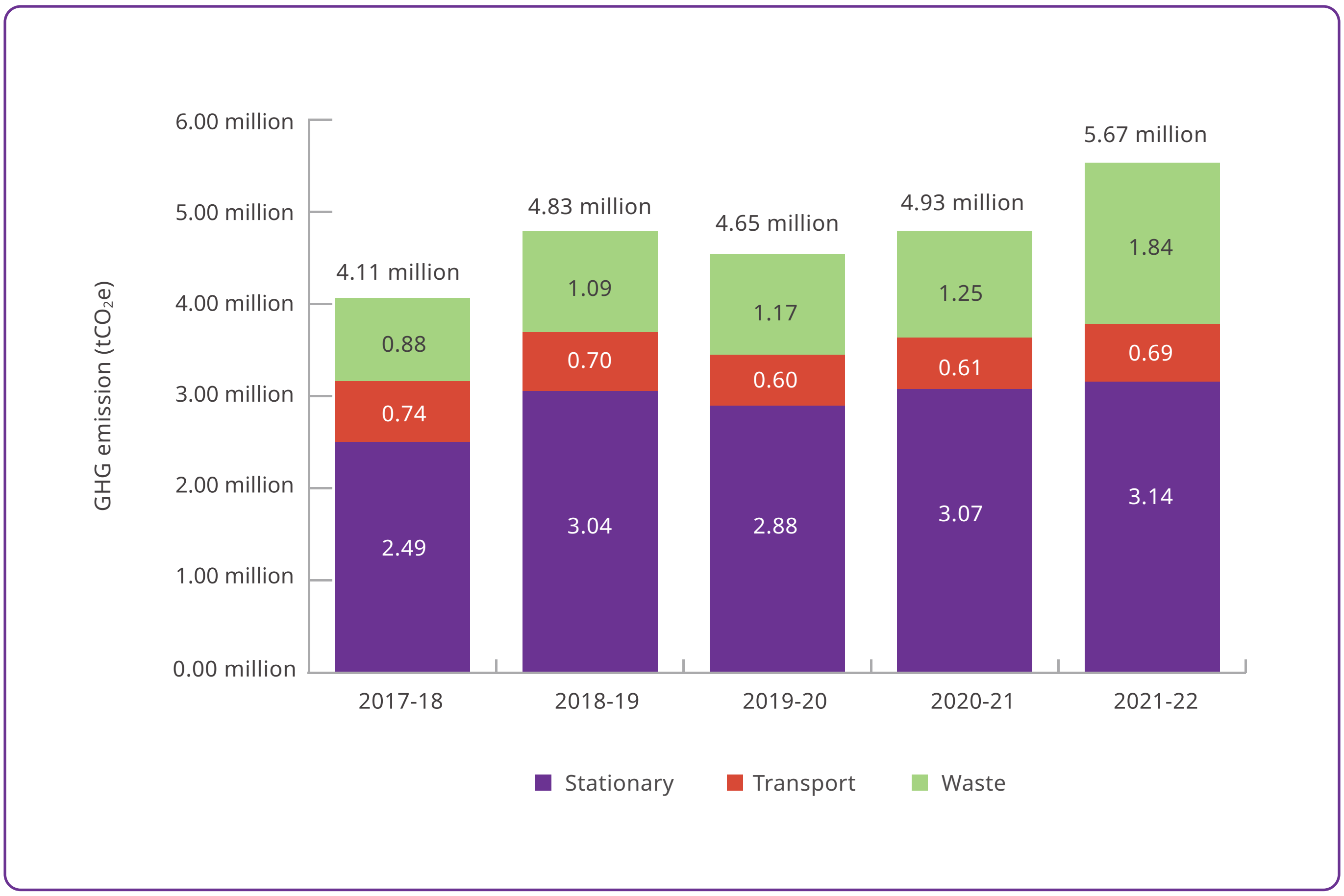


Figure 28: Sector-wise Trend of GHG Emissions in Dhaka South, 2017-18 to 2021-22 [173]

[173] The data has been collected from reliable primary sources : DPDC, DWASA, Titas, DSCC, BPC, and DTCA. Additionally, relevant secondary resources such as published journals, government websites, blogs, articles, national reports, etc. have also been used. The analysis was conducted by following the C40 and ICLEI South Asia methodology as mentioned above.

5. Future GHG Emission Reduction Scenarios

The Climate Action Plan for Dhaka aims to achieve improved climate resilience and move towards net zero emissions by 2050 to meet global climate goals as set out in the Paris Agreement. Development of future GHG emissions scenarios is an important step in this process. It helps to establish and outline the trajectories of future GHG emissions for different scenarios, providing an evidence base to guide the identification of emission reduction targets and strategies to achieve net zero goals at the city-scale.

Defining net zero GHG emissions

Net zero refers to a state of balance between anthropogenic emissions and anthropogenic removals. In the case of cities, this implies net-zero GHG emissions rather than net-zero CO_2 emissions, as the former also includes non-CO_2 GHG removals.

Three different emission scenarios have been developed for Dhaka using C40's Pathways Model, namely i) Business as usual scenario ii) Existing and Planned scenario iii) 1.5°C Extended Action scenario. Consultations with the Climate Core Team have been conducted during this process to get inputs on identifying ambitious and practical targets and actions.

On the basis of the emissions scenarios developed for Dhaka, DSCC is setting targets to reduce its city-wide GHG emissions by 14.9% by 2030, 33.8% by 2040, and 70.6% by 2050, as compared to the base year 2021-22 levels. These targets set forth in DSCC's first climate action plan are in line with the city's emissions trajectory of the 1.5°C Extended Action scenario. DSCC is committed to achieving the 1.5oC compatible net-zero GHG emissions at the city-scale by 2050, in alignment with the Paris Agreement target, and will update its targets in future climate action plan revisions to cut down the remaining emissions and achieve 100% GHG emissions reduction by 2050 from base year levels.

Identification of Dhaka's targets is aligned with C40 Deadline 2020 research and approach that helps cities to draw up and commit to GHG emissions trajectories to achieve the Paris Agreement targets and reach net-zero emissions by 2050. Based on Deadline 2020 research, Dhaka has been considered as a 'Late Peak' city, having low GDP per capita and low GHG emission per capita. It accommodates an increase in the city's overall emissions owing to growth in population and economy until 2030, while ensuring that per capita emissions do not increase any further by 2030. The 1.50C Extended Action Scenario, that Dhaka South's targets align with, is drawn up to identify the level of ambitious climate action necessary for Dhaka to move much closer to net zero GHG emissions by 2050 and meet Deadline 2020 commitments.

The GHG emission scenarios pertain to Dhaka city, i.e. the combined jurisdiction of DSCC and DNCC. This is due to the contiguous nature of Dhaka South and Dhaka North. Dhaka city was bifurcated into areas under DSCC and DNCC jurisdiction just over a decade ago in 2011, and as such there are interlinkages between the urban systems and infrastructure such as transportation and economic activity and limitations in availability segregated information for Dhaka South and Dhaka North. Several urban master plans also address Dhaka South and Dhaka North in a combined manner when identifying goals and strategies. Thus, the emission scenarios and resulting strategies, targets and actions are identified for the combined area of DSCC and DNCC, i.e., Dhaka city.

5.1. Process Adopted for Scenario Development

The overall process aims to demonstrate to city decision-makers and stakeholders how emission levels are expected to look like in the future in different scenarios, and ultimately to help identify a basis and roadmap of what is required in terms of levels of ambition and climate actions to achieve net zero goals.

As mentioned, in Chapter 4, the process was initiated in 2018 when the first GHG inventory and the GHG emission mitigation model was prepared by C40 in association with DSCC and DNCC. However, the exercise pertained to the Dhaka metropolitan region, encompassing an area of 1600 sq. km and which extends beyond Dhaka South and Dhaka North.

The 2018 model, which was developed using C40's Pathways tool, identified emission scenarios and targets for the whole Dhaka metropolitan region. The draft scenarios developed during the 2018 modelling exercise were validated through feedback at a stakeholder workshop and were further refined to develop the 1.5°C Extended Action scenario. The scenarios developed during the 2018 exercise were appropriately contextualised during the 2021-22 exercise for Dhaka city, i.e., the combined area of Dhaka South and Dhaka North, which encompasses an area of 305.45 sq. km. The approach included a detailed review of existing national, regional and city-level policies and programs, and entailed modelling of emission forecasts using appropriate population and economic growth factors as well as base datasets reflecting the local context. The 2021-22 modelling exercise identified three scenarios, viz, the (i) BAU, (ii) Existing and Planned Actions scenario and (iii) 1.5°C Extended Actions scenario. The scenarios, emission reduction strategies and targets were identified and finalised through consultations with DSCC's Climate Core Team. Based on the inputs, the model was further refined with the 1.5°C Extended Action scenario being outlined as the recommended pathway for DSCC to achieve net zero emissions. The process flow of the modelling exercise is given in Figure 29.

5.1.1. Business-As-Usual Scenario

The BAU Scenario depicts the level of future GHG emissions if the current state-of-play is followed and no emissions reduction efforts and measures are implemented. The BAU Scenario represents the 'baseline condition' and serves as a reference point for assessing the impact of other emissions reduction scenarios or pathways. GHG emissions for the BAU Scenario are projected on the basis of Dhaka's GHG emissions for 2021-22 and account for the impact of population and economic growth in different sub-sectors that have GHG emissions, such as residential, commercial, industries, transport, solid waste and wastewater.

GHG emissions have been forecast until 2050 based on a combination of population growth rate and GDP growth rates. The base growth rates considered for Dhaka's population and GDP over three forecasting periods are given in Table 16. For each sub-sector, weights have been apportioned to the population and GDP growth factors based on their level of influence or impact on sectoral activity and emissions. Subsequently, the weighted average of these composite growth factors have been considered to estimate sectoral emissions growth rate over each forecasting period (see **Annexure 10** for further details).

This projection has been made using the BAU scenario, which shows what the situation would be like if no measures were taken. As DSCC will intervene sector-wise, it is expected to reduce the level of GHG emissions in the future.

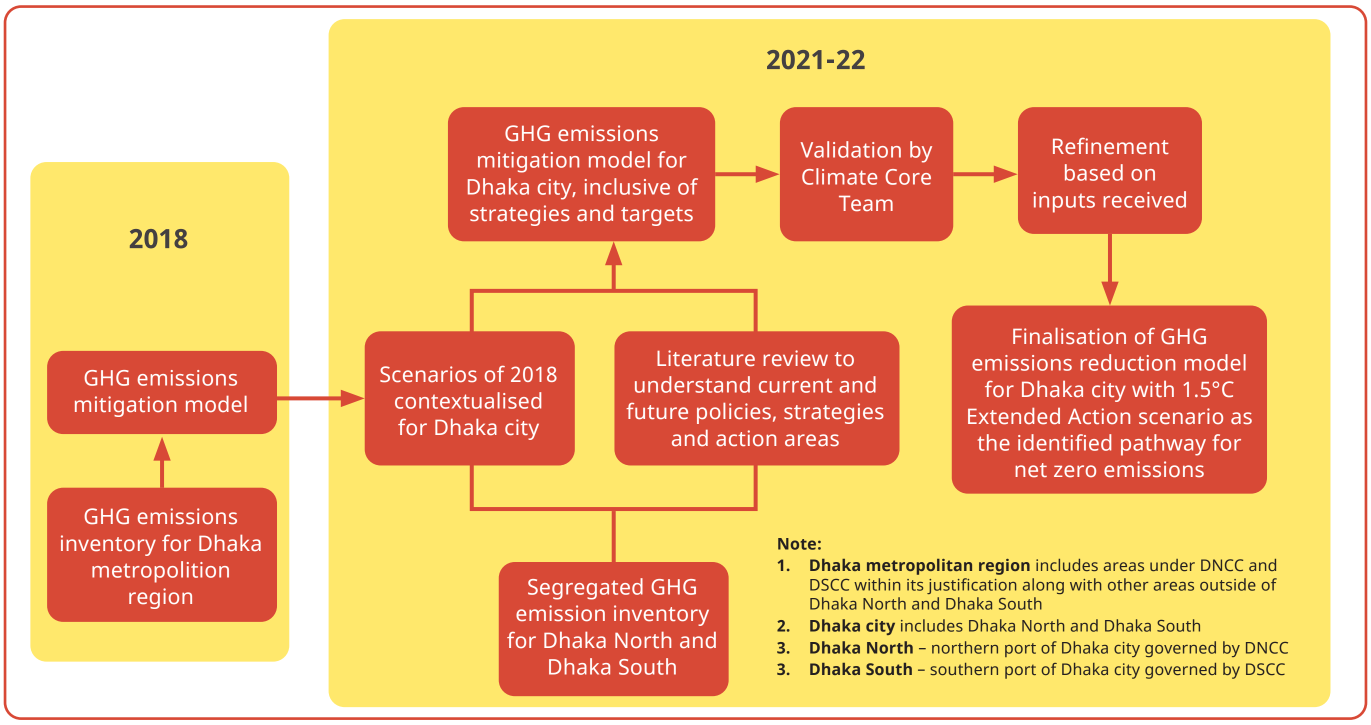


Figure 29: Process Flow of the GHG Emissions Scenario Modelling[174]

[174] ICLEI South Asia analysis

Table 16: Base Population and GDP Growth Rates for GHG Emission Forecast in BAU Scenario[175]

Parameter	2021-22 to 2030	2030 to 2040	2040 to 2050
Population Growth Rate	3.3%	1.1%	1.1%
GDP Growth Rate	7.6%	5.8%	4.7%

If current trends continue and in the absence of any mitigation efforts, Dhaka's GHG emissions are expected to increase by almost 2.5 times to 32.6 million tCO_2e 2050 from 2021-22 levels of 13.3 million tCO_2e (Figure 30)

In the BAU Scenario, the projected increase in GHG emissions until 2050 is driven primarily by the stationary energy sector, specifically energy consumption in buildings. Emissions from stationary energy use are estimated to account for 63.6% of Dhaka's city-scale emissions in 2050, showing an upward trend from the corresponding share of 56% in base year 2021-22. GHG emissions from transportation are expected to contribute to 9.7% and 26.8%, respectively, in 2050 as against their contribution of 11.6% and 32% in 2021-22.

5.1.2. Existing and Planned Scenario

The E&P Scenario demonstrates the expected level of GHG emissions resulting from climate action being implemented through existing policies and plans at the city-scale, as compared to the BAU scenario. Moreover, it helps to determine the gap between emission reduction that can be achieved by current targets and plans and the action that is additionally needed to achieve net zero goals by 2050. The E&P Scenario supports identification of the level of

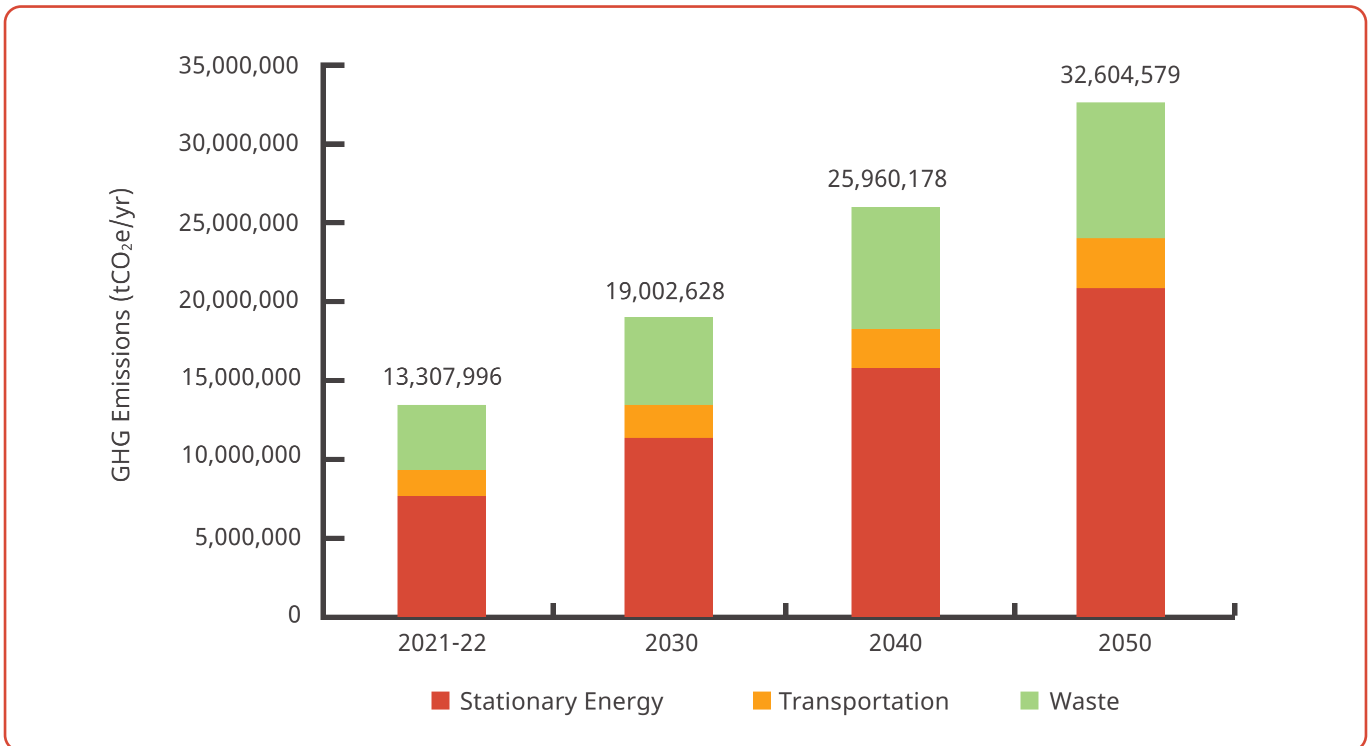


Figure 30: *Projected GHG Emissions in BAU Scenario*[176]

175 ICLEI South Asia analysis
176 ICLEI South Asia analysis

ambition and sub-sectors or areas where further action is needed. The targets and actions required to close the gap to net zero emissions can then be mapped through further ambitious scenarios.

The E&P Scenario considers goals and guidelines of national, regional and city policies and programs that are currently underway or being planned, while being reflective of on-ground context and factors such as local conditions, current status of adoption of actions, and resources, among others. The key existing policies and commitments considered to build this scenario include:

- Nationally Determined Contributions (NDCs) 2021 Bangladesh (Updated)
- Mujib Climate Prosperity Plan 2022-2041
- Power System Master Plan, 2016
- National Solar Energy Roadmap, 2021-2041 (draft)
- Net Metering Guidelines, 2018
- Energy Efficiency and Conservation Masterplan, 2016
- Bangladesh National Building Code, 2020
- Building Energy Efficiency & Environment Rating (BEER) scheme
- National Action Plan for Clean Cooking Bangladesh 2020-2030
- Dhaka Structure Plan (2016-2035) (draft)
- Dhaka Revised Strategic Transport Plan 2016
- Sustainable Urban Transport Index - Mobility Assessment for Dhaka, 2018

In the E&P Scenario, city-wide GHG emissions for Dhaka are estimated to increase by 63.5 % in 2050 as compared to that in the base year 2021-22, even with the implementation of actions as per existing plans and policies.

The E&P Scenario results in the following levels of emissions compared to base year:

- GHG emissions in 2030: 26.7% higher than base year 2021-22 levels
- GHG emissions in 2040: 52.5% higher than base year 2021-22 levels
- GHG emissions in 2050: 63.5% higher than base year 2021-22 levels

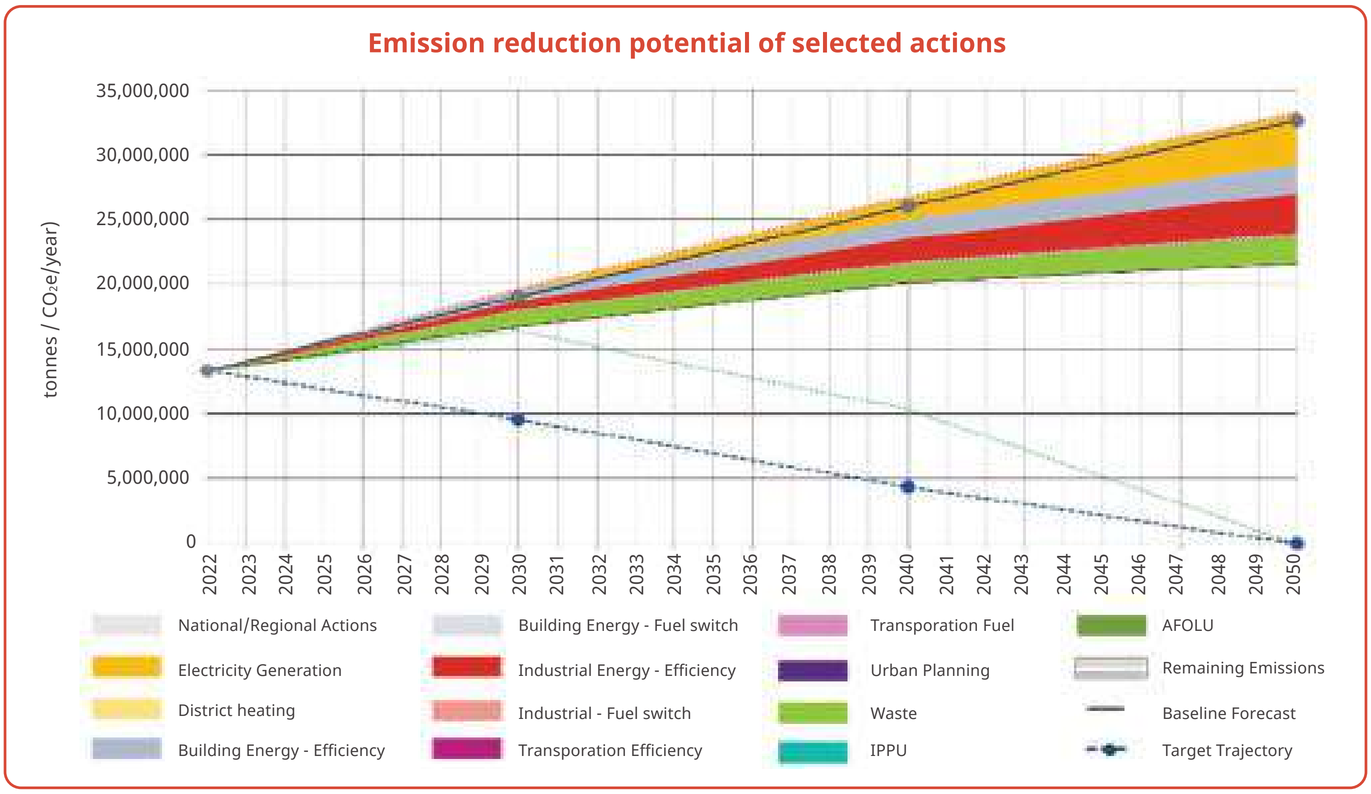


***Figure 31:** GHG Emission Pathway and Emission Reduction Potential for Existing and Planned Scenario*[177]

[177] ICLEI South Asia analysis

- DWASA Wastewater Masterplan
- New Clean Dhaka Waste Master Plan, 2018-2032 for Dhaka South

Notable targets and actions are outlined in the E&P Scenario across the sectors of Stationary Energy, Transportation and Waste. The share of renewables in the power grid is assumed to increase to 24% by 2050 as compared to 3% in 2022, while between 60 to 80% of new buildings (residential, commercial and institutional) are targeted to be built as per high energy efficiency standards. However, results indicate that more accelerated action on energy efficiency in different types of buildings and on renewable energy integration is required for deep reductions in emissions. Based on Dhaka's Strategic Transport Plan, improvements in public bus services and metro rail are expected to lead to public transit-based trips rising to 30 % by 2050. Based on the current plans and the limited number of electric vehicles on-ground, it is anticipated that 10 % of all private and intermediate public transit (three-wheelers) vehicles will be electric by 2030. In the Waste sector, increased source reduction and recycling of solid waste is assumed as per the Clean Dhaka Master Plan, along with 100% treatment of domestic wastewater (without biogas recovery) in line with goals of the Sewerage Master Plan.

The E&P Scenario projects that Dhaka's GHG emissions will rise to 21.78 million tCO_2e by 2050, as compared to 13.3 million tCO_2e in 2021-22, despite the implementation of such climate actions envisaged in line with current plans. While the actions in the E&P Scenario do lead to an emission reduction of 10.83 million tCO_2e by 2050 as against the projected BAU emissions of 32.6 million tCO_2e, it falls short of meeting the target of 100% reduction and resulting net zero emissions. Therefore, Dhaka will require more ambitious climate action to close this gap, considering its expected future population and GDP growth.

The Extended Action Scenario has been drawn up to support identification of targets and actions that will help Dhaka achieve its 1.5°C aligned net zero climate targets.

5.1.3. Extended Action Scenario

The Extended Action Scenario identifies the level of ambitious climate action necessary for Dhaka to undertake to move much closer to the goal of net zero GHG emissions by 2050 as compared to the E&P Scenario. For the Extended Action Scenario, all the targets, actions and assumptions considered in the E&P Scenario are used as a basis and are further extended to allow for a higher reduction in emissions.

The key actions and targets identified in the Extended Action scenario include:

1. Achieving 85% of renewable energy share in the electricity grid by 2050, and increasing the share of rooftop solar PV to 30% in residential buildings and up to 70 % in commercial and institutional buildings;
2. Energy efficiency and fuel switch in all new residential, commercial and public buildings, and public utilities by 2030; and in 70% of existing buildings by 2050;
3. Transitioning to 95% share of EVs among vehicles by 2050;
4. Switching from 95% dependence on industrial fossil fuel use to low-carbon electricity by 2050;
5. Increased waste recycling, composting and bio-methanation of 100% of wet waste; and 100% of wastewater treatment to either adopt anaerobic treatment with biogas capture or well-managed efficient aerobic treatment by 2050

The Extended Action Scenario helps Dhaka to reduce its city-wide GHG emissions by 70.6% below its levels in base year 2021-22. Implementation of strategies and actions in this scenario will result in Dhaka having GHG emissions of 3.91 million tCO_2e by 2050.

The Extended Action Scenario results in the following levels of emissions, as compared to base year:

- GHG emissions in 2030: 14.9% lower than base year 2021-22 levels
- GHG emissions in 2040: 33.8% lower than base year 2021-22 levels
- GHG emissions in 2050: 70.6% lower than base year 2021-22 levels

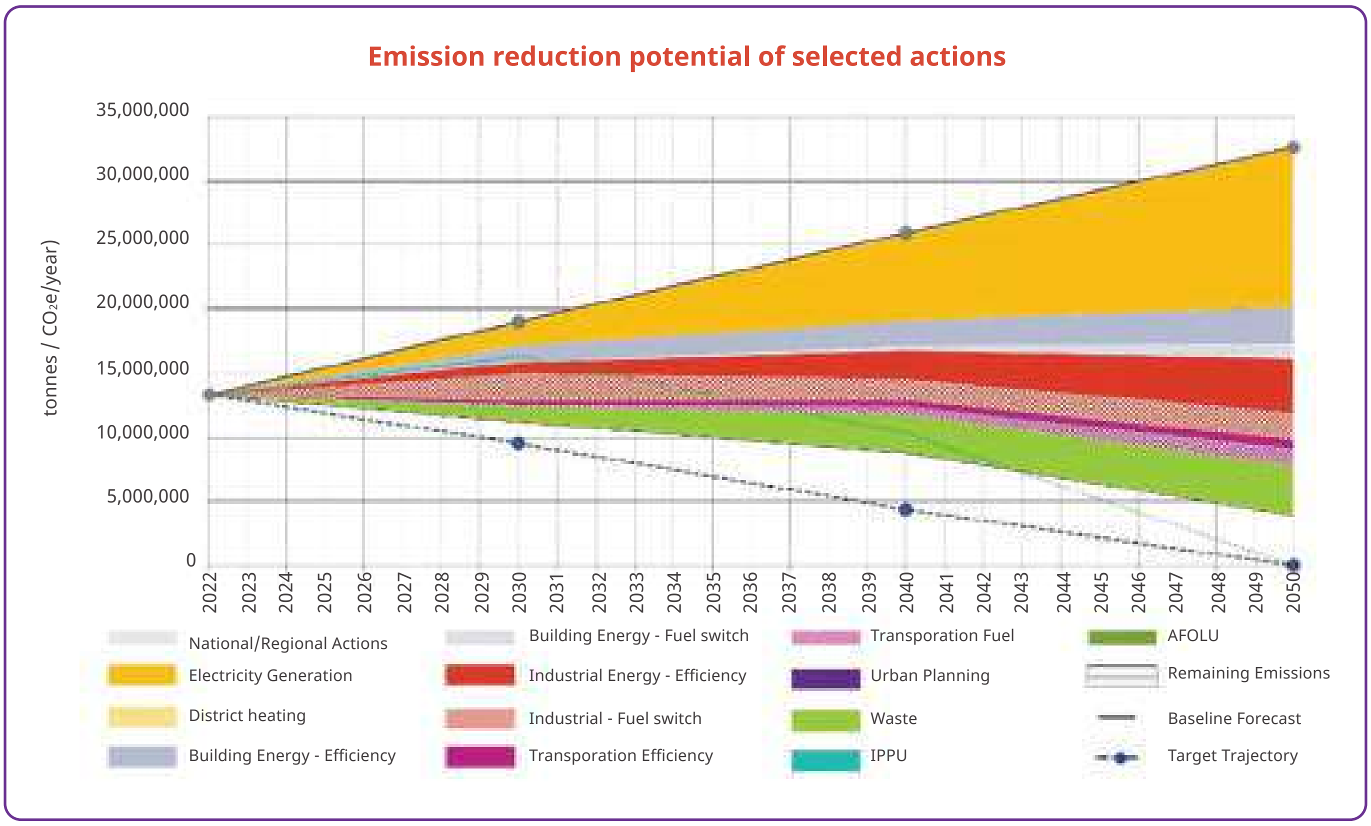


***Figure 32:** GHG Emission Pathway and Emission Reduction Potential for Extended Action Scenario*[178]

The actions in the Extended Action Scenario will result in an estimated emission reduction of 28.69 million tCO_2e by 2050 as compared to 2050 projected BAU emissions. The strategies and actions identified in the Extended Action Scenario require significant policy, financial and other enabling support from the city, state and national governments as well as from stakeholders. Realising successful implementation of the actions on-ground will require addressing associated political, institutional, technological, or financial barriers (as outlined in section 5.2) to improve their feasibility.

5.1.4. Remaining Emissions in Extended Action Scenario

Despite the ambitious level of efforts and targets outlined in the Extended Action Scenario, Dhaka needs to address some portion of residual or remaining emissions to achieve net zero emissions by 2050. Dhaka's remaining emission level is estimated to be 3.91 million tCO_2e in 2050, amounting to 29.4% of its base emissions from 2021-22[179].

The major sources of remaining emissions include use of fossil fuel energy (primarily remaining 15% electricity that is non-renewable) in households, commercial and institutional buildings, and for industrial purposes, and due to limitations in the extent of landfill gas capture from solid waste constituents such as non-recycled paper.

Dhaka South will periodically monitor and report on its remaining emissions during the implementation of the climate action plan and its further updates. DSCC is committed to undertaking further efforts should be undertaken by DSCC to assess the potential of new solutions and technologies to cut down on the remaining emissions and achieve net zero emissions by 2050. Periodic revisions of the climate action plan should address and include such solutions and actions that have limited line of sight at present.

5.2. Barrier Analysis for Key Climate Actions

The Climate Action Plan outlines essential strategies and targets for both mitigating and adapting to climate

[178] ICLEI South Asia analysis
[179] ICLEI South Asia analysis

change in Dhaka South. It aims not only to achieve net-zero emissions in line with the 1.5°C Extended Action scenario but also to enhance the city's resilience to the impacts of a changing climate. However, the road to Realising the goal and commitments and to undertaking the actions listed in the 1.5°C Extended Action scenario, is beset by certain barriers to implementation which make the targets infeasible under current and foreseeable future conditions. Although the barriers have been analysed specifically for the actions listed in the 1.5°C Extended Action (net-zero) scenario, they remain equally valid for the less ambitious Existing and Planned Actions scenario because of them prevailing as of 2023.

These barriers have been summarised for the key strategies of the 1.5°C Extended Action (net-zero) scenario are given below.

(i) Legal and Institutional

These include lack of legal powers to implement a particular strategy or action, situations where legal responsibilities are split between agencies or tiers of governments, limiting the ability of the city authority to implement the strategy or action. For example, where laws or regulations from other tiers of government (or their absence) prevents or limits implementation.

(ii) Financial and economic

These could include lack or insufficient financial resources, rules restricting expenditure on particular strategies, limitations on the flexibility with which revenues can be used to finance actions, barriers limiting access to finance as well as barriers affecting the economics of a strategy (e.g. fossil fuel subsidies).

(iii) Political and social

These could include lack of political or public acceptance of an instrument, as well as restrictions imposed by pressure groups, and cultural attributes, such as attitudes to enforcement, which influence action implementation.

(iv) Practical and technological

These include practical limitations when implementing actions, for examples barriers associated with the physical geography of the city, and with technological development and technology availability.

Table 17: Barriers for Key Climate Actions[180]

1. Stationary Energy: Decarbonisation of the grid	Targets: 1.5°C Extended Action scenario		
Priority Actions	**2030**	**2040**	**2050**
Capacity of renewable power in the electricity grid	24%	56%	85%
Rooftop solar PV in residential buildings	10%	20%	30%
Rooftop solar PV in commercial and institutional buildings	40%	60%	70%

Target and Strategy description/ assumptions	Decarbonisation of the grid occurs at an accelerated rate, reaching 85% renewable electricity by 2050. Simultaneously, installation of distributed solar PV on commercial/institutional and residential building rooftops is emphasised through policy interventions thereby ensuring uptake of 30% and 70% distributed solar PV installations on residential and commercial/institutional buildings respectively.
Barrier	**Description of Barrier**
Legal and Institutional	Many of the national government's plans and policies outline ambition for increasing the percentage of renewables to the electricity grid and diversifying away from fossil fuel energy generation (e.g. Bangladesh's NDC and NDC Roadmap, Revised Power System Master Plan, 2016, Renewable Energy Guidelines, National Solar Energy Roadmap, Mujib Climate Prosperity Plan and others). However, these are all led by the national government, namely Sustainable and Renewable Energy Development Authority, Bangladesh Power Development Board and Power Division of Ministry of Power, Energy and Mineral Resources. DSCC has a limited mandate on transitioning to 85% RE based electricity grid by 2050.

[180] ICLEI South Asia analysis

	This action is therefore reliant on actions of energy sector institutions such as SREDA, BPDB, DPDC, and the Power Division of Ministry of Power, Energy and Mineral Resources. On the other hand, mandating installation of rooftop solar PV systems through building code is the domain of the Ministry of Housing and Public Works and it is implemented in Dhaka by RAJUK. DSCC has limited jurisdiction in building permits and mandating rooftop solar PV installations. DSCC, however, is responsible for collecting taxes related to properties/buildings and would thus need to coordinate with energy sector institutions and RAJUK to ensure this strategy is realised. Furthermore, DSCC's actions and targets need to be integrated into national, regional and sectoral goals and plans, which will ultimately support Dhaka South in achieving net zero emission by 2050 because DSCC has a limited mandate and role with respect to this action.
Financial and economic	Renewable energy plants are typically more expensive than their fossil fuel equivalent in terms of capital costs. For consumers, renewable energy sources may increase the average cost of power generation which leads to increasing retail power tariff in the short term, especially as most of the RE equipment will need to be imported given the limited local manufacturing base. The Government still aims to keep the retail power tariff low for social security and to attract foreign investment, so this strategy is likely to be financially and economically infeasible given the current circumstances. Also, mobilisation of this huge upfront investment from local financial sources to implement 85% renewable in the electricity grid will be challenging. Likewise, installing solar PV systems is also expensive. It is assumed that the up-front investment for installing solar PV would be easier for commercial/institutional buildings than individual households, thereby necessitating financial incentives for its uptake.
Political and social	The main social and political barriers will be due to the potential increase in the cost of energy for consumers in the short term. Push back is also expected against the regulation mandating solar PV system installations that are accompanied by large capital expenditure and physical space requirement. Reserving an extensive area for solar PV installations is expected to be challenging, given that floor space in Dhaka South is among the costliest in the world. It is also possible that not all rooftops will be facing the correct direction, or may encounter shadow and obstruction from other buildings. There is also the barrier of competing roof space between solar heaters and rooftop solar PV, which needs to be carefully considered. There are additional social barriers, such as those mentioned below, but these might be beyond the city's boundary. Such social barriers will affect stakeholders and communities living outside of the city boundary, for example. Pressure from these groups may impact the views of Dhaka South's residents and political figures. • Large scale PV requires large areas of land to be used, which often comes at the expense of farming and other productivity related land uses such as fisheries, poultry. • Offshore wind may be opposed by stakeholders of the shipping and fishing industries. • Hydropower may be opposed by communities living in areas around the dams that may be flooded. Dams may also impact fish in river communities.
Practical and technological	Renewable energy in Bangladesh is in its infancy with the RE share reported to comprise 3% in the country's energy mix in 2022[181]. This will need to grow at maximum capacity over the next two decades to meet the outlined targets of the Mujib Climate Prosperity Plan which outlines a target of 100% decarbonisation of the grid by 2050. Therefore, this Climate Action Plan aims for a lower RE target of 85% given the present status and RE mix. The overhaul required for this massive deployment of RE could potentially lead to destabilisation of the present electricity grid due to issues like peak load demand, intermittent RE sources, integration of assorted RE sources and others. It is assumed that the remaining 15% of conventional energy mix would be able to handle any potential hiccups that might occur during the transition phase. Going forward as the RE integration becomes progressively more stable, 100% decarbonisation of the grid would be the aim. With regard to rooftop solar PV systems and solar heaters, not all rooftops will have the appropriate orientation and technically feasible conditions to optimally tap into solar potential by implementing such systems. There is also the barrier of competing roof space between solar heaters and rooftop solar PV which needs to be carefully considered.

[181] ICLEI South Asia analysis

Proposed solutions to address barriers	Communicate ambition and desires from DSCC's perspective for the sector to the concerned national and sub-national government bodies through meetings and advocacy. DSCC can support the energy sector institutions and RAJUK to ensure this strategy is realised through facilitation, by leveraging its mandate and powers in spatial planning and building regulation to supplement power and energy sector policies, and by making direct investments for RE deployment in municipal operations. DSCC can form a committee along with DPDC and SREDA for urban development and master planning, providing opportunities to offer inputs and integrate net-zero energy-oriented measures in urban spatial planning. DSCC, and DPDC will need to work closely together focusing on local people's participation for effective integration of urban planning and urban energy planning. This will enable integration of low carbon interventions at an early stage in built infrastructure and electricity networks. The designs of solar ready rooftops can be promoted in new buildings to support and maximize rooftop solar PV adoption. A local plan to finance large-scale and distributed RE can be developed, wherein various financing options including public and private investments, low-cost finance, and climate finance are identified. DSCC along with RAJUK can explore offering incentives such as property tax rebates, discounts on building permit fees, and faster building approvals to promote RE adoption by consumers. Demand aggregation can be facilitated by DSCC along with RAJUK and SREDA to reduce the costs of deploying RE power plants and procuring renewable energy to enable small consumers to offset their conventional grid-electricity consumption. Implementation and business models (CAPEX, lease, OPEX/RESCo) can be tested in pilot rooftop solar PV projects on priority buildings to support further scale-up and replication. A pool of technicians and engineers will need to be trained to build the local technical expertise required for the planning, installation and operations of renewable energy projects. SREDA and DSCC will need to collaborate with technical institutes and stakeholders to deliver such training and upskilling.

2. Stationary energy: Energy efficiency and fuel switch in residential, commercial and public buildings/ utilities	**Targets: 1.5°C Extended Action scenario**		
Priority Actions	**2030**	**2040**	**2050**
Existing Buildings			
Existing residential buildings with high efficiency appliances[182]	20%	40%	80%
Existing commercial buildings with high efficiency appliances	30%	50%	100%
Existing residential buildings with envelopes retrofitted to high energy efficiency standards	20%	50%	70%
Existing commercial and institutional buildings with envelopes retrofitted to high energy efficiency standards	25%	60%	80%
Existing buildings with LED lights	80%	100%	100%
Cool roofs in existing buildings	50%	80%	100%
Energy-efficient design and high efficiency appliances[183] in existing public buildings	80%	100%	100%
Existing residential buildings that use electricity for cooking	20%	40%	95%
Existing commercial buildings that use electricity for cooking	30%	40%	95%

182 CHigh efficiency appliances include refrigerators, fan, AC/advanced cooling system, solar water heater, water efficient fixtures among others

183 Includes both high efficiency appliances and green/net-zero building concepts

2. Stationary energy: Energy efficiency and fuel switch in residential, commercial and public buildings/ utilities	Targets: 1.5°C Extended Action scenario		
Priority Actions	**2030**	**2040**	**2050**
New Buildings			
New buildings with high efficiency appliances and LED lights	100%	100%	100%
New buildings that are green/net-zero buildings	100%	100%	100%
Cool roofs in new buildings	100%	100%	100%
Energy-efficient design and high efficiency appliances in new public buildings	100%	100%	100%
Energy efficiency in public infrastructure and utilities	80%	100%	100%
New residential and commercial buildings that use electricity for cooking	100%	100%	100%

Target and Strategy description/ Assumptions	Bangladesh's ambition to become one of the major emerging economies of the world will be driven by its cities, including Dhaka North. This process would be accompanied by energy consumption in various sectors such as the stationary energy, transport, and waste sectors. Emissions from stationary energy consumption contribute to more than 50% of the total GHG emissions in Dhaka South. Thus, it is imperative that the energy consumption in the built environment be reduced if Dhaka North is to achieve its goal of net zero emissions, which can be through use of energy efficient appliances, fuel switch to renewable electricity, adoption of green building standards for new and existing buildings among others. New buildings and greenfield development allow for easier adoption of such energy efficiency measures, and thus, 100% of new buildings are required to follow these measures. The same becomes more challenging existing buildings and brownfield retrofits. Thus, the targets therein, are slightly less at 70%.
Barrier	**Description of Barrier**
Legal and Institutional	DSCC is only responsible for collecting taxes related to properties/buildings while various national and sub national government bodies are responsible for different aspects of policy formulation pertaining to energy efficient appliances and green/net zero buildings. Those policies are not mandatory, with some of them being in the draft formulation stage. For example, the Building Energy Efficiency and Environment Rating (BEEER) system for new and existing buildings is still in the draft stage and not being implemented. Further, DSCC's role is limited not only towards enacting policies but also to enforcing them. Power regarding policies pertaining to green building, envelope retrofits and other related policies and regulation vests with the Ministry of Housing and Public Works (MHPW) or RAJUK. On the other hand, promoting and mandating policies for adoption of energy-efficient appliances and low-carbon alternatives for space cooling, lighting, water heating and cooking is the responsibility of SREDA and/or EMRD. Knowledge regarding such policies remain in silos, which renders them ineffective, thereby necessitating the need for integrating them as one cohesive whole. However, coordination among all concerned government bodies like MHPW, EMRD, SREDA, RAJUK and DSCC is a challenge in the present scenario.

Financial and economic	Conventional practices of building construction, renovation, and energy consumption for appliances would need to be disincentivised in favour of incentivising green/net-zero building practices, envelope retrofits, energy efficiency and cleaner fuel alternatives. The incentives and disincentives would need to be synchronised between MHPW, SREDA and EMRD and implemented by RAJUK through the BNBC 2020. At present no such incentives or disincentives exist in Bangladesh. In the short term, replacing equipment or systems that are not at the end of their life yet might not be economically feasible. Energy-efficient appliances are also expensive which will hinder the access of the low-income groups. Ensuring retrofits in existing buildings might prove to be a challenge due to high associated costs. To overcome these, the benefits in terms of energy bill savings should be promoted to consumers. In the long run the PNG infrastructure of the city would need to be dismantled necessitating significant capital expenditure which eventually would translate into a loss in purely economic terms. Tax incentives to developers/builders for meeting the required standards would mean lower tax revenue for DSCC which would need to be supplemented through finance from the national government.
Political and social	Mandating all buildings, whether new or existing, to adopt green/net-zero building practices will increase the cost of construction/renovation and might face pushback from the people who will not want to incur the additional costs of construction. Similarly, energy efficient appliances are expensive compared to their less efficient counterparts. Convincing consumers to opt for higher priced options instead of lower priced ones will be difficult, especially the low-income groups who might oppose the idea altogether. In relation to the transition to clean cooking, many chefs and cooks prefer to use gas for cooking rather than electricity. This measure will therefore come up against some resistance, especially from low-income groups whose cost of living is likely to increase in the absence of incentives to make the fuel switch. In the short term, the national government of Bangladesh envisages the use of PNG and LPG to be the dominant fuel for cooking, further limiting the scope of fuel switch. It is suggested that PNG should be disincentivised starting from the short term in favour of renewable electricity. LPG cylinders could be used as an option during the transition, which also ought to be eventually phased out in favour of renewable electricity. In residential buildings, the building owners have control over installation of energy-efficient appliances, and adoption of energy efficiency design measures and practices. While tenants or occupiers may be willing to adopt measures, they often have limited control. Moreover, building owners may not directly benefit from reduced energy consumption and cost savings, while tenants are actual end users who will benefit.
Practical and technological	The market for green/net-zero building practices, envelope retrofits, adoption of energy-efficient appliances, and fuel switch to RE is in its infancy with limited knowledge and best practices available in Dhaka particularly and in Bangladesh generally. The penetration of knowledge and technology in the market is thus slow. Green/net-zero buildings: Promotion in new and existing buildings will require R&D into construction and material technologies which is currently lacking in the city and country. Knowledge on the researched products would also require dissemination among developers and builders. A huge effort would be required to upgrade windows, roofs and walls, and upgrade space cooling systems. Clean cook stoves: Factors such as financial constraints of low-income households, non-availability of spare parts in the open market to replace faulty stove accessories, and stove size are the potential barriers to clean cookstove adoption. Energy-efficient appliances tend to be costlier than their conventional counterparts which discourages people and businesses from making the switch. It is expected that as the market for energy efficiency expands, there will be more R&D in technological options that will gradually reduce the costs of adoption.

Proposed solutions to address barriers	DSCC, MHPW, SREDA, EMRD and RAJUK would need to come together on one platform and create a set of linked mandates for green/net-zero building practices, envelope retrofits, uptake of energy efficient appliances, and fuel switch to RE. - The mandate would need to be enforced through appropriate policies such as the Bangladesh National Building Code, 2020, and the Building Energy Efficiency & Environment Rating (BEEER) system. - The mandate should offer incentives to developers to meet the standards. Examples include reduced taxes, expedited permits, higher FSI/FAR among others. RAJUK is the implementing authority of the BNBC 2020 during the building plan approval process. In such a scenario, DSCC's role would be limited to supporting RAJUK in nudging the people towards energy-efficient appliances and green/net zero buildings. Since DSCC is responsible for collecting taxes, it can monitor the implementation during the tax collection process. It would need to be ensured that initiatives by the institutions are well-integrated and not implemented in silos. This would require seamless transfer of knowledge between MHPW, EMRD, SREDA, RAJUK and DSCC. Establishing an online platform for building plan approval and taxation can be a potential way forward, which brings all entities together. The online platform can have best practice guidelines and knowledge material for developers and builders for green/net-zero building practices, envelope retrofits, uptake of energy-efficient appliances, and fuel switch to RE. Establishing a dedicated unit such as a Sustainable Energy Cell in DSCC can help promote and coordinate energy efficiency actions with different stakeholders at the city-scale. DSCC should lead by example and switch to accelerated adoption of renewable based electricity and energy-efficient equipment in all its buildings and facilities, while ensuring that all equipment are also energy-efficient. A targeted building renovation program for existing buildings can help to identify and implement specific building envelope and energy efficiency retrofit solutions for different types of buildings. Requirements can be laid out for old buildings beyond a certain age to undertake actions. Demonstration projects implemented in different building types can help showcase green building and net-zero concepts and benefits. A knowledge incubator can be developed collaboratively with all concerned government and non-government stakeholders along with the development of a system that helps to disseminate knowledge, innovations, and improvements to the public can be an effective solution to increase the overall knowledge about green buildings, energy efficiency, fuel switch and related matters in an effort to steer the sector out of its infancy. Public IEC campaigns can help increase awareness at large within the city's local community on building and appliance energy efficiency. Training and certification programs for architects, developers, technicians, service providers on energy-efficient construction and buildings can help create local capacity and a skilled workforce. DSCC and SREDA can conduct IEC campaigns based on model guidebooks on cooking with electric cookstoves which will be prepared by SREDA and/or EMRD. National and/or sub national level incentive and support schemes for low-income communities could be leveraged for the fuel switch to RE and adoption of EE appliances. Green/net zero building and EE appliance principles could be embedded into housing credit schemes that can offer higher subsidies on loans adhering to those principles.

3. Stationary energy: Industrial fuel switch to renewable electricity	Targets: 1.5OC Extended Action scenario		
Priority Actions	**2030**	**2040**	**2050**
Fuel switch to low-carbon electricity	45%	50%	95%

Target and Strategy description/ Assumptions	Bangladesh's NDC and NDC roadmap anticipates that the industry sector would contribute to GHG emissions reductions of 4% below the “business-as-usual” scenario by 2030, or by 15% below the “business-as-usual” scenario by 2030, conditional on support from international funding sources. To achieve these targets as outlined in the NDC, it is imperative that industrial fuel use be switched to renewable electricity from conventional sources.
Barrier	**Description of Barrier**
Legal and Institutional	It is not within the DSCC's power to mandate regulations upon industrial facilities within the boundary of the city. DSCC does collect taxes from industries in its jurisdiction. The concerned agencies for industrial energy use and renewables are SREDA, Ministry of Power, and Ministry of Industry. SREDA is responsible for energy transition at the national-level across sectors, including industries.
Financial and Economic	Replacing industrial machinery that still works (i.e. is not broken or in need of repair) with new equipment that performs the same function is likely to come at a high capital cost. The overall costs to the economic system are likely higher due to not achieving full utilisation of the industrial machinery to the end of its life. To achieve such high levels of replacement that will be required in this fuel switch action, financial incentives and subsidies may be required, which will probably need to come from the national government. The costs associated with running the equipment are, therefore, higher. The target to electrify to 95% of all industrial processes by 2050 will thus, require electrification of processes which may not be the most economical option.
Political and Social	For the industrial sector in particular, it may be easier and more socially appealing to convert to biofuels than to electric, due to the current technologies in place, and therefore the desire to make an incremental change might be greater than making a more radical change to electric. Also, industries will be looking to shed the losses incurred due to enhanced costs of switching to electrified processes. This may get reflected in inflated prices of products and/or reduced wages of the workers, thereby creating social pushback to electrification of industrial processes.
Practical and technological	Wide-scale electrification increases the demand for electricity which will need to be met by increased electricity generation. At present, the electricity generated is unable to meet the demand load, resulting in frequent and extended spells of power cuts. In a situation wherein additional demand is created from industries and electrification across other sectors, without increasing the installed capacity, there will be increased pressure on the grid supply. Given that industries are usually bulk consumers, it is probable that their demand will be prioritised over other sectors' demand.
Proposed solutions to address barriers	A national policy would need to be introduced by the Ministry of Industries, Government of Bangladesh to incentivise industries to switch to renewable electricity. EMRD would also be required to be brought on board to ensure a smooth fuel switch roadmap is created. DSCC, DPDC and RAJUK can support them to ensure the roadmap is implemented through advocacy, industrial summits and other IEC activities. A financial incentive structure would be required to create the change. Incentives could include but not be limited to technology-specific subsidies and should address operating costs and stock replacement rather than capital expenditures. It would be necessary to increase the total power supply capacity of the grid, primarily RE-based power, and augment grid infrastructure in order to ensure the additional industrial energy demand is fulfilled and electricity transition in industrial processes is realised smoothly An assessment of RE potential and energy efficiency implementation can be undertaken to cover industries of different sizes and types in Dhaka. Implementation and business models can be identified to enable deployment. Guidelines and norms can be revised to allow industrial consumers to install solar PV systems to cater to nearly all of their electricity requirement (90% of the sanctioned load) Demand aggregation can be undertaken to facilitate deployment of RE and EE solutions among multiple potential consumers located in close geographical proximity

4. Transportation: Transitioning towards decarbonised transportation	Targets: 1.5°C Extended Action scenario		
Priority Actions	**2030**	**2040**	**2050**
Fuel switch in private vehicles	10%	50%	95%
Fuel switch in public transit	Electric Public bus/ BRT: 80% Rail & metro: 100%	Electric Public bus/ BRT: 100% Rail & metro: 100%	Electric Public bus/ BRT: 100% Rail & metro: 100%

Target and Strategy description/ Assumptions	This strategy looks at the complete overhaul of the transport sector. All vehicle categories are required to be 95% electric. As public transport gains a larger modal share, the importance of electric vehicles in the bus fleet and BRT increases. The success of this strategy hinges on appropriate infrastructure, supply of renewable electricity and incentives.
Barrier	**Description of Barrier**
Legal and Institutional	The DSCC has limited jurisdiction to mandate transition of vehicles to EV. It can, however, ensure its own fleet's transition to EVs. The Ministry of Road Transport and Bridges, Government of Bangladesh and Dhaka Transport Coordination Authority are responsible for framing policies pertaining to EVs. However, there are no national or city-level policies that encourage EV uptake. The 'Electric Vehicle Registration and Operation Policy 2023' was notified in 2023, which allowed EVs to be registered and operated legally. However, this policy does not consider electric rickshaws, electric rickshaw-vans and electric bicycles as EVs. In response, Dhaka South, along with a few other cities of Bangladesh, has banned the plying of electric rickshaws within their respective city limits.
Financial and economic	Currently, EVs do not have the financial incentives (such as tax incentives or subsidies) that would encourage their uptake on a mass scale. At present, EVs are more expensive than their internal combustion engine (ICE) counterparts but, over time, this will change, especially as the demand for EVs increases across the globe. This trend will be particularly prevalent as the capital costs of EVs fall, making both the upfront and running cost of EVs cheaper than their ICE equivalents over the lifetime of the vehicle. However, Bangladesh currently has a relatively low GDP per capita, thereby, making it harder for most people to adopt EVs. EV infrastructure, such as charging points, also come with a high cost. Individuals who put charging infrastructure at their residence currently incur the cost themselves in the absence of incentives/capital grants.
Political and Social	There are often social concerns around the uptake of EVs. These can be around 'range anxiety', lack of infrastructure to charge vehicles and the cost of investing in an EV. Over time, these social concerns are likely to be eased as the global trend toward EVs continues, and actions are taken by city and national governments to promote the uptake of EVs.
Practical and Technological	A massive deployment of charging infrastructure would be required to allow for EV penetration. Such fundamental changes in fuel use over a relatively short period will be very challenging to achieve, especially when considering the lifespan of a car. Moreover, the present electricity generation is unable to fulfil the demand load resulting in frequent and extended spells of power cuts. In a situation wherein additional demand is created from EVs and electrification happens across other sectors, without increasing the installed capacity, then it will increase the pressure on grid supply.

Proposed solutions to address barriers	The DSCC can make suggestions/recommendations to the national and subnational departments for any change that it may desire. It needs to ensure its commitments and ambition of a net-zero future is duly informed through advocacy and public outreach. The DSCC, in association with RAJUK, BRTA and DTCA, will need to attract investment, either private or FDI to help build a public charging infrastructure network that encourages the uptake of EVs. A comprehensive plan for an EV charging infrastructure network can be developed to address components such as private and public charging infrastructure, and building bye-law and regulatory amendments Subsidies to buildings that install a charging infrastructure could also be explored by DSCC in association with MHPW and RAJUK through the BNBC 2020. The DSCC along with other government stakeholders will need to fund charging infrastructure for the electric buses that are managed by BRTA as well as ones managed by private operators. Grid flexibility is required for EVs, as well as an increase in the electricity outputs from the grid. Sub-stations will require reinforcements to handle increased load. Practical challenges around charging infrastructure are eased when considering the electrification of motorbikes. It is possible for motorbike batteries to be removed and charged within the home premises, which is far more practical than the requirement to develop and integrate full-scale car charging points.

5. Waste: 100% solid waste and wastewater processing and wastewater	Targets: 1.5°C Extended Action scenario		
Priority Actions	**2030**	**2040**	**2050**
Percentage of sewerage collected and treated safely through septic tank	50%	40%	20%
Percentage of sewerage collected and treated safely through piped sewer system	50%	60%	80%
Percentage of wastewater treated	50%	100%	100%
Percentage of waste collected, transported and processed	95%	100%	100%
Percentage of waste processed through centralised processing of waste or Eco-town (as mentioned in the New Clean Master Plan of DSCC)	44%	60%	60%
Percentage of waste processed through decentralised waste processing facility to reduce emissions from transporting waste and to ensure onsite processing of the waste.	0%	20%	30%
Percentage of the total wet waste undergoing composting/ bio-methanation	20%	40%	100%

Target and Strategy description/ Assumptions	At present, there are no solid waste processing measures or wastewater treatment being done in Dhaka South. This strategy suggests that before moving to processing and treatment of waste, DSCC should focus on reduction of solid waste at source, recycling and better management, and then proceed to processing of solid waste and scientific disposal of rejects and inert waste, since processing is dependent on segregated waste availability. The suggested strategy for wastewater management is 100% collection and treatment, either through aerobic or anaerobic processes with gas capture and reuse for energy. The success of solid waste processing depends heavily on the level of segregation and reduction of waste that can be achieved, the level of engagement of civil society, and regulatory policies. For wastewater management, it is assumed that DSCC will be able to provide user connections to sewer lines, and will be able to provide safe collection and treatment of wastewater, without significant leakage.

Barrier	Description of Barrier
Legal and Institutional	In Bangladesh, waste management services involve city corporations taking charge of operations, while the national government establishes policies and the overall legislative framework. However, this straightforward portrayal masks the intricate division of roles and responsibilities among various government levels. In certain instances, the DSCC must seek approval from the Ministry of Local Government, Rural Development and Cooperatives (MLGRDC) to initiate waste processing plants and secure land for these facilities, a process that can be time-consuming. The DSCC has drafted the New Clean Dhaka Master Plan, which discusses in detail the various processes of solid waste management that DSCC intends to employ. DWASA has authority over wastewater treatment in Dhaka, and has drafted the Dhaka Sewerage Master Plan which envisages setting up of multiple STPs to ensure 100% treatment of wastewater. However, this master plan focuses more on the treatment of wastewater rather than its emissions. While the former is the need of the hour and should be prioritised in the short term, the latter ought to be ensured if Dhaka South intends to achieve net zero emissions.
Financial and economic	A large amount of capital expenditure (CAPEX) will be required to commission the solid waste processing facilities and their operation and maintenance. Additional CAPEX would be required by the supporting infrastructure like secondary transfer stations and transfer vehicles, which would also need to adhere to the second and fourth strategies mentioned above so that the sector becomes net zero. This huge amount of CAPEX poses a burden for the DSCC given its various other priorities. Typically, local authorities such as the DSCC rely on foreign grants and loans to establish these high-cost plants. Nevertheless, the sustainability of such facilities often depends on the type of waste recovered and sold in the recycling market. Limited familiarity with public-private partnerships in waste services can impede the development of a financially viable project and the acquisition of loans and grants from national or international funding sources. Similarly, constructing STPs and establishing sewerage networks involve significant capital investments, much like waste processing facilities. Relevant public institutions may have limited expertise in implementing public-private partnerships for the operation of such plants. While opting for less advanced treatment methods without biogas capture might be more economical, these can lead to higher GHG emissions.
Political and Social	Construction of solid waste management facilities either at the end of the chain or at secondary locations, and wastewater treatment facilities may lead to opposition from various parts of society, including those living around the proposed sites, and environmental activists concerned about the impact on the local environment. Furthermore, limited support from society may pose a significant obstacle to the success of waste management initiatives. Lack of awareness regarding the challenges in unplanned or unauthorised areas, coupled with an imbalanced allocation of resources, can significantly hinder the goal of achieving 100% effectiveness in waste and wastewater management.
Practical and Technological	**Solid Waste Management** Waste segregation needs to be strengthened to bring in circularity for valuable and recoverable materials. Currently, the DSCC lacks both decentralised and centralised waste processing facilities. This gap poses a challenge for the city to meet the goal of achieving 48% centralised waste processing by 2030. **Wastewater Management** Practically, to deal with wastewater of a city with such a large population will require multiple large wastewater treatment plants. The technologies required to do this exist, but it will be a large undertaking, as are all large-scale infrastructure projects in terms of time, funding and skills. DWASA operates the Pagla Sewage Treatment Plant (PSTP) in Dhaka City. It can only treat 7.5% of the wastewater while 24.5% of the wastewater gets collected through the piped sewers but does not get treated. Given the current circumstances, attaining the target of safely collecting and treating 50% of sewage through a piped sewer system by 2030 appears challenging.

Proposed solutions to address barriers	**Solid Waste Management** The DSCC should ensure segregation and ensure that 100% of its wet waste is processed through composting/Bio-CNG/Bio-methanation facilities and 100% of dry waste is recycled/upcycled/pelletised. This will avoid emissions from incineration as well as from use of virgin materials instead of recycled or upcycled products. In the long run, it can hugely impact economic opportunities, particularly for the urban poor. The DSCC can leverage private sector and foreign direct investments to meet the CAPEX required for solid waste infrastructure. The facilities should undergo strict environmental and social impact assessments prior to commissioning. Decentralised facilities can be promoted in large markets, residential and commercial complexes instead of large, centralised facilities to reduce CAPEX and ease of implementation. Conduct comprehensive waste characterisation and value chain analyses to improve the effectiveness and sustainability of established centralised or decentralised plants. Enhance the capacity of city officials in understanding and implementing public-private partnerships, as well as in the preparation of financially viable projects. **Wastewater Management** Although the DSCC's role in this regard is a supporting one, it can convey its net-zero ambition and commitments to DWASA and ensure legal frameworks are updated to align with the strategies to enhance wastewater treatment technologies to the lowest emission solutions. Similar to the DSCC in the solid waste sector, DWASA would also need to encourage PPPs and FDIs in the wastewater sector to avert the burden of the CAPEX. The facilities should undergo strict environmental and social impact assessments prior to commissioning. DEWATS can be promoted instead of large, centralised facilities to reduce CAPEX and ease of implementation. Establishment of faecal sludge treatment plants (FSTPs) at strategic locations can cater to faecal sludge management where sewer lines are not possible. Progressively increase centralised collection and treatment and reduce septic tank use, as infrastructure for wastewater is developed in the city. Enhance the capacity of DWASA officials in understanding and implementing public-private partnerships, as well as in the preparation of financially viable projects.

6. Stormwater Drainage System: To mitigate flooding, enhance healthy urban living conditions and ensure long-term resilience and water resource management.	Targets for Adaptation		
Priority Actions	**2030**	**2040**	**2050**
All khals are free of encroachment and restored.	20%	50%	100%
Flood early warning systems for low lying areas in the city are set up in Dhaka, linked to the DSCC's command and control centre		Yes	

Target and Strategy description/ assumptions	The objective of drainage system initiatives is to manage urban flooding, alleviate the consequences of unpredictable rainfall, and address stormwater runoff in urban environments, all while fostering sustainability and adaptability to evolving climate conditions. The interventions can be applied when there is civil society support in cleaning up of the khals and their conservation and maintenance.

Barrier	Description of Barrier
Legal and Institutional	Since 2021, the DSCC has taken on the responsibility of managing the stormwater drainage system of the city. However, the DSCC faces a challenge as it possesses limited expertise in the technical aspects of drainage system management. Meanwhile, the DWASA has developed a drainage master plan for the city. Engaging with DWASA for planning and implementation, leveraging their expertise in drainage management, may pose a challenge for DSCC.
Financial and Economic	To effectively manage and preserve the *Khals* (canals) and establish an Early Warning system, the DSCC may need to allocate additional funds for drainage management from its budget.
Political and Social	There is a potential for protests from the society against the removal of illegal encroachments from the khals. Furthermore, the limited support from the community and political groups in conserving khals can adversely affect all initiatives undertaken by the DSCC in this regard. Additionally, the community's limited knowledge of how to respond during a warning may also impact the effectiveness of actions taken. Urban-rural migration and illegal settlements has led to encroachment of khals resulting in disturbance in the natural flow of stormwater.
Practical and Technological	In practical terms, the conservation of *Khals* necessitates robust political and societal support, coupled with meticulous planning, effective enforcement, and a comprehensive monitoring system. The initiatives undertaken by the DSCC for drainage management (drainage network and khals) could face hindrance due to limited societal and political support. With a rapidly growing city population, the emergence of illegal settlements, and unplanned development, crucial drainage channels have been consistently encroached upon or utilised for the construction of new structures, roads, and buildings.
Proposed solutions to address barriers	The DSCC should involve DWASA engineers in both the planning and implementation phases to enhance collaboration and coordination between the two entities. There should be a strong monitoring and reporting system for the protection of khals. The DSCC should initiate awareness programs to educate residents about the role of khals in mitigating urban flooding and addressing associated health hazards

7. Water Supply System: To provide equitable access to clean safe and affordable water in the city and promote its judicious use to ensure future sustainability of water resources	Targets for Adaptation		
Priority Actions	**2030**	**2040**	**2050**
Reduction of Non-Revenue Water	20%	10%	5%
Climate-proof water supply systems to avoid outages during disasters	100%	100%	100%
Augment the quantity of surface water supplied.	40%	50%	70%

Target and Strategy description/ Assumptions	The goal of strategies and targets for the water supply system is to ensure fair access to clean, safe, and affordable water within the city, while encouraging responsible usage to ensure the long-term sustainability of water resources.
Barrier	**Description of Barrier**
Legal and Institutional	The DWASA has jurisdiction over water treatment in Dhaka and has formulated the Dhaka Water Supply Master Plan, outlining the establishment of multiple water treatment plants for surface water extraction. Despite the Ministry of Water Resources implementing various laws and policies, including the Environment Conservation Act of 1995, Environment Protection Act (EPA) of 1995, Environment Court Act of 2000, and Bangladesh Water Act of 2013, the effective prevention and control of water pollution, especially in Dhaka, faces challenges, such as legal connections, institutional weaknesses, and inadequate law enforcement. To safeguard surface water, DSCC, with DWASA's assistance, must actively enforce rules and regulations to conserve its surface water.

Financial and economic	Building water treatment plants requires substantial capital investment. Officials within the DWASA possess limited knowledge and experience in executing public-private partnerships for the operation of these facilities.
Political and Social	The major challenges for DWASA include insufficient societal support for the preservation of water resources. Illegal connections, excessive groundwater extraction, and surface water pollution pose significant threats that can hinder DWASA's efforts to conserve and build resilience in the city's water sector.
Practical and Technological	The existing water supply distribution network is facing challenges in meeting the demands of the current population, and DWASA has been unable to enhance its water supply capacity. Consequently, achieving a 40% augmentation of water through surface water treatment plants appears challenging for the city. The losses incurred from unaccounted for water (UFW), attributed to leakages and unauthorised connections, remain significantly high.
Proposed solutions to address barriers	The DSCC can encourage DWASA to leverage private sector and foreign direct investments to meet the CAPEX required for WTP. Progressively increase surface water extraction and reduce the ground water dependency. Monitor quality of water supply regularly to ensure clean and safe water distribution. Promote rainwater harvesting system

8. Health: Improve residents wellbeing and health by promoting a resilient healthcare system that responds to climate challenges	**Targets**		
Priority Actions	**2030**	**2040**	**2050**
Early warning and early action systems developed for heat stress and flood risks	25% of city area covered by the system	80% of city area covered by the system	100% of city area covered by the system
Heat Action Plan developed for the city	Yes	Yes	Yes

Target and Strategy description/ Assumptions	The challenges of heat stress and waterborne diseases in Dhaka North City are adversely impacting the health of residents and the efficiency of productive working hours. This strategy recommends addressing these issues by advocating the enhancement of the current healthcare system, including associated infrastructures to better respond to climate challenges and build resilience. The interventions will not be implemented by the DSCC alone and they will need to coordinate closely with other stakeholders in the sector.
Barrier	**Description of Barrier**
Legal and Institutional	While the DSCC manages 193 hospitals and clinics to cater to citizens' health needs, its role in the healthcare sector is limited. The oversight and regulation of all hospitals fall under the purview of the Directorate General of Health, while the formulation of policies in this domain is the responsibility of the Ministry of Health and Family Welfare. Moreover, the DSCC may encounter a challenge in limited coordination and collaboration among various actors and stakeholders in the health sector to implement actions outlined in the CAP, including the government, private sector, non-governmental organisations (NGOs), and communities. Additionally, the current policies do not adequately address the impact of climate change, such as heat stress and waterborne diseases on citizens, lacking provisions to effectively tackle these emerging issues.

Financial and economic	The interventions in Dhaka South's Climate Action Plan are not excessively expensive. However, unequal distribution of health facilities, services, and resources is a significant challenge for the DSCC, particularly in low-income and slum areas across the city. The DSCC should allocate a dedicated budget for their regular implementation. Ensuring ongoing financial support will be crucial to effectively carry out the identified measures and sustain the efforts in addressing climate-related challenges.
Political and Social	Limited understanding regarding the impact of climate change on human health and the healthcare system within society and among political leaders poses a challenge in formulating a robust resilience plan for the healthcare sector. The DSCC may face the challenge of a high burden of disease stemming from inadequate environmental and social determinants of health, including issues related to water, sanitation, hygiene, nutrition, education, and gender.
Practical and Technological	Lack of capacity of healthcare workers to act on new pandemics, especially climate-induced hazards. Private hospital staff need to get training frequently on preparedness for climate-induced hazards. The DSCC faces a substantial challenge in delivering health services, which are of low quality and efficiency, due to deficiencies in equipment, supplies, staffing, training, and supervision.
Proposed solutions to address barriers	The DSCC can allocate funds from its budget or explore external funding for the planning and implementation of relevant strategies. The DSCC can propose and recommend to national and sub-national departments the development of policies explicitly addressing preparedness for health hazards induced by climate change. Healthcare professionals, including doctors, nurses, and public health workers, can be trained to recognize and address climate-related health risks in their practice, particularly heat stress and heat strokes, and report on them. The DSCC can collaborate with research institutes to conduct additional research, to enhance understanding through more evidence regarding the impact of climate change on the health of citizens in Dhaka South. The DSCC should increase coordination with private hospitals. Routine drills and simulations can be organised to ensure that healthcare facilities are adequately prepared to respond to emergencies related to climate conditions.

6. Dhaka South's Climate Action Plan

6.1. Dhaka South's Climate Action Plan

With the accelerating growth of the city and climate change impacts, Dhaka South has dedicated itself to enhance climate resilience and reduce GHG emissions in the city. The groundwork for preparing the CAP for the DSCC was laid in August 2022 with ICLEI South Asia and C40 collaborating to support the DSCC in the process. The CAP is a steadfast effort to address the city's urban system vulnerabilities and adopt strategies to adapt and reduce its climate risks and reduce GHG emissions to progress towards a net-zero emissions future, while ensuring that co-benefits such as improved health, cleaner air and water, improved waste management, information access, inclusivity, quality of life, and economic opportunities are also realised.

The DSCC CAP has been prepared in consultation with multiple stakeholders during numerous engagements throughout the CAP development process and steered by the climate core team. Consultations with various other departments, which examined the city's priorities and commitments using a data driven approach, have ensured that diverse perspectives were considered for the development of an inclusive climate action plan.

Taking key urban systems into account, namely, solid waste management, drainage system, sewerage system, water supply, transportation, energy and health system, a climate vulnerability assessment was carried out. Through the CCRA assessment, the city's vulnerabilities were effectively identified which, in addition to the analysis from GHG emissions inventory, further assisted the stakeholders to evaluate different mitigation and adaptation strategies, enabling evidence-based decision-making. This process facilitated the setting of sectoral visions and targets to guide its climate action planning and address challenges faced by the city.

6.2. Vision and Strategies

CAP Vision

The Climate Action Plan of Dhaka South City Corporation endeavours to help the city shift towards a sustainable, climate resilient and net zero development pattern aligned to the Paris Agreement, by adopting good governance systems, improved service delivery and social equity. It aligns with national and global climate goals and seeks to implement transformational actions that makes the city resilient to climate change and improves the quality of life of its residents.

The overarching goal of the CAP is to enhance the ability of these urban systems to strive towards a net zero development, adapt and reduce the identified climate risks, with a particular emphasis on strengthening resilience among disadvantaged and vulnerable groups.

The DSCC is setting ambitious targets to reduce its city-wide GHG emissions by 14.9% by 2030, 33.8% by 2040, and 70.6% by 2050, as compared to base year 2021-22 levels. The targets are informed by the GHG emissions baseline and the future emission scenarios developed as part of this CAP, in particular the 1.5°C Extended Action scenario. The DSCC is committed to achieving the Paris Agreement aligned goal of 1.5°C compatible net-zero GHG emissions at the city-scale by 2050. The DSCC will update our climate targets and ramp up climate action efforts in future CAP revisions to close the gap and reach net-zero emissions by 2050. In addition to the mitigation targets, the CAP has also identified a number of adaptation interventions that aim to improve urban service delivery and access, particularly for the more vulnerable sections of society. Such interventions include better access to water and sanitation services, improved health care systems, development of green and blue areas, among others. This approach of looking at both mitigation and adaptation actions in the climate action plan will help to develop the overall resilience of the city.

Sectoral visions are formulated to establish a clear trajectory for each urban system, aiming to enhance resilience, looking at emission reduction as well as adaptation to climate risks as depicted in the climate fragility statements in section 3.5 and section 6.3. To realise these sectoral visions, strategies outlined with action areas and ambitious targets for 2030, 2040, and 2050 are delineated. To meet these targets, a specific set of actions that must be executed by various city authorities has been outlined, which are in alignment with the SDGs. Integration of co-benefits resulting for the city's residents from the climate actions is factored in and highlighted for each sector. For each sector, the relevant national and regional or local policies have been identified that should be referred to for implementation of the selected actions. In the rapid strategic appraisal of the city, it was observed that there are a number of national and regional or local policies that provide opportunities for engagement with the CAP implementation process (see Annexure 4). The sectoral goals of the CAP have been identified as per the strategic goals or targets of these national and regional policies, such as the Mujib Climate Prosperity Plan: Decade 2030, Bangladesh Delta Plan 2100, the updated NDCs of Bangladesh as well as the Dhaka Structure Plan, the New Clean Dhaka Master Plan 2018-2032, Sewerage Master Plan and the Drainage Master Plan. These policies are also outlined in section 7.4 and 7.5. Additionally, the responsible authorities or stakeholders for each urban system are identified, and financing opportunities from existing or upcoming plans and programs have been integrated to make a robust climate action plan.

While the CAP looks at innovative measures for the seven priority sectors to mitigate emissions and reduce climate impacts, there are a number of management and systemic interventions that need to be adopted and implemented. These systemic interventions will support the innovative measures identified, while at the same time giving quick and short-term benefits of better access to quality urban services for all residents of Dhaka South. The CAP also identifies a number of policy, regulatory, and communication actions that support climate actions.

Wider Benefits of CAP

The CAP acknowledges that while the city needs to work on reduction of emissions and climate risks, targeted measures that help to improve urban services can significantly enhance the ability of residents to respond to climate impacts while delivering co-benefits, for instance through improved health and economic opportunities. This will particularly benefit the urban poor, who are often disproportionately impacted by climate risks.

A large number of the interventions suggested in the CAP have been identified and prioritised such that they will also help to promote urban sustainable development and contribute to the global SDGs in Dhaka South. The interventions identified for different sectors will have positive impacts on resource conservation (including water, energy, materials), improved air quality, better water security and ground water resources, better public health, enhanced economic opportunities, better self-sufficiency and reduced grid dependence for energy supply, better road safety, and in general an enhanced sense of well-being in the city.

Actions that encourage citizens participation in energy conservation and waste segregation, for instance, will not only improve the urban system in general, but also foster a social engagement process, encouraging citizens to be more involved in the urban development processes. In the long run, this will also help to build transparency and good governance mechanisms in the DSCC and improve accountability of the government towards its citizens.

Dhaka South's CAP has integrated wider benefits into certain visions and strategies of sectors including water supply, wastewater, storm water drainage, waste and health. This approach enables goals of wider benefits to go hand-in-hand with sectoral goals and targets, while ensuring that these co-benefits are realised as the DSCC implements its identified climate actions across sectors.

Dhaka South envisions building a sustainable city that thrives amidst climate change, while considering social equity and gender aspects and enhancing the quality of life for all citizens.

The scenarios and pathway modeling have been conducted using the C40 and ICLEI South Asia methodology. Different scenarios have specific targets and timeframes, and cities can adopt targets based on their priority and scope of work. Additionally, cities may set particular targets depending on the availability of resources and their governance mechanism.

Sectoral goals, targets and strategies identified to help realise Dhaka North's vision

SECTOR	Vision	TARGETS	STRATEGIES
Storm Water	Reduce urban flooding, enhance healthy urban living conditions, and ensure water resource management	• By 2050, 100% removal of encroachment and restoration of all *Khals* (natural drainage system). • By 2030, flood early warning systems established and integrated with DSCC's command centre. • By 2050, 100% permeable footpath coverage to enhance water recharge.	**Strategy 1**: Restoration of natural drainage systems to improve stormwater management. **Strategy 2**: Efficient stormwater management system in place to prevent pluvial flooding.
Solid Waste	Transforming into a waste-free city with Integrated solid waste management plan	• By 2050, 100% collection and transportation of municipal solid waste (MSW). • By 2050, 60%centralised processing, 30% decentralised processing and scientific disposal of the rest. • By 2050, 20% landfill gas captured.	**Strategy 1**: Improved MSW management - Collection, Transportation, Processing, and Disposal **Strategy 2**: Strengthened implementation of the 3Rs (Reuse, Reduce, Recycle) strategy. **Strategy 3**: Reduction in waste being sent to landfills through waste processing facilities **Strategy 4**: Landfill gas capture
Health	Climate resilient healthcare systems corresponding to resident's well-being	• By 2050, set up early warning and action systems for heat stress and flood risks. • By 2050, 100% access to healthcare within 1.5 km. • By 2030, a Heat Action Plan will be developed for the city.	**Strategy 1**: Boosting healthcare professionals' skills and awareness to tackle climate health challenges. **Strategy 2**: Integrating climate considerations into healthcare to boost resilience. **Strategy 3**: Corporation-level measures to mitigate heat stress and water/vector-borne diseases.
Water Supply	Ensuring sustainable water resources and equitable access to clean, safe and affordable water	• By 2050, use of 70% surface water for water supply • By 2030, ensure 100% consistent and secure water supply for all. • By 2050, reduce the percentage of Non-Revenue Water to 5%.	**Strategy 1**: Reduction of Non-Revenue Water to reduce commercial and physical loss of water. **Strategy 2**: Ensure resilience of water resources. Strategy 3: Ensure safe water for low-income groups aiming for equitable clean water access.
Waste-water	Transitioning to a circular economy through 100% wastewater treatment and reuse	• By 2050, 80% of off-site sewage treatment and 20% on-site sewage treatment. • By 2050, 100% wastewater treatment, using efficient technologies, with methane capture and alternative energy where feasible. • By 2050, 80% treated wastewater should be reused.	**Strategy 1**: Implement an efficient sewage collection system to prevent environmental and groundwater contamination. **Strategy 2**: Enhance wastewater treatment via centralised and decentralised facilities. **Strategy 3**: Sustained toilet coverage to maintain the city's status as open defecation-free. **Strategy 4**: Improving wastewater treatment
Transport	Decarbonisation of the transport sector	• By 2050, 95% private vehicles and 100% public vehicles are electric. • By 2050, 20% improvement in vehicle fuel efficiency compared to base year. • By 2050, modal share of public transport is 60% and of non-motorised transport is 20%	**Strategy 1**: Fuel switch to low carbon electric mobility **Strategy 2**: Increased use of public and non-motorised transit **Strategy 3**: Increase vehicle fuel efficiency.
Energy	Energy secure and zero-emission renewable electricity	• By 2050, renewables to constitute 85% of grid electricity. • By 2050, 100% buildings use energy efficient electronic/ electric appliances and lighting • By 2050, 100% new buildings, 70% existing residential buildings and 80% existing commercial and institutional buildings to be climate resilient/green buildings	**Strategy 1**: Increased RE generation share. **Strategy 2**: Distributed solar PV installation in buildings. **Strategy 3**: Energy-efficient (EE) building design **Strategy 4**: Uptake of EE measures in buildings **Strategy 5**: EE in public buildings and infrastructure **Strategy 6**: Switch to cleaner fuels and advanced/electric cookstoves for home and commercial use. **Strategy 7**: Reduce conventional energy use in the industrial sector.

6.2.1. Stormwater Drainage System

Sectoral Vision: *"Mitigate urban flooding, enhance healthy urban living conditions, and ensure long-term resilience and water resource management"*

The objective of having drainage systems is to control urban flooding and mitigate the impacts of erratic rainfall and stormwater runoff in urban areas, while promoting sustainability and adaptability to changing climate. The following drainage system strategies are set to align with its vision:

Strategy 1: Prioritising the restoration of natural drainage systems to improve stormwater management.

Strategy 2: An efficient stormwater management system to prevent pluvial flooding.

The Department of Engineering, DSCC, will lead the implementation of the strategies in association with the Department of Urban Planning, DSCC, and support from DWASA, RAJUK, Department of Disaster Management, and the Department of Fire Service and Civil Defence.

Action Area	Target Parameter	Target		
		2030	2040	2050
Conservation and restoration of natural drains of the city	Removal of encroachment and restoration of all khals of the city	20%	50%	100%
Establishment of Early Warning System (EWS)	Flood early warning systems for low-lying areas in the city set up in Dhaka. This can be linked to the DSCC's command and control centre - in collaboration with DWASA	Flood EWS, Established	Flood EWS, Established	Flood EWS, Established
Enhancement of footpaths and permeable surfaces	Improve footpaths with permeable surfaces for minimising runoff and promoting water recharge	20%	50%	100%

Source: ICLEI South Asia analysis through following C40 tools and pathway modelling (Based on primary data)

6.2.2 Solid Waste Management

Sectoral Vision: *"Transforming into a waste-free city with Integrated solid waste management plan"*

The actions proposed are primarily meant to reduce open dumping of waste in the city and in dumpsites. There is a need to strengthen waste collection, transportation, processing, recycling, and scientific disposal, through infrastructure development as well as improved behavioural changes among waste generators. To improve the situation and strengthen the resilience of the solid waste management sector in the DSCC, the following key strategies are proposed.

Strategy 1: Improve DSCC's solid waste management-Collection, Transportation, Processing, and Disposal

Strategy 2: Strengthen the Implementation of the 3Rs (Reuse, Reduce, Recycle) strategy

Strategy 3: Reducing waste being sent to landfills

Strategy 4: Landfill gas capture

Implementation of the strategies will be undertaken by the Department of Solid Waste Management, DSCC in association with Department of Urban Planning, DSCC, and supported primarily by the Department of Environment, and local NGOs/CBOs.

Action Area	Target Parameter	Target		
		2030	2040	2050
Waste collection and Transportation	Percentage of waste collected and transported	95%	100%	100%
Promotion of decentralised waste processing facilities in the city	Percentage of waste processed through decentralised waste processing facility to reduce emissions from transporting waste and to ensure onsite processing of the waste.	0%	20%	30%
Promotion of a centralised Waste Management Facility	Percentage of waste processed through centralised processing of waste or Eco-town (as mentioned in the New Clean Master Plan of DSCC)	48%	60%	60%
Scientific disposal of waste	Percentage of waste going for scientific disposal	47%	20%	10%
Waste segregation, reduction, and recycling	Percentage of waste reduced before going to solid waste stream.	10%	15%	20%
Waste reduction and recycling	Percentage of waste reduced or recycled (paper, textiles, plastic)	10%	15%	20%
Processing of wet waste through decentralised and centralised composting and biomethanation	Percentage of the total wet waste undergoing composting/ bio-methanation	20%	40%	100%
Scientific landfill with gas capture mechanism	Percentage of landfill gas captured	10%	15%	20%

Source: ICLEI South Asia analysis through following C40 tools and pathway modelling (Based on primary data)

6.2.3. Health System

Sectoral Vision: *"Climate resilient healthcare systems corresponding to resident's well-being"*

The aim of the strategies is to fortify the city's health system against climate change and to tackle the health repercussions linked to it. This involves empowering healthcare professionals and residents with the skills to effectively handle climate-related health challenges and emergencies. Additionally, integrating climate change considerations into healthcare facilities is crucial to bolstering climate resilience. City Corporation-level interventions are also essential to proactively mitigate the effects of heat stress and water/vector-borne diseases. The following strategies emphasizes measures to meet the health system vision:

Strategy 1: Capacity building and awareness generation of healthcare professionals and residents to address climate-related health challenges and emergencies effectively.

Strategy 2: Integrate climate change considerations into healthcare facilities to enhance climate resilience.

Strategy 3: Corporation-level interventions to prevent or reduce impacts of heat stress and water/vector-borne diseases.

The Department of Health, DSCC in association with the Department of Urban Planning, DSCC will lead implementation of the strategies with adequate support from the Directorate General of Health Services (DGHS) and various public and private health institutions.

Action Area	Target Parameter	Target		
		2030	2040	2050
Capacity building of health workers and establishment of an Early Warning System linked it with the health sector 	Early warning and early action systems set up for heat stress and flood risks	25% of city area covered by the system	80% of city area covered by the system	100% of city area covered by the system
Access to health care facilities to all citizen 	Establishment of healthcare centres that are within 1.5 km, with power backup facilities	80% of population has access to healthcare within 1.5 km	100% of population has access to healthcare within 1.5 km	100% of population has access to healthcare within 1.5 km
Prevention and reduction of heat stress and water/ vector borne disease 	Heat Action Plan developed for the city, with allocated budget and staff to implement the plan	Yes	Yes	Yes
	Buildings with cool roofs	20% of slum houses	50% of slum houses	80% of slum houses
	Buildings with green roofs	20% of residential buildings	50% of residential buildings	70% of residential buildings
	Area of green space in the city	15%	20%	25%
	Cooling shelters with drinking water facilities	Provided in all public spaces like markets	Provided in all public spaces like markets	Provided in all public spaces like markets
	Ensure regular spraying of insecticides to prevent vector borne disease	Weekly spraying in disease-prone areas	Weekly spraying in disease-prone areas	Weekly spraying in disease-prone areas

Source: ICLEI South Asia analysis through following C40 tools and pathway modelling (Based on primary data)

6.2.4. Water Supply System

Sectoral Vision: *"Ensuring sustainable water resources and equitable access to clean, safe and affordable water"*

The primary goal of the water supply systems intervention is to enhance the city's resilience to climate change challenges. This involves efficiently managing local water resources, advocating sustainable water usage, and ensuring the provision of water services across all sectors of the society. To realise these goals, the city must focus on reducing non-revenue water, enhancing the climate-resilient water supply infrastructure, and promoting sustainable water usage among citizens and other stakeholders. The key strategies to enhance the current state and strengthen the resilience of the water supply sector in DSCC are delineated below.

Strategy 1: Reduction of Non-Revenue Water to reduce commercial and physical loss of water.

Strategy 2: Establish effective water resource management through climate-resilient infrastructure for water and sustainable water use.

Strategy 3: Ensure safe water supply to low-income communities, migrants, and slum areas, aiming to provide equitable access to clean water.

DWASA is primarily responsible for supply of water to residential and commercial consumers in Dhaka. DSCC will support DWASA to implement the strategies by means of public outreach, door to door awareness campaigns, knowledge dissemination through citizen conventions and community scale focused group discussions, while working closely with RAJUK and DWASA to integrate strategies in spatial and built environment planning, policies and programs.

Action Area	Target Parameter	Target		
		2030	2040	2050
Reduction in non-vevenue water	Reduce the percentage of Non-Revenue Water	20%	10%	5%
Promotion of rainwater Harvesting	Increase groundwater recharge through rainwater harvesting and artificial aquifer recharge - number of RWH recharge borewells established and maintained	100% in new construction, 10% of existing institutions	100% in new construction, 10% of existing institutions	100% in new construction, 10% of existing institutions
Climate proof infrastructure	Establishing climate-proof water supply systems is essential to prevent disruptions during disasters	100%	100%	100%
Exploration of surface water for water supply.	Augment the quantity of water supplied by exploring surface water sources in the city, particularly rivers.	40%	50%	70%
Access of safe water for all	Ensuring a consistent and secure water supply, particularly for households at all time	100%	100%	100%
	Reduction of demand for fresh water to guarantee access to safe water for everyone.	5%	10%	20%

Source: ICLEI South Asia analysis through following C40 tools and pathway modelling (Based on primary data)

6.2.5. Wastewater System

Sectoral Vision: *"Transitioning to a circular economy through 100% wastewater treatment and reuse"*

The primary goal of the wastewater system strategy is to optimize the utilisation of treated wastewater across different sectors, thereby diminishing the demand for freshwater resources. Simultaneously, the strategy aims to enhance public awareness and acceptance of treated wastewater reuse. Additionally, it seeks to implement robust monitoring and evaluation mechanisms to gauge the effectiveness of wastewater treatment and reuse initiatives. Moreover, there is a focus on establishing and enforcing regulations that align with the circular economy model for wastewater management.

Strategy 1: Efficient sewage collection to prevent surface environmental contamination as well as seepage into groundwater and contamination of local water sources.

Strategy 2: Augmentation of wastewater treatment facilities through the promotion of centralised and decentralised wastewater management.

Strategy 3: Sustained toilet coverage to maintain the city's status as open defecation-free.

Strategy 4: Improving wastewater treatment.

With the city's wastewater collection and treatment managed by DWASA at present, DSCC will play a supporting role in implementation of the identified strategies through facilitating community and citizen engagement, knowledge dissemination and awareness generation, dovetailing the strategies in its spatial and built environment plans, policies and programs along with RAJUK.

Action Area	Target Parameter	Target		
		2030	2040	2050
Efficient collection of sewerage	Percentage of sewerage collected and treated safely through Septic tank	50%	40%	20%
	Percentage of sewerage collected and treated safely through piped sewer system	50%	60%	80%
Scientific treatment, reuse disposal of Wastewater	Increase in treatment of wastewater, faecal sludge, and septage by adopting efficient scientific treatment technology, either centralised or decentralised with methane capture mechanisms and use of alternative energy sources wherever feasible.	50%	100%	100%
	Increase reuse of treated wastewater	10%	60%	80%
Toilet coverage in the city	The city must continue to uphold a low percentage or achieve zero open defecation in the foreseeable future	Less than 1% of the population	Less than 1% of the population	Less than 1% of the population
Scientific treatment of wastewater and sludge	Percent of wastewater treated	50% (improved performance management and biogas capture)	100% (improved performance management and biogas capture)	100% (improved performance management and biogas capture)

Source: ICLEI South Asia analysis through following C40 tools and pathway modelling (Based on primary data)

6.2.6. Transport

Sectoral Vision: *"Decarbonisation of the transport sector"*

To achieve the ambitious transport sector vision, enhanced efforts are required to promote the adoption of electric mobility and fuel-efficient vehicles, use of non-motorised transport (NMT) and implement traffic management measures. Developing dedicated NMT infrastructure and ensuring increased use of public transport will decrease the number of private vehicles will eventually result in lower emissions and improved air quality and well-being of the citizen. The following strategies will help accomplish the vision set for the transport sector:

Strategy 1: Fuel switch to low carbon electric mobility

Strategy 2: Increased use of public and non-motorised transit

Strategy 3: Increase vehicle fuel efficiency.

The Department of Transport, DSCC in association with Department of Urban Planning, DSCC will support national and sub-national level departments like BRTC, BRTA, DTCA, and DMP to implement strategies by means of requisite measures and infrastructure for decarbonised mobility and knowledge dissemination within the community.

Action Area	Target Parameter	Target		
		2030	2040	2050
Fuel switch in private vehicles	Percent of private electric vehicles on-road (private vehicles, private buses and IPT)	10%	50%	95%
Fuel switch in public transit	Percent of mass transit using electric fuel (metro, railway, public buses and BRT)	Electric Public bus/BRT: 80% Rail & metro: 100%	Electric Public bus/BRT: 100% Rail & metro: 100%	Electric Public bus/BRT: 100% Rail & metro: 100%
Promotion of walking and bicycling and other NMT modes	Mode share of NMT	18.4%	19.2%	20%
Promotion of public transport	Mode share of public transport (public buses, BRT, MRT)	26.9%	33.7%	40.7%
	Mode share of private operator buses	32.3%	26.3%	20.4%
	Mode share of private transport (for reference)	22%	20.8%	18.9%
Implement measures such as improved road traffic management, emission standards, segregated lanes for slow-moving traffic	Improvement in vehicle fuel efficiency compared to base year	10%	15%	20%

Source: ICLEI South Asia analysis through following C40 tools and pathway modelling (Based on primary data)

6.2.7. Energy and Buildings

Sectoral Vision: *"Energy secure and zero-emission renewable electricity"*

Prioritising the expansion and integration of renewable energy will be an immediate approach to achieve net-zero goals in Dhaka South city. In addition, incorporating energy efficiency in buildings and promoting the use of cleaner fuels will help realise deep cuts in the city's carbon footprint. The following strategies will help achieve the vision for 'Energy and Buildings':

Strategy 1: Increase the share of renewable energy generation.

Strategy 2: Distributed solar PV installation in buildings.

Strategy 3: Energy efficient building design

Strategy 4: Uptake of energy efficiency measures in buildings

Strategy 5: Renewable energy and energy efficiency in public buildings and infrastructure

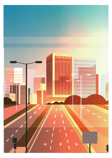
Strategy 6: Switch to cleaner fuel and advanced/electric cookstoves in household and commercial cooking

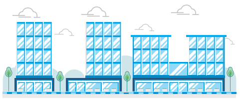
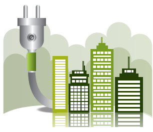
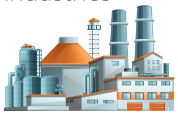
Strategy 7: Reduce conventional energy use in industrial sector.

Energy sector decision-making, governance and implementation of actions is primarily under the purview of institutions such as Sustainable and Renewable Energy Development Authority (SREDA), Dhaka Electricity Supply Company (DESCO), Dhaka Power Distribution Company (DPDC) and the Bangladesh Power Development Board (BPDB). DSCC has a limited mandate on energy sector policies. It can support the energy sector institutions by means of advocacy and facilitation, leveraging its mandate and powers in spatial planning and building regulation to supplement energy sector policies, driving renewables and energy efficiency adoption in DSCC's operations, and community engagement and knowledge dissemination. DSCC will play a key role in leading implementation of strategies in the city's new and existing buildings along with SREDA, DPDC and RAJUK.

Action Area	Target Parameter	Target		
		2030	2040	2050
Expand the capacity of renewable power in the electricity grid 	Share of renewables in grid electricity generation	24%	56%	85%
Rooftop solar PV in residential buildings 	Percent of residential buildings with rooftop solar PV systems installed	10%	20%	30%
Rooftop solar PV in commercial and institutional buildings 	Percent of commercial buildings with rooftop solar PV systems installed	40%	60%	70%

Action Area	Target Parameter	Target		
		2030	2040	2050
New residential and commercial buildings built to high energy efficiency standards 	Percent of new residential buildings that are green/climate resilient buildings	100%	100%	100%
	Percent of new commercial and institutional buildings that are green/climate resilient buildings	100%	100%	100%
New affordable housing built to high energy efficiency standards 	Percent of new affordable housing buildings that are green/climate resilient buildings	100%	100%	100%
Retrofit building envelopes of existing residential and commercial buildings 	Percent of existing residential buildings with envelopes retrofitted to high energy efficiency standards	20%	50%	70%
	Percent of existing commercial and institutional buildings with envelopes retrofitted to high energy efficiency standards	25%	60%	80%
Cool roof program for energy savings and urban heat island mitigation 	Cool roofs in new buildings	100%	100%	100%
	Cool roofs in existing buildings	50%	80%	100%
Energy efficiency in residential buildings 	Percent of **existing residential buildings** with high efficiency appliances (refrigerators, fan, AC/advanced cooling system, solar water heater, water efficient fixtures)	20%	40%	80%
	Percent of **new residential buildings** with high efficiency appliances (refrigerators, fan, AC/advanced cooling system, solar water heater, water efficient fixtures)	100%	100%	100%
	Percent of **existing residential buildings** with LED lights	80%	100%	100%
	Percent of **new residential buildings** with LED lights	100%	100%	100%

Action Area	Target Parameter	Target		
		2030	2040	2050
Energy efficiency and renewable energy in new public buildings 	Percent of **existing commercial buildings** with high efficiency appliances (refrigerators, fan, AC/advanced cooling system, solar water heater, water efficient fixtures)	30%	50%	100%
	Percent of **new commercial buildings** with high efficiency appliances (refrigerators, fan, AC/advanced cooling system, solar water heater, water efficient fixtures)	100%	100%	100%
	Percent of **existing commercial buildings** with LED lights	80%	100%	100%
	Percent of **new commercial buildings** with LED lights	100%	100%	100%
Energy efficiency and renewable energy in existing public buildings	Percent of existing public buildings	80%	100%	100%
Energy efficiency and renewable energy in new public buildings 	Percent of new public buildings	100%	100%	100%
Energy efficiency and renewable energy in public infrastructure and utilities 	Percent of public infrastructure and utilities (water supply, wastewater)	80%	100%	100%
Adopt LED streetlighting 	Percent of LED streetlights	100%	100%	100%

Action Area	Target Parameter	Target		
		2030	2040	2050
Advanced/electric cookstoves in existing households and commercial buildings (i.e., hotels) along with phase out of wood/wood waste in cooking 	Percent of existing residential buildings that use electricity for cooking	20%	40%	95%
	Percent of existing commercial buildings (Hotels) that use electricity for cooking	30%	40%	90%
Advanced/electric cookstoves in new residential and commercial (i.e., hotels) buildings 	Percent of new residential buildings that use electricity for cooking	100%	100%	100%
	Percent of new commercial buildings (Hotels) that use electricity for cooking	100%	100%	100%
Fuel switch to low-carbon electricity 	Proportion of industrial fuel (diesel and natural gas) switched to low carbon electricity	45%	50%	95%
Energy efficiency measures in industries 	Percent improvement in industrial energy efficiency	20%	30%	40%
Rooftop and distributed solar PV in industries 	Percent of industrial buildings with rooftop/ distributed solar PV systems installed	40%	60%	70%

Source: ICLEI South Asia analysis through following C40 tools and pathway modelling (Based on primary data)

6.3. Sectoral Actions and Implementation

The DSCC's CAP includes 26 strategies outlined across 7 sectors that provides a pathway for the city to substantially improve its climate resilience and move towards a net zero future. Enactment of the interventions identified in the CAP will provide several co-benefits for the city and its citizens. These include secure and strengthened energy supply, reduced GHG emissions from transport and waste sectors, informed and conscious decision making among citizens, water security, improved resilience to urban heat and flooding risks, improved public health, and increased economic opportunities through innovation and clean technologies. The sectoral strategies will also support the city in meeting its SDG aspirations.

Each of the strategies are set with respect to the action area and target parameter for effective implementation of the proposed actions. These strategies are aligned with the adaptation and mitigation actions agreed through the action prioritisation process. This process of Prioritising the actions helps present a clear, comprehensible, and robust approach towards the city's climate vision and targets. Given the uncertainties of actions' subject to change, the prioritisation process can be revisited at each stage of the climate action planning and during the updating phase as per the increase in the city's capacity. This approach is beneficial for other city priorities as well.

The selection of the interventions for different sectors of the CAP was conducted through a detailed discussion within the Climate Core Team. Expert inputs from C40 and ICLEI South Asia fed into the selected list of interventions. The selected interventions were based on city level priorities and interests and their possible contribution to climate resilience as well as ensuing co-benefits. Ambitious and practical targets were set by the Core Team for each intervention in the CAP. A phased approach was undertaken so that the city can move towards a net zero future with realistic plans.

Actions for implementation in the CAP were prioritised based on the climate resilience benefits, intervention feasibility and period of impact as well as the city's available resources in consultation with stakeholders as discussed in Section 1.1.3. The feasibility of the intervention is assessed on technical, financial and political parameters and the time period required to generate the impact within the city in the short, medium or long term. The overall feasibility depends on whether an intervention has readily available, accessible and affordable technology, has already allocated or easily available finances and can garner political and social support. The time period of impact assesses whether an intervention can bring out a change in the resilience of an urban system in the short term – by 2030, medium term by 2040 or long term by 2050. The assessment is based on the Net Zero ClimateResilientCITIES methodology of ICLEI South Asia, which has been used in a number of cities in the South Asian region, including in Bangladesh. In addition, the priority of proposed actions and their potential to generate climate resilience benefits have been assessed in terms of their ability to contribute to the redundancy and flexibility of the urban systems, their ability to provide information for future planning of the relevant systems, their ability to respond to sudden shocks or stresses, and their GHG emission reduction potential. The details of this analysis are attached in **Annexure 11**. This approach helps to ascertain the priority of actions in the local context so as to deliver improved climate resilience and reduced GHG emissions while also integrating realisation of multiple co-benefits. For example, priority for implementation should be given to actions that bring high climate resilience benefit, high feasibility, and have a short period of impact, along with readily available technology and readily available financing sources. **All the sectoral actions identified in the CAP below are those that have been prioritised by the DSCC Core Team.**

The subsequent sections present the identified climate resilience actions that make up the CAP as follows:

- Sectoral snapshot of information reflecting its baseline status including its share of GHG emissions and opportunities, challenges, and gaps; guiding policies and initiatives that align with proposed actions', BAU GHG emissions scenario and the identified climate risks; vulnerable areas and actors and their adaptive capacity; overall GHG emissions mitigation potential and climate resilience impact and co-benefits; and the SDGs that will be met with the proposed actions.
- Sector-specific adaptation and mitigation strategies and targets: The adaptation strategies are to help build resilience towards climate risks and urban system vulnerabilities while the mitigation strategies are to address the target reduction of GHG emissions from the sectors. Each strategy has a set of action areas, target parameters and ambitious targets for the timeline 2030, 2040 and 2050. The proposed actions are then further elaborated by the implementation entities, financing mode and prioritisation and feasibility parameters.

6.3.1. Stormwater Drainage System

Baseline status (2021-22)

Key statistics:

- The DSCC is responsible for managing the drainage system in the city.
- Dhaka's storm drainage system is inefficient and inadequate, as it can only drain about 120 MLD (6%) of the stormwater runoff generated daily.
- The existing storm drainage network covers an area of approximately 140 sq. km and consists of 26 drainage canals and 10 pumping stations.
- The stormwater runoff also contains emerging pollutants (EPs), such as microplastics and antibiotics, that are not removed by the conventional drainage system.

Opportunities, challenges and gaps:

- Implementing effective stormwater management practices in the city
- Technological innovations and innovative finance in the stormwater treatment sector
- Waterlogging is observed in areas that have undergone topological changes due to new construction.
- Solid waste littering and sewage from illegal drainage connections cause siltation in stormwater drains and reduce their efficiency.
- Lack of coordinated urban planning
- Lack of regulatory enforcement

Existing policy and initiatives at the national and sub-national levels

National Policy/ Programs/ Targets:

- Bangladesh Delta Plan 2100

Regional and City Level Policy/ Programs/ Targets:

- Stormwater Drainage Master Plan for Dhaka City 2015-2040,
- Dhaka Structure Plan 2016-2035,
- Flood Risk Management in Dhaka: A Case for Eco-Engineering Approaches and Institutional Reform 2018,
- Dhaka Structure Plan 2016-2035,
- Dhaka Detailed Area Plan 2022-2035

Climate risk scenario

Climate Risk Status: Extremely High

- Increased rainfall, coupled with clogged drains, will lead to more incidence of waterlogging and flooding in the city. Since the Dhaka South area is low-lying, it is more prone to damage due to urban flooding and waterlogging.
- Storm surges from cyclones may cause similar impacts from waterlogging and urban flooding.
- Stagnating water may impact the health and well-being of residents and increase the incidence of waterborne diseases.

Climate Vulnerability

Vulnerable Area:

Ward-2, Ward 3, Ward-4, Ward-5, Ward -7, Ward-10, Ward-11, Ward-14, Ward-22, Ward-23, Ward-24, Ward-26, Ward-29, Ward-30, Ward-34, Ward-35, ward-38, ward-40, Ward- 52, Ward53. Ward-60, Ward-62, Ward-65, Ward 68, Ward- 75

Vulnerable Actors:

- DWASA
- DSCC
- Low-Income group
- Residents
- People with disabilities
- Ward Councillors
- Informal Sector
- Elderly and Children
- Migrants

Adaptive capacity of the system:

- Low: Economic, Technological/ Infrastructure
- Medium: Governance
- High: Ecosystem

Potential climate resilience impact and wider co-benefits of climate actions

- Reduce water drainage blockages for efficiency.
- Separate sewerage and storm drainage to reduce health risks during floods.
- Improve long-term resilience against urban flooding.
- Minimize disruptions to economic activities, ensuring a stable environment.
- Contribute to community well-being for a safer, healthier, and sustainable urban environment.

SDGs

Adaptation Strategies for Stormwater Drainage System

Strategy 1: Prioritising the restoration of natural drainage systems to improve stormwater management

Action Area	Target Parameter	Target		
		2030	2040	2050
Conservation and restoration of Natural Drains of the City	Removal of encroachment and restoration of all Khals of the city	20%	50%	100%

Proposed Action	Resilience potential	Feasibility of Intervention	Period to Realise Impact (Short – by 2030 Med – by 2040 Long – by 2050)	Implementation Entities	Financing source or mode
(i) Action: Conservation and restoration of Natural Drains of the City (Khals)					
Sub Action-1 Prevent further encroachments of khals and provide communities residing in already encroached areas the option to relocate to government-sponsored housing schemes.	High	High	Long-term	**Lead role** • DSCC **Supporting role** • NGOs • CBOs • National and international donor/lending agencies • RAJUK	• WASA and DSCC budget • Funding through relevant government schemes • Aid from donor agencies • PPPs and FDIs • CSR funds • Loans from lending
Subaction-2 Cleaning and revitalising khals that have been encroached upon or have deteriorated to improve flow capacity	High	High	Long-term		
To complement the outlined strategy for the Drainage System, additional soft interventions should be considered.					
The existing Drainage Master Plan with DWASA should be followed	High	High	Long-term	**Lead role** • DSCC **Supporting role** • NGOs • CBOs	• Budget from DWASA and DSSC • Funding through relevant government schemes • Aid from donor agencies • PPPs and FDIs • CSR fund • Loans from lending

Strategy 2: An efficient stormwater management system to prevent pluvial flooding

Action Area	Target Parameter	Target		
		2030	2040	2050
Establishment of Early Warning System (EWS)	Flood early warning systems for low-lying areas in the city set up in Dhaka. This can be linked to DSCC's command and control centre - in collaboration with DWASA.	Flood EWS, Established	Flood EWS, Established	Flood EWS, Established

Proposed Action	Resilience potential	Feasibility of Intervention	Period to Realise Impact (Short – by 2030 Med – by 2040 Long – by 2050)	Implementation Entities	Financing source or mode
(i) Action-Establishment of an Early Warning System					
Sub Action-1 **Stem** Implement flood-level early warning and monitoring for water bodies within the city; possible flood response plans for the city with institutional structure in place at the local level.	High	Medium	Long-term	**Lead role** • DSCC **Supporting role** • NGOs • CBOs • National and international donor/lending agencies • RAJUK	• DWASA and DSCC budget • Funding through relevant government schemes • Aid from donor agencies • PPPs and FDIs • CSR funds • Loans from lending institutions
Sub Action-2 Upgrade the existing stormwater drainage network's capacity by aligning it with anticipated future rainfall intensities and surface runoff coefficients.	High	High	Long-term		
To complement the outlined strategy for the drainage system, additional soft interventions should be considered.					
Establish a structured maintenance framework for stormwater drainage systems to ensure regular cleaning and obstruction removal in order to proactively prevent waterlogging, particularly in the lead-up to the monsoon season.	High	High	Medium-term	**Lead role** • RAJUK	The implementation of these actions requires less financial investment

Action Area	Target Parameter	Target		
		2030	2040	2050
Enhancement of footpath and permeable surface	Enhance the extent of footpaths with permeable surfaces for minimising runoff and promoting water recharge	20%	50%	100%

Proposed Action	Resilience potential	Feasibility of Intervention	Period to Realise Impact (Short – by 2030 Med – by 2040 Long – by 2050)	Implementation Entities	Financing source or mode
(ii) Action: Enhancement of footpath and permeable surface					
Improve the permeable surfaces in open areas, such as the internal walkways of residential or commercial properties, parks, sidewalks, etc., to reduce runoff and encourage groundwater recharge.	High	High	Medium-term	**Lead role** • DSCC **Supporting role** • Research Institution • Academic institutions	• DWASA and DSCC budget • Funding through relevant government schemes • Aid from donor agencies • PPPs and FDIs • CSR fund • Loans from lending
To complement the outlined strategy for solid waste management, a range of additional soft interventions should be considered to enhance policies and regulatory structures to promote water resilience.					
Formulate a policy to prevent the disposal of solid and liquid waste into water channels (khals) with penal provisions.	High	High	Medium-term	**Lead role** • DSCC **Supporting role** • Research Institution • Academic institutions	• DWASA and DSCC fund
Launch a public awareness campaign to discourage the disposal of solid and liquid waste into drainage systems	High	High	Short- term		
Establish bylaws to promote the use of permeable surfaces for water recharge particularly for paved footpaths.	Average	Medium	Short-term		

6.3.2. Solid Waste Management

Baseline status (2021-22)

Share of city-wide GHG emissions in Dhaka South: 22.3%

Key statistics:

- The DSCC area generates around 3426 TPD (2021-22 base year) waste
- The collection efficiency of DSCC's solid waste is about 90%.
- 75 PCSPs are actively involved in primary waste collection in the DSCC area.
- About 5346 cleaners are responsible for cleaning of streets, drains, roads, and STSs.
- A total of 246 PCSPs are currently working in the DSCC, providing services to 2,450 fieldworkers
- Dustbins made of concrete blocks by the roadside are becoming increasingly obsolete, with only 26 functional dustbins in Wards 34, 35, 37, 38, 40, 42, and 50.
- In addition, there are 206 open spots and 270 containers that are currently functional in the DSCC.

Sector	Baseline GHG Emissions (Million tCO_2e)
Solid waste	1.26

Opportunities, challenges and gaps:

- Waste processing and recycling initiatives
- Lack of segregation at source leads to inefficient recycling and treatment
- Littering of solid waste in roadblocks, sewerage and stormwater drains during extreme rainfall.
- Open dumping and non-scientific landfill issues
- Integrated waste management planning.

Existing policy and initiatives at the National and sub-national level

National Policy/ Programs/ Targets:

- National 3R Strategy for Waste Management, 2010,
- Bangladesh Climate Change Strategy and Action Plan 2009,
- Nationally Determined Contributions (NDCs) 2021 Bangladesh (Updated),
- Mujib Climate Prosperity Plan: Decade 2030

Regional and City Level Policy/ Programs/ Targets:

- New Clean Dhaka Master Plan 2018-2032,
- Dhaka Structure Plan 2016-2035,
- Dhaka Detailed Area Plan 2022-2035

Climate risk scenario

BAU GHG Emissions for Dhaka city (DNCC & DSCC combined):

Sub-sector	Baseline GHG Emissions (Million tCO_2e)		
	2030	2040	2050
Solid waste	3.83	5.30	5.93

Climate Risk Status: High

- Rising temperatures can impact the waste collection efficiency of the city.
- High temperatures and humidity can alter the waste decomposition rate, leachate production rate and chemical composition of the leachate, which will facilitate microenvironments that encourage the spread of infectious diseases.
- It can also increase the risk of fires in landfill sites.

Climate Vulnerability

Vulnerable Area:

Ward- 3, Ward-4, Ward-6, Ward-14, Ward-18, Ward-22, Ward-23, Ward-26, Ward-29. Ward-30, Ward-58, Ward-59, Ward-63, Ward-61, Ward-60, Ward-53

Vulnerable Actors:

- DSCC
- PCSPs
- Residents
- Low-Income Groups
- Migrants
- Informal Sector
- Ward Councillors

Adaptive Capacity of the system:

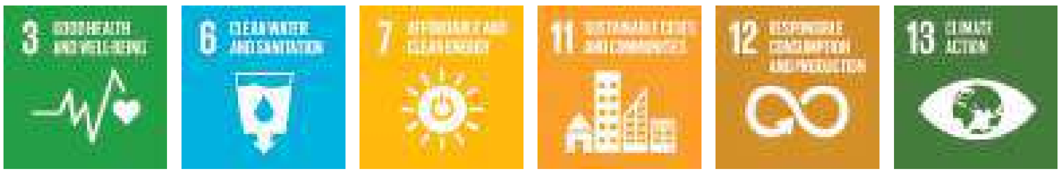
- Low: Societal
- Medium: Economic, Technological/Infrastructure
- High: Ecosystem

Potential climate resilience impact and wider co-benefits of climate actions

- GHG mitigation potential of interventions in Extended Action Scenario from solid waste strategies: 12% of total GHG emission reduction by 2050
- Reduce GHG emission from effective waste treatment
- Higher resource efficiency, lower local pollution and public health risks
- Improve resilience from decentralised systems

SDGs

SUSTAINABLE DEVELOPMENT GOALS



Adaptation Strategies for Solid Waste Management

Strategy 1: Improved solid waste management-Collection, Transportation, Processing, and Disposal

Action Area	Target Parameter	Target		
		2030	2040	2050
Waste collection and transportation	Percentage of waste collected and transported	95%	100%	100%

Proposed Action	Resilience potential	Feasibility of Intervention	Period to Realise Impact (Short – by 2030 Med – by 2040 Long – by 2050)	Implementation Entities	Financing source or mode
(i) Action: Enhancement of the collection and Transportation of waste					
Sub Action-1 Ensure a comprehensive service for door-to-door collection of waste from every household through primary collection service providers (PCSPs), commercial establishments, institutions, and hotels. This involves conducting an assessment to identify gaps in both primary and secondary collection services and deploying an adequate number of personnel or private collectors for the collection and transportation of waste.	High	Medium	Medium-term	**Lead role** • DSCC • RAJUK **Supporting role** • NGOs/CBOs • Department of Environment (DoE), • Resident Welfare Associations (RWA) • Waste collectors	• City Corporation budget • Funding through relevant government schemes • Aid from donor agencies • PPPs and FDIs • CSR funds • Loans from lending institutions
Subaction-2 Ensure adequate infrastructure - collection vehicles for primary and secondary collection of solid waste; establishment of adequate numbers of secondary collection points in all wards/zones.	High	Medium	Medium-term		
Sub Action-3 Enhance secondary storage, collection, and transport of solid waste. - Upgrade transfer stations with pre-sorting facilities - GPS-enabled route rationalisation of solid waste vehicles to optimize fuel use.	Medium	Medium	Short-term		

Proposed Action	Resilience potential	Feasibility of Intervention	Period to Realise Impact (Short – by 2030 Med – by 2040 Long – by 2050)	Implementation Entities	Financing source or mode
Subaction-4 Enforce measures and regulation to minimize unscientific handling and processing of plastic, electronic waste and C&D waste and establish mechanisms for their processing.	Medium	Medium	Short-term		
To complement the outlined strategy for solid waste management, additional soft interventions should be considered.					
Subaction-5 Conduct capacity enhancement for waste collectors through regular training for proper collection of waste at primary and secondary levels; conduct IEC for citizens to encourage active participation in waste management processes by segregating, reducing waste, recycling, and proper handing over of waste to collectors.	High	High	Short-term	**Lead role** • DSCC • RAJUK **Supporting role** • NGOs/CBOs • Department of Environment (DoE)	• City Corporation budget • Funding through relevant government schemes • Aid from donor agencies • CSR funds

Action Area	Target Parameter	Target		
		2030	2040	2050
Promotion of decentralised waste processing facilities in the city	Percentage of waste processed through decentralised waste processing facility to reduce emissions from transporting waste and to ensure onsite processing of the waste.	0%	20%	30%

Proposed Action	Resilience potential	Feasibility of Intervention	Period to Realise Impact (Short – by 2030 Med – by 2040 Long – by 2050)	Implementation Entities	Financing source or mode
(ii) Action: Promotion of Decentralised waste processing facilities in the city					
Sub Action-1 Explore the opportunity to establish decentralised waste processing facilities in different zones through feasibility assessment, particularly catering to bulk waste generators such as hotels, malls, restaurants, wet markets, and residential complexes to remove organic waste going to landfills.	Very High	Low	Medium-term	**Lead role** • DSCC • RAJUK **Supporting role** • NGOs/CBOs • Department of Environment (DoE)	• City Corporation budget • Funding through relevant government schemes • Aid from donor agencies • PPPs and FDIs

Proposed Action	Resilience potential	Feasibility of Intervention	Period to Realise Impact (Short – by 2030 Med – by 2040 Long – by 2050)	Implementation Entities	Financing source or mode
Sub Action-2 Establishment of decentralised processing facilities such as composting and bio methanation facilities for wet waste	Very High	Low	Long-term		• CSR funds • Loans from lending institutions
Sub Action-3 Encourage the practice of home composting by providing incentives for reducing waste and sorting waste materials at source in households.	High	Medium	Long-term		

Action Area	Target Parameter	Target		
		2030	2040	2050
Promotion of a Centralised Waste Management Facility	Percentage of waste processed through centralised processing of waste or Eco-town (as mentioned in the New Clean Master Plan of DSCC)	48%	60%	60%

Proposed Action	Resilience potential	Feasibility of Intervention	Period to Realise Impact (Short – by 2030 Med – by 2040 Long – by 2050)	Implementation Entities	Financing source or mode
(iii) Action: Promotion of Centralised Waste Management Facility					
Sub Action-1 Ensure processing of waste through centralised waste management processing facilities such as bio methanation/material recovery facilities - all technologies to be selected based on feasibility assessment. - value chain analysis to ensure uptake of end products	Very High	High	Long-term	**Lead role** • DSCC • RAJUK **Supporting role** • NGOs/CBOs • Department of Environment (DoE)	• City Corporation budget • Funding through relevant government schemes • Aid from donor agencies • PPPs and FDIs • CSR funds • Loans from lending institutions

Action Area	Target Parameter	Target		
		2030	2040	2050
Scientific disposal of waste	Percentage of waste going to scientific disposal	47%	20%	10%

Proposed Action	Resilience potential	Feasibility of Intervention	Period to Realise Impact (Short – by 2030 Med – by 2040 Long – by 2050)	Implementation Entities	Financing source or mode
(iv) Action: Promotion of Scientific Disposal of Waste					
Sub Action-1 Ensure maximum recovery of recyclables and non-recyclables (having high calorific value) waste at the processing facility.	High	Low	Long-term	**Lead role** • DSCC • RAJUK **Supporting role** • NGOs/CBOs • Department of Environment (DoE)	• City Corporation budget • Funding through relevant government schemes • Aid from donor agencies • PPPs and FDIs • CSR funds • Loans from lending institutions
Sub Action-2 Ensure only inerts and rejects from processing facilities are reaching the landfill site.	High	Medium	Long-term		

Strategy 2: Strengthen the Implementation of the 3R (Reuse, Reduce, Recycle)

Action Area	Target Parameter	Target		
		2030	2040	2050
Waste segregation, reduction, and recycling	Percentage of waste reduced before going to solid waste stream.	10%	15%	20%

Proposed Action	Resilience potential	Feasibility of Intervention	Period to Realise Impact (Short – by 2030 Med – by 2040 Long – by 2050)	Implementation Entities	Financing source or mode
(i) Action: Maximize the reduction, segregation and recycling of waste					
Segregated at source and segregated collection - through separate vehicles or separate collection days.	Medium	High	Medium-term	**Lead role** • DSCC	• City Corporation budget

Proposed Action	Resilience potential	Feasibility of Intervention	Period to Realise Impact (Short – by 2030 Med – by 2040 Long – by 2050)	Implementation Entities	Financing source or mode
Prevention of littering - provision of sufficient infrastructure at public places and commercial markets.	Medium	High	Medium-term	**Supporting role** • RWAs • NGOs and civil society organisations • Business/trade associations • Industrial associations • Academic institutions like schools, colleges and universities	• Funding through relevant government schemes • Aid from donor agencies • PPPs and FDIs • CSR funds • Loans from lending institutions
Identify gaps and strengthen primary collection to ensure 100% door-to-door collection of segregated waste	Medium	Medium	Short-term		
To complement the outlined strategy for solid waste management, additional soft interventions should be considered.					
IEC to popularize circular economy and 3Rs principles, source segregation, recycling, and reduction of waste.	Medium	High	Short-term	**Lead role** • DSCC **Supporting role** • RWAs • NGOs and civil society organisations • Business/trade associations • Industrial associations • Academic institutions like schools, colleges and universities	• City Corporation budget • Funding through relevant government schemes • Aid from donor agencies
Promotion of waste reduction strategies: lifestyle and behaviour changes, IEC for the residential sector and textile industries	Medium	High	Short-term		

<table>
<tr><th>Proposed Action</th><th>Resilience potential</th><th>Feasibility of Intervention</th><th>Period to Realise Impact (Short – by 2030 Med – by 2040 Long – by 2050)</th><th>Implementation Entities</th><th>Financing source or mode</th></tr>
<tr><td>Penalty for littering and open disposal</td><td>Low</td><td>Low</td><td>Short-term</td><td>Lead role
• DSCC</td><td rowspan="2">• City Corporation budget
• Funding through relevant government schemes
• Aid from donor agencies
• PPPs and FDIs
• CSR funds
• Loans from lending institutions</td></tr>
<tr><td>User charges/ Incentives for household waste composting/ incentives for BWGs for onsite waste processing</td><td>Low</td><td>High</td><td>Short-term</td><td>Supporting role
• RWAs
• NGOs and civil society organisations
• Business/trade associations
• Industrial associations
• Academic institutions like schools, colleges and universities</td></tr>
</table>

Mitigation Strategies for Solid Waste Management

Strategy 1: Reducing waste to landfill

Action Area	Target Parameter	Target		
		2030	2040	2050
Waste reduction and recycling	Percentage of waste reduced or recycled (paper, textiles, plastic)	10%	15%	20%
Processing of wet waste through decentralised and centralised composting and biomethanation	Percentage of the total wet waste undergoing composting/ bio-methanation	20%	40%	100%

Proposed Action	Resilience potential	Feasibility of Intervention	Period to Realise Impact (Short – by 2030 Med – by 2040 Long – by 2050)	Implementation Entities	Financing source or mode
(i) Minimize solid waste generation and maximize reuse and recycling					
Sub Action • Identify gaps and strengthen primary collection to ensure 100% door-to-door collection of segregated waste • Strengthen implementation of 3Rs (Reuse, Reduce, Recycle) practices and recovery of recyclables at the city-scale.	High	Low	Medium-Term	**Lead role** • DSCC **Supporting role** • RWAs • NGOs and civil society organisations • Business/trade associations • Industrial associations • Academic institutions like schools, colleges and universities	• City Corporation budget, taxes, incentives/ rebates • Funding through relevant government schemes • International grants/ assistance, concessional finance
(ii) Strengthen waste transfer and processing infrastructure					
Sub Actions • Commission decentralised and/ or centralised composting/ bio-methanation facilities for processing of wet waste • Construct decentralised and/ or centralised material recovery facilities to ensure coordinated and formal recovery of dry waste • Adopt alternative fuels like refuse derived fuel (RDF) pelleting for dry waste	High	Medium	Long-Term	**Lead role** • DSCC **Supporting role** • RAJUK • RWAs • NGOs and civil society organisations • Business/trade associations • Industrial associations • Academic institutions like schools, colleges and universities • Corporate entities	• City Corporation budget • Funding through relevant government schemes • International grants/ assistance, concessional finance • Private sector investment and PPPs • CSR funds

Strategy 2: Landfill gas capture

Action Area	Target Parameter	Target		
		2030	2040	2050
Scientific landfill with gas capture mechanism	Percentage of landfill gas captured	10%	15%	20%

Proposed Action	Resilience potential	Feasibility of Intervention	Period to Realise Impact (Short – by 2030 Med – by 2040 Long – by 2050)	Implementation Entities	Financing source or mode
(i) Augment waste disposal infrastructure					
Sub Action • Commission sanitary landfill for scientific disposal of inert materials and any rejects from the solid waste processing facilities. • Equip the landfill with gas capture system - Estimate methane generation potential of the landfill - Track methane capture on a regular basis	High	High	Long-Term	**Lead role** • DSCC **Supporting role** • National and international donor/lending agencies • Corporate entities	• City Corporation budget • Funding through relevant government schemes • Private sector investment and PPP • Carbon credits/ climate finance • International grants/ assistance, concessional finance

6.3.3. Health System

Baseline status (2021-22)

Key statistics:

- The urban poor in the DSCC face various health challenges and risks, such as communicable and non-communicable diseases, malnutrition, maternal and child mortality, reproductive health problems, mental health issues, and injuries.
- The urban health and demographic surveillance system (urban HDSS) in selected slums of the DSCC is a population-based cohort that monitors the primary healthcare services provided by non-government organisations and urban local bodies.
- The Urban Health Atlas is a web-based tool that provides spatial and temporal information on the health facilities, services, and resources available in the DSCC.
- According to the urban HDSS data, the crude birth rate in the DSCC slums was 18.9 per 1000 population, the crude death rate was 5.3 per 1000 population, and the infant mortality rate was 37.4 per 1000 live births in 2019.
- According to the Urban Health Atlas data, there were 1,047 healthcare facilities in the DSCC, of which 36% were public, 59% were private, and 5% were NGO-run.
- The total number of hospital beds was 14,539, of which 46% were public, 51% were private, and 3% were NGO-run. The bed-population ratio in the DSCC was 1.9 per 1000 population, which was lower than the national average of 2.3 per 1000 population
- According to the Urban Health Atlas data, there were 8,527 health workers in the DSCC, of which 29% were doctors, 24% were nurses, 11% were paramedics, and 36% were other health staff. The doctor-population ratio in the DSCC was 0.3 per 1000 population, which was higher than the national average of 0.2 per 1000 population.

Opportunities, challenges and gaps:

- New healthcare infrastructure development
- Digital healthcare initiatives
- Health workforce development
- Limited access to healthcare service
- Infrastructure and information gaps

Existing policy and initiatives at the national and sub-national levels

National Policy/ Programs/ Targets:

- National Urban Health Strategy 2020,
- National Environmental Policy 1992,
- National Environmental Management Plan 1995

Regional and City Level Policy/ Programs/ Targets:

- Dhaka Structure Plan 2016-2035,
- Dhaka Detailed Area Plan 2022-2035

Climate Risk scenario

Climate Risk Status: High

- Increasing temperature and waterlogging can provide breeding grounds for the growth of vector-borne diseases such as dengue and malaria.
- It will also increase the risk of non-communicable diseases such as asthma and heart attacks.

Climate Vulnerability	**Vulnerable Area:** Water/Vector-borne diseases affected wards: 2, 7, 10, 12, 14, 15, 22, 23, 24, 25, 26, 27, 29, 35, 36, 38 56, 57, 58, 62, 63, 64, 65, 66, 67, 68, 70, 75 Heat stress affected wards: 2,7 10, 11, 12, 13, 14, 15 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38 **Vulnerable Actors:** • Public and Private Hospitals • Primary Healthcare Centres • DSCC • Informal Sector • Ministry of Health and Public Welfare, GoB • Low Income Group • Elderly and Children **Adaptive capacity of the system:** • Low: Societal, Economic, Ecosystem • Medium: Technological/Infrastructure • High: Governance
Potential climate resilience impact and wider co-benefits of climate actions	• Informed communities for better post-flood health protection. • Timely actions by local authorities, reducing climate-related health impacts. • Improved recognition and management of climate-related health risks among professionals. • Reduced heat-related illnesses with early warnings. • Lowered urban temperatures via cool and green roofs. • Enhanced well-being with urban green areas and shelters.
SDGs SUSTAINABLE DEVELOPMENT GOALS	3 GOOD HEALTH AND WELL-BEING; 6 CLEAN WATER AND SANITATION; 7 AFFORDABLE AND CLEAN ENERGY; 11 SUSTAINABLE CITIES AND COMMUNITIES; 12 RESPONSIBLE CONSUMPTION AND PRODUCTION; 13 CLIMATE ACTION

Adaptation Strategies for Health System

Strategy 1: Capacity building and awareness generation of healthcare professionals and residents to address climate-related health challenges and emergencies effectively

Action Area	Target Parameter	Target		
		2030	2040	2050
Capacity building of health workers and establishment of an Early Warning System and linking it with the health sector	Early warning and early action systems set up for heat stress and flood risks	25% of city area covered by the system	80% of city area covered by the system	100% of city area covered by the system

Proposed Action	Resilience potential	Feasibility of Intervention	Period to Realise Impact (Short – by 2030 Med – by 2040 Long – by 2050)	Implementation Entities	Financing source or mode
(i) Action: Establishment of an Early Warning System and linked it with the health sector					
Sub Action-1 Early warning and early action systems need to be put in place for local bodies to act on time to prevent climate-related health impacts.	High	Medium	Short-term	**Lead role** • Public and Private Hospitals, Directorate General of Health Services (DGHS), • Institute of Public Health (IPH), • DSSC	• WASA and DSCC budget • Funding through relevant government schemes • Aid from donor agencies • PPPs and FDIs • CSR funds • Loans from lending
To complement the outlined strategy for the Health System, additional soft interventions should be considered.					
Sub Action-2 Conduct public awareness campaigns to educate people about the health risks such as heat stress, and waterborne or vector-borne diseases after urban floods.	High	Medium	Medium-term	**Lead role** • Public and Private Hospitals, Directorate General of Health Services (DGHS) • Institute of Public Health (IPH) • Dhaka South City Corporation	• Budget from DSCC • CSR funds • Funding through relevant government schemes
Sub Action-3 Train healthcare professionals, including doctors, nurses, and public health workers, to recognize and address climate-related health risks in their practice, particularly heat stress and heat strokes, and report on them.	High	High	Short-term	**Supporting Role** • NGOs, • Academic institution • RWA	
Sub Action-4 Conduct regular drills and simulations to ensure healthcare facilities are well-prepared for climate-related emergencies.	Medium	High	Short-term		

Strategy 2: Integrate climate change considerations into healthcare facilities to enhance climate resilience

Action Area	Target Parameter	Target		
		2030	2040	2050
Access to healthcare facilities to all citizen	Establishment of healthcare centres that are within 1.5 km with power backup facilities	80% of population has access within 1.5 km	100% of population has access within 1.5 km	100% of population has access within 1.5 km

Proposed Action	Resilience potential	Feasibility of Intervention	Period to Realise Impact (Short – by 2030 Med – by 2040 Long – by 2050)	Implementation Entities	Financing source or mode
(i) Action-Access to health care facilities to all citizen					
Sub Action-1 Healthcare facilities should be set up in areas that are easily accessible by the urban poor, that is, within the range of public transport facilities and should not be inaccessible due to flooding or other hazards.	High	Medium	Medium-term	**Lead role** • Public and Private Hospitals, Directorate General of Health Services (DGHS) • Institute of Public Health (IPH) • DSCC	• Funding through relevant government schemes • Aid from donor agencies • PPPs and FDIs • CSR funds • Loans from lending institutions
Sub Action-2 Healthcare facilities should have backup power systems with renewable sources, such as solar power systems	High	High	Long-term		
To complement the outlined strategy for the Health System, additional soft interventions should be considered.					
Establishing regulations and guidelines to ensure the development of healthcare facilities that are well-prepared to withstand and effectively respond to the impacts of climate change on public health.	High	High	Medium-term	• Public and Private Hospitals, Directorate General of Health Services (DGHS), • Institute of Public Health (IPH) • DSCC	The implementation of these actions demands a minimal financial investment.
Sub Action-4 Mapping of existing health care system to identify the areas where new health care facilities are required	High	High	Medium-term		

Strategy 3: City Corporation-level interventions to prevent or reduce impacts of heat stress and water/vector-borne diseases

Action Area	Target Parameter	Target		
		2030	2040	2050
Prevention and reduction of heat stress and water/vector borne disease	Heat Action Plan developed for the city, with allocated budget and staff to implement the plan	Yes	Yes	Yes
	Buildings with cool roofs	20% of slum houses with cool roofs	50% of slum houses with cool roofs	80% of slum houses with cool roofs
	Buildings with green roofs	20% of residential buildings with green roofs	50% of residential buildings with green roofs	70% of residential buildings with green roofs
	Area of green space in the city	15%	20%	25%
	Cooling shelters with drinking water facilities	Provided in all public spaces like markets	Provided in all public spaces like markets	Provided in all public spaces like markets
	Ensure regular spraying of insecticides to prevent vector borne disease	Weekly spraying, particularly in disease-prone areas	Weekly spraying, particularly in disease-prone areas	Weekly spraying, particularly in disease-prone areas

Proposed Action	Resilience potential	Feasibility of Intervention	Period to Realise Impact (Short – by 2030 Med – by 2040 Long – by 2050)	Implementation Entities	Financing source or mode
(i) Action-Prevention and reduction of heat stress and water/vector borne disease					
Sub Action-1 Promote cool roofs for new buildings.	Very High	Medium	Long-term	**Lead role** • Public and Private Hospitals, Directorate General of Health Services (DGHS), • Institute of Public Health (IPH), • DSCC	• Funding through relevant government schemes • Aid from donor agencies • PPPs and FDIs • CSR funds • Loans from lending institutions
Sub Action-2 Promote green roofs in all buildings.	Very High	Medium	Long-term		
Sub Action-3 Provide drinking water facilities in public areas and at regular intervals on the roadsides/rickshaw stands.	High	High	Medium-term		
Sub Action-4 Promote urban green area development, through avenue plantations or shelters for pedestrians.	High	High	Short-term		
Sub Action-5 Provide cooling centres for pedestrians and people who work outside like street vendors, rickshaw pullers, construction labourers	High	Medium	Medium-term		
Sub Action-6 Ensure no waterlogging due to solid waste disposal as mentioned in the previous section on solid waste.	Medium	High	Medium-term		
Sub Action-7 Ensure fogging and spraying of insecticides for vectors	Average	High	Long-term		
To complement the outlined strategy for the Health System, additional soft interventions should be considered.					
Prepare a heat action plan for the city with early warning and early action systems in place.	Medium	Medium	Medium-term	**Lead role** • DSCC **Supporting role** • NGOs • Academic	• Budget from • DSCC

6.3.4. Water Supply System

Baseline status (2021-22)	**Key statistics of the sector** • DWASA covers over 401 sq.km of service area with around 12.5 million people.[184] • Over 78% of the supplied water comes from groundwater extraction, while 22% comes from surface water sources such as rivers.[185] • The water demand in Dhaka City is 2.25 million cubic meters per day (2,250 MLD), which is just a little bit over the current supply of around 2.11 million cubic meters per day (2,110 MLD)[186] **Opportunities, challenges and gaps:** • River Restoration projects taken by DNCC and DSCC • New water treatment plants • Increased awareness of rainwater harvesting at the individual and community levels • Water scarcity and ground water pollution • Groundwater depletion • Lack of infrastructure • Lack of integrated water management system
Existing policy and initiatives at the national and sub-national level	**National Policy/ Programs/ Targets:** • National Water Policy 1999, • National Water Management Plan 2001, • Bangladesh Delta Plan 2100, • National Strategy for Water Supply and Sanitation 2014, • Bangladesh Climate Change Strategy and Action Plan 2009, • Nationally Determined Contributions (NDCs) 2021 Bangladesh (Updated), • Mujib Climate Prosperity Plan: Decade 2030 **Regional and City Level Policy/ Programs/ Targets:** • Water Supply Master Plan for Dhaka City 2014, • Dhaka Structure Plan 2016-2035, • Dhaka Detailed Area Plan 2022-2035

[184] WASA annual report 2021-22
[185] WASA annual report 2021-22
[186] WASA annual report 2021-22

Climate risk scenario	**Climate Risk Status:** **Extremely High** • Due to rising temperatures, water demand may increase in the city, putting stress on existing sources of water, particularly the groundwater. Given that the groundwater table is depleting, this may result in acute stress on the water resources within the city. • Sudden, intense rainfall may cause urban flooding that can damage the infrastructure of the water supply system and contamination of water due to leakages, thus exacerbating water scarcity. • Storm surges from cyclones may cause similar impacts from urban flooding.
Climate Vulnerability	**Vulnerable Area:** Ward - 2, Ward- 3, Ward-4, Ward 14, Ward 22, Ward 26, Ward- 52 (most vulnerable), Ward-53, Ward-54, Ward -58 **Vulnerable Actors:** • DWASA • DSCC • Low-Income group • Resident • Women • Ward Councillors • Migrants **Adaptive capacity of the system:** • Low: Governance, Societal • Medium: Technological/ Infrastructure, Economic • High: Ecosystem
Potential climate resilience impact and wider co-benefits of climate actions	• Reduced energy consumption and GHG emissions by introducing and promoting rainwater harvesting (RWH) • Increase resilience through groundwater recharge and improving soil condition. • Improve groundwater recharge. • Better water access • Enhance water availability, quality and security. • Reduce risk of waterlogging • Lower public health risks
SDGs SUSTAINABLE DEVELOPMENT GOALS	3 GOOD HEALTH AND WELL-BEING, 6 CLEAN WATER AND SANITATION, 7 AFFORDABLE AND CLEAN ENERGY, 10 REDUCED INEQUALITIES, 11 SUSTAINABLE CITIES AND COMMUNITIES, 12 RESPONSIBLE CONSUMPTION AND PRODUCTION, 13 CLIMATE ACTION

Adaptation and Mitigation Strategies for Water Supply System

Strategy 1: Reduction of Non-Revenue Water to reduce to commercial and physical loss of water.

Action Area	Target Parameter	Target		
		2030	2040	2050
Reduction in Non -Revenue Water	Reduce the percentage of Non-Revenue Water	20%	10%	5%

Proposed Action	Resilience potential	Feasibility of Intervention	Period to Realise Impact (Short – by 2030 Med – by 2040 Long – by 2050)	Implementation Entities	Financing source or mode
(i) Action: Reduction in Non-Revenue Water					
Sub Action-1 Implement Smart Water Meters in all residential and commercial buildings is proposed to quantify the volume of water consumed by establishments receiving water from the public water supply system	Low	High	Medium-term	**Lead role** • DWASA • Rajdhani Unnayan Kartripakkha (RAJUK) **Supporting Role** • Commercial and Industrial entities • NGOs and civil society • Academic institutions like schools, colleges and universities	• DWASA budget • Funding through relevant government schemes • Aid from donor agencies • PPPs and FDIs • CSR fund • Loans from lending institutions • Budget from • Dhaka South City Corporation • CSR funds • Funding through relevant government schemes
Sub Action-2 Conduct water audits not only for the water supply system of the city. However, water audits should be conducted for commercial and industrial entities (especially in water-intensive industries such as paper, textile, steel, etc) to conserve water and reduce water footprint as much as possible.	Low	High	Medium-term		
Sub Action-3 Install leak deduction technology to reduce wastage of water and damage to water supply infrastructure (especially water pipeline)	Low	Low	Short-term		
Sub Action-4 Upgrade pipeline network to improve access to water	Medium	High	Medium-term		

Strategy 2: Establish effective water resource management - Climate resilient infrastructure for water and sustainable water use

Action Area	Target Parameter	Target		
		2030	2040	2050
Promotion of Rainwater Harvesting	Increase groundwater recharge through rainwater harvesting and artificial aquifer recharge - number of RWH recharge borewells established and maintained	100% in new construction, 10% of existing institutions	100% in new construction, 10% of existing institutions	100% in new construction, 10% of existing institutions

<table>
<tr><th>Proposed Action</th><th>Resilience potential</th><th>Feasibility of Intervention</th><th>Period to Realise Impact (Short – by 2030 Med – by 2040 Long – by 2050)</th><th>Implementation Entities</th><th>Financing source or mode</th></tr>
<tr><td colspan="6">(i) Action: Promotion of Rainwater Harvesting for conservation of water</td></tr>
<tr><td>Sub Action-1
Promote rainwater harvesting (RWH) for artificial aquifer recharge in residential, public/ institutional, and industrial properties using recharge borewells to reverse the declining groundwater.</td><td>High</td><td>Medium</td><td>Medium-term</td><td rowspan="2">Lead role
• DWASA
• Rajdhani Unnayan Kartripakkha (RAJUK)
Supporting Role
• Commercial and Industrial entities
• NGOs and civil society
• RWA
• Academic institutions like schools, colleges and universities</td><td rowspan="2">• DWASA budget
• Funding through relevant government schemes
• Aid from donor agencies
• PPPs and FDIs
• CSR fund
• Loans from lending institutions</td></tr>
<tr><td>Sub Action-2
Establish a robust monitoring mechanism to evaluate existing and upcoming RWH systems.</td><td>High</td><td>High</td><td>Medium-term</td></tr>
</table>

Action Area	Target Parameter	Target		
		2030	2040	2050
Climate proof infrastructure	Establishing climate-proof water supply systems is essential to prevent disruptions during disasters	100%	100%	100%

Proposed Action	Resilience potential	Feasibility of Intervention	Period to Realise Impact (Short – by 2030 Med – by 2040 Long – by 2050)	Implementation Entities	Financing source or mode
(ii) Action: Promotion of Climate proof infrastructure					
Sub Action-1 Ensure that all Water Treatment Plants (WTPs) and Deep tube wells (DTWs) are equipped with renewable power sources.	Very High	High	Long-term	**Lead Role** • DWASA • RAJUK **Supporting Role** • Academic institutions like schools, colleges and universities	• DWASA budget • Funding through relevant government schemes • Aid from donor agencies • PPPs and FDIs • CSR fund • Loans from lending institutions
Sub Action-2 Undertake energy audits of all water treatment plants and deep tube wells at annual intervals and shift to renewable sources.	High	High	Medium-term		
Sub Action-3 Regular maintenance of Deep Tube-wells	High	Medium	Medium-term		

Action Area	Target Parameter	Target		
		2030	2040	2050
Exploration of Surface water for water supply.	Augment the quantity of water supplied by exploring surface water sources in the city, particularly rivers.	40%	50%	70%

Proposed Action	Resilience potential	Feasibility of Intervention	Period to Realise Impact (Short – by 2030 Med – by 2040 Long – by 2050)	Implementation Entities	Financing source or mode
(iii) Action: Increase the Use of Surface Water					
Sub Action-1 Increase the capacity and number of surface water treatment plants	High	Medium	Long -term	**Lead role** • DWASA • Rajdhani Unnayan Kartripakkha (RAJUK) **Supporting Role** • Academic institutions like schools, colleges and universities	• DWASA budget • Funding through relevant government schemes • Aid from donor agencies • PPPs and FDIs • CSR fund • Loans from lending institutions

Strategy 3: Ensure safe water supply to low-income communities, migrants, and slum areas, aiming to provide equitable access to clean water

Action Area	Target Parameter	Target		
		2030	2040	2050
Access of safe water for all	Ensuring a consistent and secure water supply, particularly for households at all times	100%	100%	100%
	Reduction of demand for fresh water to guarantee access to safe water for everyone.	5%	10%	20%

Proposed Action	Resilience potential	Feasibility of Intervention	Period to Realise Impact (Short – by 2030 Med – by 2040 Long – by 2050)	Implementation Entities	Financing source or mode
(I) Action: Ensure access to safe and clean water for all citizens					
Sub Action-1 Regular quality monitoring of water supply to ensure clean and safe water distribution.	Average	Low	Short-term	**Lead role** • DWASA • Rajdhani Unnayan Kartripakkha (RAJUK) **Supporting Role** • Commercial and Industrial entities • NGOs and civil society • Academic institutions like schools, colleges and universities	• DWASA budget • Funding through relevant government schemes • Aid from donor agencies • PPPs and FDIs • CSR fund
Sub Action-2 Promote the implementation of dual plumbing in new building projects and the promotion of greywater reuse. The authorities should offer technical assistance and incentives to support these practices in new constructions	Medium	Low	Medium-term		

Proposed Action	Resilience potential	Feasibility of Intervention	Period to Realise Impact (Short – by 2030 Med – by 2040 Long – by 2050)	Implementation Entities	Financing source or mode
To complement the outlined strategy for water supply system, a range of additional soft interventions should be considered to enhance policies and regulatory structures to promote water resilience.					
Develop a policy to help regulate and control surface water and groundwater use and pollution, reduce water wastage, and support the introduction of water meters.	Low	High	Short-term	**Lead Role:** • DWASA), • Rajdhani Unnayan Kartripakkha (RAJUK) **Supporting Role** • NGOs/CBOs/ School/ RWA	• The implementation of these actions demands a less financial investment.
IEC promotes the conservation of water at the household level, and incentives of water conservation through using different tariff slabs for water consumption.	Average	Medium	Short-term		
Implement policies to promote treated wastewater reuse for industrial and commercial consumers.	Medium	Medium	Medium-term		
Promote principles of IUWM by encouraging rainwater harvesting, wastewater reuse, recycling, minimising ground water extraction.	High	Medium	Long-term		

6.3.5. Wastewater System

Baseline status (2021-22)

Share of city-wide GHG emissions for Dhaka North: 10.2%

Key statistics:

- Dhaka South's wastewater treatment infrastructure is as follows:
  - 1 STP at Pagla with a designed capacity of 96 MLD. It has been operational since 1978 and thus, the trunk sewer lines are heavily damaged, resulting in less than 40 MLD of wastewater reaching the STP[187].
  - 882 km of trunk sewer lines, indicating a network coverage of 47%[188]
  - 27 sewage lifting stations.
- Onsite sanitation, including septic tanks or pit latrines, accounts for 54% of sanitation practices in Dhaka South[189].
- 7.5% of the wastewater is treated, remaining 92.5% is discharged in the open through different methods[190].

Opportunities, challenges and gaps:

- Low rate of open defecation
- Institutional and Regulatory Framework for Faecal Sludge Management (FSM) in place for greater Dhaka
- Pagla STP operational has been operational since 1978. Its truck sewer line is heavily damaged and requires repair to augment the flow rate.
- Infiltration of rainwater during monsoon leading to sedimentation, thereby, decreasing flow rate
- DWASA has prepared a master plan for treating 100% wastewater in Dhaka. As per the master plan, two other STPs will be set up in Dhaka South, one each at Rayerbazar and Demra.
- Lack of sufficient operations and maintenance capability
- Limited septic tank sludge management facilities, with heavy dependence on manual cleaning of septic tanks.

Existing policy and initiatives at the National and sub-national level

National Policy/ Programs/ Targets:

- Bangladesh Standards and Guidelines for Sludge Management, 2015

Regional and City Level Policy/ Programs/ Targets:

- Sewerage Master Plan for Dhaka City 2010-2035,
- Dhaka Structure Plan 2016-2035,
- Dhaka Detailed Area Plan 2022-2035
- Institutional and Regulatory Framework for Faecal Sludge Management (FSM) for Megacity Dhaka, 2017

[187] Preparation of the Stormwater Drainage Master Plan for Dhaka City, 2016
[188] Preparation of the Stormwater Drainage Master Plan for Dhaka City, 2016
[189] Preparation of the Stormwater Drainage Master Plan for Dhaka City, 2016
[190] Preparation of the Stormwater Drainage Master Plan for Dhaka City, 2016

Climate Risk and BAU GHG emissions scenario

BAU GHG Emissions for Dhaka city (DNCC & DSCC combined):

Sub-Sector	BAU GHG Emissions (Million tCO_2e)		
	2030	2040	2050
Wastewater	1.80	2.49	2.79

Climate Risk Status: Medium

- Rising temperatures can exacerbate the release of noxious gases and foul odours from stagnant sewage, creating unfavourable conditions for the surrounding environment. Moreover, the higher temperatures can also lead to the accelerated growth and proliferation of harmful microorganisms within the sewage.
- Erratic rainfall can lead to more frequent waterlogging, which poses a challenge to the integrity of the sewerage management system infrastructure. Additionally, during these periods, there is a higher likelihood of freshwater and rainwater mixing with sewage and sludge, resulting in pollution of rivers and contributing to the potential spread of diseases.

Climate Vulnerability

Vulnerable Area:

Wards 1, 2, 3, 4, 5, 6, 7, 16, 18, 23, 30, 34, 35, 39, 50, 51, 52, 53, 54, and 58

Vulnerable Actors:

- DWASA
- DSCC
- Low Income group
- Informal Sector
- Women
- NGOs
- Migrants
- Elderly and Children

Adaptive capacity of the system:

- Low: Societal, Economic, Technological/ Infrastructure
- Medium: Governance, Ecosystem

Potential climate resilience impact and wider co-benefits of climate actions

- GHG mitigation potential of interventions in Extended Action Scenario from wastewater strategies: 1.6% of total GHG emission reduction by 2050
- Reduced land, groundwater and surface water pollution,
- Decrease in water-borne disease outbreak
- Improved water resources quality
- Improved sanitation
- Reduced public health impacts

SDGs

SUSTAINABLE DEVELOPMENT GOALS

3 GOOD HEALTH AND WELL-BEING; 6 CLEAN WATER AND SANITATION; 7 AFFORDABLE AND CLEAN ENERGY; 11 SUSTAINABLE CITIES AND COMMUNITIES; 12 RESPONSIBLE CONSUMPTION AND PRODUCTION; 13 CLIMATE ACTION; 14 LIFE BELOW WATER

Adaptation Strategies for Wastewater System

Strategy 1: Efficient sewage collection to prevent surface environmental contamination as well as seepage into groundwater and contamination of local water sources.

Action Area	Target Parameter	Target		
		2030	2040	2050
Efficient Collection of Sewage	Percentage of sewerage collected and treated safely through Septic tank	50%	40%	20%
	Percentage of sewerage collected and treated safely through piped sewer system	50%	60%	80%

Proposed Action	Resilience potential	Feasibility of Intervention	Period to Realise Impact (Short – by 2030 Med – by 2040 Long – by 2050)	Implementation Entities	Financing source or mode
(i) Action: Improved the collection, scientific disposal, and treatment of the Sewerage					
Existing septic tanks need to be renovated for scientific onsite treatment by 2030, and progressively reduced by 2050 to 20% of the total treatment options.	Long-term	Low	Long-term	**Lead role** • DWASA **Supporting role** • DSCC • National and international donor/lending agencies • RAJUK	• DWASA budget • Funding through relevant government schemes • Aid from donor agencies • PPPs and FDIs • CSR fund • Loans from lending institutions
Expansion of centralised sewer network, to cover at least 80% of the city by 2050.	Long-term	Medium	Long-term		
Progressively increase centralised collection and treatment and reduce septic tank use, as infrastructure for wastewater is developed in the city.	Long-term	Medium	Long-term		
To complement the outlined strategy for Wastewater management, additional soft interventions should be considered.					
Develop a strategy for faecal sludge management in the city for managing septic tank sludge. The document should address regulations to prevent untreated discharge, measures to improve existing/establish new on-site sanitation systems (household and group-level), identify mechanisms for sludge transfer, establishment of treatment facilities, and options for sludge end-use as fertilizer. It should ensure regular emptying of septage.	High	High	Long-term	**Lead role** • DWASA) • Rajdhani Unnayan Kartripakkha (RAJUK)	• DWASA budget • City Corporation budget

Strategy 2: Augmentation of wastewater treatment facilities through the promotion of centralised and decentralised wastewater management.

Action Area	Target Parameter	Target		
		2030	2040	2050
Scientific treatment, reuse disposal of wastewater	Increase in treatment of wastewater, faecal sludge, and septage by adopting efficient and scientific treatment technology, either centralised or decentralised with suitable methane capture mechanisms and use of alternative energy sources wherever feasible.	50%	100%	100%
	Increase reuse of treated wastewater	10%	60%	80%

Proposed Action	Resilience potential	Feasibility of Intervention	Period to Realise Impact (Short – by 2030 Med – by 2040 Long – by 2050)	Implementation Entities	Financing source or mode
(i) Action- Enhance the Capacity of Scientific treatment and disposal of Waste					
Strengthen and ensure operation and maintenance of aerobic technology based STPs, with trained staff, for instance, the facultative lagoons.	High	Low	Medium-term	**Lead role** • DWASA **Supporting role** • DSCC • National and international donor/lending agencies • RAJUK	• DWASA budget • Funding through relevant government schemes • Aid from donor agencies • PPPs and FDIs • CSR fund • Loans from lending institutions
Enhance sewage treatment capacity to be able to process generated wastewater while focusing on anaerobic technology-based secondary treatment with the option of methane recovery.	Very High	Medium	Long-term		
Integrate faecal sludge cotreatment facility with both aerobic and anaerobic sewage treatment plants.	Very High	Medium	Long-term		
Establishment of faecal sludge treatment plants (FSTPs) at strategic locations.	High	Medium	Medium-term		
Undertake feasibility study for installing decentralised wastewater treatment solutions for cluster of households or residential complexes as well as in upcoming large residential townships and commercial areas.	High	Low	Medium-term		

Proposed Action	Resilience potential	Feasibility of Intervention	Period to Realise Impact (Short – by 2030 Med – by 2040 Long – by 2050)	Implementation Entities	Financing source or mode
Encourage adoption of anaerobic technology based DeWATS in large hospitals and public/institutions	Very High	Medium	Long-term		
Deploy and integrate renewable energy (such as solar) to meet some part of energy demand of treatment plants.	Very High	Medium	Medium-term		
Gas Recovery with anaerobic treatment	Very High	Medium	Long-term		
Ensure uptake of treated wastewater in industries, City Corporation parks or in the construction sector through policy changes and incentives.	High	Medium	Short-term		

Strategy 3: Sustained toilet coverage to maintain the city's status as open defecation-free.

Action Area	Target Parameter	Target		
		2030	2040	2050
Toilet Coverage in the City	The city must continue to uphold a low percentage or achieve zero open defecation in the foreseeable future	Less than 1 % of the population	Less than 1 % of the population	Less than 1 % of the population

Proposed Action	Resilience potential	Feasibility of Intervention	Period to Realise Impact (Short – by 2030 Med – by 2040 Long – by 2050)	Implementation Entities	Financing source or mode
(i) Action: Access to Toilet for all					
Dhaka has a very low rate of open defecation. This status should be maintained in the future as well.	High	High	Short-term	**Lead role** • DWASA • RAJUK	• Budget from Dhaka Water Supply and Sewage Authority (Dhaka WASA) and Rajdhani Unnayan Kartripakkha (RAJUK)

Proposed Action	Resilience potential	Feasibility of Intervention	Period to Realise Impact (Short – by 2030 Med – by 2040 Long – by 2050)	Implementation Entities	Financing source or mode
To complement the outlined strategy for solid waste management, a range of additional soft interventions should be considered to enhance policies and regulatory structures to promote water resilience.					
Mass awareness activities - Create awareness and capacitate relevant stakeholders regarding proper septic tank construction or connection to sewer lines.	Medium	High	Short-term	**Lead Role** • DWASA • RAJUK **Supporting Role** • NGOs, CBOs	The implementation of these actions demands a less financial investment.
Training and capacity building programs for staff of DWASA regarding DEWATS, low carbon technologies for wastewater treatment.	Medium	Medium	Medium-term		
Establish a plan for regular desludging of septic tanks and safe collection and disposal in treatment facilities.	Low	Medium	Short-term		
Develop a policy for the reuse of wastewater in industries, DSCC's gardens, avenue plantation, etc.	Medium	Medium	Medium-term		

Mitigation Strategies for Wastewater System

Strategy 1: Improving wastewater treatment

Action Area	Target Parameter	Target		
		2030	2040	2050
Scientific treatment of wastewater and sludge	Percentage of wastewater treated	50% (improved performance management and biogas capture)	100% (improved performance management and biogas capture)	100% (improved performance management and biogas capture)

Proposed Action	Resilience potential	Feasibility of Intervention	Period to Realise Impact (Short – by 2030 Med – by 2040 Long – by 2050)	Implementation Entities	Financing source or mode
(i) Improved performance management of wastewater treatment facilities					
Sub Actions • Adoption of efficient and scientific treatment technology wherein - All new sewage treatment plants (STPs) employ anaerobic technology with gas capture to treat wastewater. - All aerobic STPs should install gas capture systems • Implement process automation in wastewater treatment plants to ensure optimal performance. • Develop minimum operating standards and benchmarks for all wastewater treatment plants and deploy governance processes that capture this information through an automated system, with results made available to all concerned officials	Very High	Medium	Long-term	**Lead role** • DWASA **Lead role** • DNCC and DSCC • National and international donor/lending agencies • RAJUK	• DWASA budget • Funding through relevant government schemes • International grants/ assistance, concessional finance • Private sector investment and PPP

6.3.6. Transport

Baseline status (2021-22)

Share of total GHG emissions for Dhaka South: 12%

Breakdown of on-road transportation emissions by fuel:

Fuel	BAU GHG Emissions (Million tCO_2e)	Share
Diesel	0.35	51%
CNG	0.23	34%
Petrol	0.10	15%

Opportunities, challenges and gaps:

- Dhaka is experiencing rapid urbanisation, creating opportunities for the expansion and improvement of transport infrastructure to meet the growing demand.
- A flourishing economy provides the financial means for investment in transportation projects in Dhaka
- Public-Private Partnerships (PPPs) and green transportation initiatives
- Insufficient public transport and infrastructure deficit
- Lack of integrated transport planning
- Safety concerns and funding constraints

Existing policy and initiatives at the national and sub-national level

National Policy/ Programs/ Targets:

- National Integrated Multimodal Transport Policy 2013
- RSTP/Strategic Transport Plan for Dhaka (Urban Transport Policy) 2015,
- Sustainable Urban Transport Index for Dhaka, Bangladesh 2018,
- Dhaka Structure Plan 2016-2035,
- Dhaka Detailed Area Plan 2022-2035

Regional and City Level Policy/ Programs/ Targets:

- RSTP/Strategic Transport Plan for Dhaka (Urban Transport Policy) 2015,
- Sustainable Urban Transport Index for Dhaka, Bangladesh 2018,
- Dhaka Structure Plan 2016-2035,
- Dhaka Detailed Area Plan 2022-2035
- Cycle Lane Initiative of DSCC and DNCC

Climate Risk and BAU GHG emissions scenario

BAU GHG Emissions for Dhaka city (DNCC & DSCC combined):

Sub-Sector	BAU GHG Emissions (Million tCO_2e)		
	2030	2040	2050
Wastewater	2.14	2.62	3.15

Climate Risk Status: High

- Higher temperatures may lead to greater use of private transport leading to an increase in traffic congestion and higher GHG emissions caused by the increase of private vehicles on the roads. It will also impact the economy and health of rickshaw pullers due to prolonged exposure to extreme heat. High temperatures can also damage the transportation infrastructure such as roads and public buses. It will also impact the economy and health of rickshaw pullers due to prolonged exposure to extreme heat.
- Erratic rainfall will expedite the deterioration of transportation-related infrastructure affecting road and rail transportation. As a result, the overall maintenance cost of roads and other infrastructure will be increased.

Climate Vulnerability

Vulnerable Area:

All Wards have fixed congestion point except 15, 24, 25, 28, 36, 38

Vulnerable Actors:

- Rickshaw Puller/Informal Sector
- Elderly and Children
- Low-Income group
- Resident
- Dhaka Transportation Coordination Authority (DTCA)
- Bangladesh Road Transport Corporation (BRTC)
- RAJUK
- DSCC
- Bangladesh Road Transportation Authority (BRTA)

Adaptive capacity of the system:

- Low: Ecosystem, Societal,
- Medium: Technological/Infrastructure, Governance

Potential climate resilience impact and wider co-benefits of climate actions

- GHG mitigation potential of interventions in Extended Action Scenario from transportation strategies: 7.1% of total GHG emission reduction by 2050
- Reduced fuel consumption and GHG emission
- Improved air quality
- Ensure public safety
- Reduced traffic congestion
- Improved air quality and public health
- Improved accessibility

SDGs

Mitigation Strategies for Transport

Strategy 1: Fuel switch to low carbon electric mobility

Action Area	Target Parameter	Target		
		2030	2040	2050
Fuel switch in private vehicles	Percentage of private electric vehicles on-road (private vehicles, private buses and IPT)	10%	50%	95%
Fuel switch in public transit	Percentage of mass transit using electric fuel (metro, railway, public buses and BRT)	Electric Public bus/ BRT: 80% Rail and metro: 100%	Electric Public bus/ BRT: 100% Rail and metro: 100%	Electric Public bus/ BRT: 100% Rail & metro: 100%

Proposed Action	Resilience potential	Feasibility of Intervention	Period to Realise Impact (Short – by 2030 Med – by 2040 Long – by 2050)	Implementation Entities	Financing source or mode
(i) Develop plans and policies to promote faster adoption of EV					
Sub Actions • Develop Comprehensive Mobility Plan (CMP) with focus on promoting 'Low Carbon Transport'. • Develop an E-mobility Framework including enabling policies, norms and guidelines for electric mobility and charging infrastructure. • Incorporate green mobility zones in land use planning and master plans	High	High	Short-term	**Lead role** • Dhaka Transport Coordination Authority (DTCA) • Bangladesh Road Transport Corporation (BRTC) • DNCC and DSCC	• Departmental and City Corporation budget • Technical assistance from donor agencies
• Transitioning towards zero emission freight through dedicated policies, route management and incentives • Prepare project report which will estimate the potential to access carbon credits for various interventions under E-mobility transition				**Supporting Role** • RAJUK • Bangladesh Road Transport Authority (BRTA)	• Aggregated procurement of EVs for public transport fleet in collaboration with SREDA, BRTA and DTCA

Proposed Action	Resilience potential	Feasibility of Intervention	Period to Realise Impact (Short – by 2030 Med – by 2040 Long – by 2050)	Implementation Entities	Financing source or mode
(ii) Incentivise EV adoption					
Sub Actions • Incentivize EV adoption through lower vehicle tax, reduced parking fee and toll charges as well as waiver on fitness certificates for EV. • Promote adoption of EVs for last-mile connectivity (e-auto and e-cycle) through increased access to subsidised finance and incentives.	Very High	High	Short-term	**Lead role** • BRTA • DNCC and DSCC • Ministry of Road Transport **Supporting Role** • DTCA • Private sector enterprises and associations	• Budget of BRTA • EV schemes of Ministry of Road Transport • International grants/ assistance
(iii) Develop and install EV charging infrastructure					
Sub Actions • Develop a plan for EV charging infrastructure network inclusive of - Fast-charging facilities, residential and workplace charging - Public charging opportunities - Suggested building by-law amendments to promote EV-ready buildings and infrastructure, particularly for residential and commercial areas.	Very High	High	Short-term	**Lead role** • SREDA • DNCC and DSCC • RAJUK • IDCOL **Supporting Role** • DTCA • Power Division • BRTA and BRTC • Private sector enterprises	• DCOL schemes • Budget of Power Division • International grants/ assistance • Private sector investment
• Integrate EV infrastructure planning with proposed transport corridors, road networks and identified zones. • Adopt supporting frameworks to enhance public and private EV charging infrastructure. • Adopt renewable energy powered EV charging for emission-free mobility. • Pilot EV chargers integrated with urban infrastructure, such as streetlights. • Enable intermediate charging points for electric buses					

Strategy 2: Increased use of public and non-motorised transit

Action Area	Target Parameter	Target		
		2030	2040	2050
Promotion of walking and bicycling and other NMT modes	Mode share of NMT	18.4%	19.2%	20%
Promotion of public transport	Mode share of public transport (public buses, BRT, MRT)	26.9%	33.7%	40.7%
	Mode share of private operator buses	32.3%	26.3%	20.4%
	Mode share of private transport (for reference)	22%	20.8%	18.9%
	Mode share of IPT (three-wheeler, moto-taxis) (for reference)			

Proposed Action	Resilience potential	Feasibility of Intervention	Period to Realise Impact (Short – by 2030 Med – by 2040 Long – by 2050)	Implementation Entities	Financing source or mode
(i) Develop plans and policies for increased adoption of NMT and public transport					
Sub Actions • Updation of RSTP 2015, inclusive of a TOD plan which promotes NMT as the favoured mode of last-mile connectivity and public transport for all major trips. • Prepare standalone Low Carbon Transport strategies which outline methods of accessing carbon credits for mitigated emissions. • Develop NMT street design guidelines. • Prepare a bicycle master plan promoting trips by bicycles and PBS • Undertake a route rationalisation study for bus services	Medium	Medium	Medium-term	**Lead role** • DNCC and DSCC • DTCA **Supporting Role** • BRTA • RAJUK • Dhaka Mass Transit Co. Ltd.	• City Corporation budget • DTCA budget • International grants/ assistance

Proposed Action	Resilience potential	Feasibility of Intervention	Period to Realise Impact (Short – by 2030 Med – by 2040 Long – by 2050)	Implementation Entities	Financing source or mode
(ii) Incentivise NMT and public transport					
Sub Actions • Incentivise regular use of public transportation through discounts on fares. • Promote adoption of NMT for last-mile connectivity (bicycles and PBS) through increased access to subsidised finance and incentives	High	Medium	Medium-term	**Lead role** • DNCC and DSCC • DTCA • BRTC • Dhaka Mass Transit Co. Ltd. **Supporting Role** • BRTA • RAJUK	• City Corporation budget • DTCA budget • BRTC budget • International grants/ assistance, concessional finance • CSR funds

Proposed Action	Resilience potential	Feasibility of Intervention	Period to Realise Impact (Short – by 2030 Med – by 2040 Long – by 2050)	Implementation Entities	Financing source or mode
(iii) Implement demonstrable pilot projects for further scale up/ replication					
Sub Actions • Take dedicated measures to promote electrification of IPT i.e., easy finance for e-auto. • Promote bicycling in residential neighbourhoods • Launch PBS system and pilot to connect offices, academic institutions, shopping malls, public spaces, metro stations. • Implement pedestrianisation projects in high footfall areas. • Demand management to improve frequency, coverage, and connectivity for higher ridership during peak hours in public transit such as buses. Identify and implement measures such as dedicated bus lanes and route rationalisation. • NMT infrastructure to be improved in city core areas that face congestion and have shorter trip lengths. • Enhance integration with intermediate transport options for improved last-mile connectivity. • City bus to be integrated with intermediate transport options (autos, three-wheelers) to improve last-mile connectivity. • Install infrastructure measures to create barrier-free and walkable public spaces	High	High	Short-term	**Lead role** • DNCC and DSCC • DTCA • BRTC • Dhaka Mass Transit Co. Ltd. **Supporting Role** • BRTA • RAJUK • Private sector enterprises	• City Corporation budget • DTCA budget • Private sector investment and PPPs • CSR funds • International grants/ assistance, concessional finance

Proposed Action	Resilience potential	Feasibility of Intervention	Period to Realise Impact (Short – by 2030 Med – by 2040 Long – by 2050)	Implementation Entities	Financing source or mode
(iv) Implement IoT and smart measures to promote public transport					
Sub Actions • Launch mobile application for passenger information on bus schedules and routes, with GPS tracking, and integrated ticketing and pass options with clear pricing. • IoT and smart measures to encourage more ridership in public transit and monitor ridership and service performance through specific indicators	Medium	Medium	Medium-term	**Lead role** • DNCC and DSCC • BRTC • Dhaka Mass Transit Co. Ltd. **Supporting Role** • ICT Division • DTCA • Private sector enterprises • RAJUK	• City Corporation budget • BRTC budget • Private sector investment and PPPs • International grants/ assistance, concessional finance
(v) IEC measures to promote NMT and public transport					
Sub Actions • Motivate citizens through frequent campaigns to replace motorised trips made for shorter distance with bicycles and walking. • Encourage citizens to adopt NMT or to use public transport	Medium	Medium	Short-term	**Lead role** • DNCC and DSCC • DTCA **Supporting Role** • BRTA • Dhaka Metropolitan Police (DMP - Traffic Division) • NGOs, CBOs • RWAs, business associations and other private sector enterprises	• City Corporation and DTCA budget • CSR funds

Strategy 3: Increase vehicle fuel efficiency

Action Area	Target Parameter	Target		
		2030	2040	2050
Implement measures such as improved road traffic management, emission standards, segregated lanes for slow-moving traffic	Improvement in vehicle fuel efficiency as compared to base year	10%	15%	20%

Proposed Action	Resilience potential	Feasibility of Intervention	Period to Realise Impact (Short – by 2030 Med – by 2040 Long – by 2050)	Implementation Entities	Financing source or mode
(i) Implement traffic management system to reduce congestion					
Sub Actions • Deploy intelligent traffic management systems to optimize traffic and mobility. • Redesign traffic signals and infrastructure for better mobility, inclusive of movement of pedestrians and NMT. Opt for solutions such as at-grade signalised crossings where possible. • Study the areas with high congestion and develop curated peak hour pricing mechanisms.	High	High	Long-term	**Lead role** • DNCC and DSCC • Dhaka Metropolitan Police (DMP - Traffic Division) **Supporting Role** • DTCA • BRTA • RAJUK	• City Corporation budget • Departmental budget of DMP • Private sector investment and PPPs • International grants/ assistance, concessional finance
(ii) Improve transportation related infrastructure from smoother flow of traffic					
Sub Actions • Develop off-street parking facilities and IPT friendly road infrastructure. • Improve intermodal connectivity, coverage, and frequency of public transportation services. • Integrate urban freight into transport and land-use planning and adopt measures to streamline and regulate freight movement	Medium	High	Long-term	**Lead role** • DNCC and DSCC • DTCA • BRTC • Dhaka Mass Transit Co. Ltd. **Supporting role** • BRTA • DMP - Traffic Division	• City Corporation budget • Departmental budget of DTCA, BRTC • Private sector investment and PPPs • International grants/ assistance, concessional finance

Proposed Action	Resilience potential	Feasibility of Intervention	Period to Realise Impact (Short – by 2030 Med – by 2040 Long – by 2050)	Implementation Entities	Financing source or mode
(iii) Prepare policies to eliminate encroachments along Right of Way					
Sub Actions • Prepare vendor policy to reduce congestion due to encroachment. The vendor policy should ensure a just transition by including options such as provision of alternative off-street spaces for street vendors being relocated to improve traffic mobility. • Prepare policies with strict penalties to ensure unauthorised on-street parking is curbed	Medium	Low	Long-term	**Lead Role:** • DNCC and DSCC • DMP **Supporting Role** • RAJUK	• City Corporation budget • Budget of DMP
(iv) Promote adoption of better engines for vehicles					
• Develop policies that mandate adoption of engines conforming to latest international standards and the phasing out of vehicles which do not adhere to those standards. • Incentivise vehicle owners to switch to better engine standards	Very High	High	Medium-term	**Lead role** • BRTA • DNCC and DSCC **Supporting role** • DTCA • Ministry of Road Transport and Bridges	• BRTA and Ministry of Road Transport schemes/funds • Private sector investments • Consumer investments

6.3.7. Energy and Buildings

Baseline status (2021-22)

Share of city-wide GHG emissions for Dhaka South: 56%

Breakdown of Stationary Energy Emissions by sub-sector:

Fuel	BAU GHG Emissions (Million tCO_2e)[191]	Share
Residential Buildings	1,898,673	60%
Commercial and Institutional Buildings	509,937	16%
Manufacturing Industries and Construction	626,482	20%
Other non-specified sources	103,896	3%
Agriculture and Fugitive	47	<1%

Opportunities, challenges and gaps:

- The Mujib Climate Prosperity Plan 2022-2042 outlines national RE targets of 30% by 2030, 40% by 2041 and 100% by 2050
- The RE share in the country's power mix is reported to be 3% in 2022[192], implying significant gap between ambitious national-level RE targets under the Mujib Plan and status of deployment on-ground, owing to technological, financial and institutional barriers (see Barrier Analysis section in Chapter 6 for further details)
- The overall decision-making and governance for scale-up of RE lies with power sector institutions such as Sustainable and Renewable Energy Development Authority (SREDA), Dhaka Electricity Supply Company (DESCO), Dhaka Power Distribution Company (DPDC) and the Bangladesh Power Development Board (BPDB). DSCC has a limited mandate in this regard and thereby achievement of RE targets is dependent on effective action by and coordination with the power sector institutions. The DSCC can play a supporting role through advocacy and facilitation, leveraging its mandate and powers in spatial planning and building regulation to supplement power and energy sector policies, and by making direct investments for RE deployment in DSCC's operations.
- The World Bank intends to support a cool roof programme for energy savings and UHI mitigation in Dhaka.
- GoB intends to prioritise LPG and reduce use of PNG as per the National Action Plan for Clean Cooking 2020-2030.
- The Building Energy Efficiency & Environment Rating (BEEER) system is awaiting final approval and can be applied and enforced for new and existing buildings once it is approved.
- More willingness and awareness building are required for implementing net-metered solar PV at both residential and commercial building owners.
- Disseminating the benefits of using net-metered solar PVs to residents and building owners can boost up the implementation.

[191] Figures have been reported in metric tonnes of CO2e instead of million tCO_2e since emissions from certain sub-sectors are relatively low.

[192] IRENA (2023): Energy Profile – Bangladesh. Accessed January 2024. Available at: https://www.irena.org/-/media/Files/IRENA/Agency/Statistics/Statistical_Profiles/Asia/Bangladesh_Asia_RE_SP.pdf

Existing policy and initiatives at the National and sub-national level

National Policy/ Programs/ Targets:

- Nationally Determined Contributions (NDCs) 2021 Bangladesh (Updated)
- Building Energy Efficiency & Environmental Rating (BEEER) (Draft) 2023
- Net Metering Guidelines 2018
- Bangladesh National Building Code 2020
- Energy Efficiency and Conservation Master Plan up to 2030
- National Energy Policy, 2004
- Renewable Energy Policy, 2008
- Mujib Climate Prosperity Plan: Decade 2030
- Bangladesh Climate Change Strategy and Action Plan (BCCSAP) 2009

Regional and City Level Policy/ Programs/ Targets:

- Dhaka Structure Plan 2016-2035
- Dhaka Detailed Area Plan 2022-2035

Climate Risk and BAU GHG emissions scenario

BAU GHG Emissions for Dhaka city (DNCC & DSCC combined):

Sub-Sector	BAU GHG Emissions (Million tCO_2e)		
	2030	2040	2050
Residential Buildings	6.30	7.73	9.29
Commercial and Institutional Buildings[193]	2.06	3.31	4.89
Manufacturing Industries and Construction	2.54	4.09	6.04
Non specified sources	0.34	0.42	0.51
Total GHG Emissions from Buildings	11.24	15.55	20.73

Climate Risk Status: Extremely High

- The rising temperature in the DSCC area will intensify the electricity demand. The need for cooling and air conditioning during heat stress strains the energy infrastructure, resulting in disruption of power supply and leading to inconvenience to local residents and textile and other industries of the city.
- Cyclones, with their strong winds and heavy rainfall, often inflict damage on the city's power infrastructure, leading to frequent power outages.

[193] City Corporation Buildings are included in this category.

Climate Vulnerability	**Vulnerable Area:** Entire DSCC region or area **Vulnerable Actors:** • Resident • Informal Sector • Low-Income Group • BPDB • DPDC • Ministry of Power, Energy and Mineral Resources, GoB **Adaptive capacity of the system:** • Low: Ecosystem, Societal • Medium: Economic, Technological/Infrastructure, Governance
Potential climate resilience impact and wider co-benefits of climate actions	• GHG mitigation potential of interventions in Extended Action Scenario from stationary energy strategies: 79.3% of total GHG emission reduction by 2050 • Reduced grid dependency • Improved indoor thermal comfort. • Improved green cover. • Heat mitigation • Improved self-sufficiency from decentralised RE generation • Lower energy usage
SDGs	3 GOOD HEALTH AND WELL-BEING; 6 CLEAN WATER AND SANITATION; 7 AFFORDABLE AND CLEAN ENERGY; 11 SUSTAINABLE CITIES AND COMMUNITIES; 12 RESPONSIBLE CONSUMPTION AND PRODUCTION; 13 CLIMATE ACTION; 14 LIFE BELOW WATER

Mitigation Strategies for Energy and Buildings

Strategy 1: Increase the share of renewable energy generation.

Action Area	Target Parameter	Target		
		2030	2040	2050
Expand the capacity of renewable power in the electricity grid	Share of renewables in grid electricity generation	24%	56%	85%

Proposed Action	Resilience potential	Feasibility of Intervention	Period to Realise Impact (Short – by 2030 Med – by 2040 Long – by 2050)	Implementation Entities	Financing source or mode
(i) Advocate to power sector decision-makers and electricity suppliers for more ambitious and faster integration of renewables in Dhaka's power supply to achieve net-zero goals	High	Medium	Long-term	**Lead role** • DNCC and DSCC • RAJUK **Supporting role** • SREDA • Dhaka Electricity Supply Company (DESCO) • DPDC • BPDB	• Advocacy action not requiring significant funds

Proposed Action	Resilience potential	Feasibility of Intervention	Period to Realise Impact (Short – by 2030 Med – by 2040 Long – by 2050)	Implementation Entities	Financing source or mode
(ii) Expand the capacity and adoption of renewable power in the electricity grid					
Sub Actions • Allow private entities and consumers to install renewable energy generation systems beyond the current 10 megawatt (MW) maximum capacity as per net-metering guidelines, thereby enabling increased adoption of distributed solar power generation. • Facilitate demand aggregation to reduce costs of deploying RE power plants and procuring renewable energy to enable small consumers to offset their conventional grid-electricity consumption. • Target cluster development initiatives to enhance RE integration to offset conventional energy consumption. • Promote options such as green power purchase through open access by large commercial, institutional and industrial consumers, helping to achieve net-zero energy when captive RE capacity falls short of consumption or if there are limited funds or space to implement captive RE plants.	Very High	Medium	Long-term	**Lead role** • BPDB • SREDA • DESCO and DPDC **Supporting Role** • Bangladesh Energy Regulatory Commission (BERC) • Energy and Mineral Resources Division (EMRD) • Power Division, Ministry of Power, Energy & Mineral Resources • DNCC and DSCC • RAJUK	• International grants/ assistance, concessional finance

Proposed Action	Resilience potential	Feasibility of Intervention	Period to Realise Impact (Short – by 2030 Med – by 2040 Long – by 2050)	Implementation Entities	Financing source or mode
(iii) Offer assistance and streamline procedures for private sector and RE developers					
Sub Actions • Establish a 'one-stop service' that provides useful RE project information, requirements, and resource data to enable developers to prepare better quality project proposals in a timely manner. • Create an online single-window platform for submission of project documents by RE developers and in accordance with approvals/permits from different regulatory entities. • SREDA to offer technical assistance and handholding to private and public consumers in deploying and procuring RE based electricity.	Average	High	Medium-term	**Lead role** • SREDA • BPDB • Power Division of Ministry of Power, Energy & Mineral Resources **Supporting Role** • BERC • DESCO and DPDC • Private sector, RE developers	• Budget of SREDA, Power Division, BPDB
(iv) Establish partnerships for research and to implement pilots					
Sub Actions • Collaborate with research organisations, technical institutions, international agencies to undertake research on clean energy solutions such as green hydrogen, battery energy storage systems, vehicle-to-grid technology in electrified mobility, and solar-wind hybrid systems. Improve local capacities and know-how by engaging academic institutions and including RE related topics in curricula. • The DSCC and DPDC to jointly develop and implement proof-of-concept pilot projects on solutions and integration of renewables, potentially attracting technical assistance and concessional financing.	Medium	High	Short-term	**Lead role** • SREDA • DNCC and DSCC • DESCO and DPDC **Supporting Role** • Local research organisations, technical institutions, developmental organisations • RAJUK	• Budget of Power Division of Ministry of Power, Energy & Mineral Resources; SREDA • City Corporation budget • Corporate social responsibility (CSR) funds • International grants/ assistance, concessional finance

Proposed Action	Resilience potential	Feasibility of Intervention	Period to Realise Impact (Short – by 2030 Med – by 2040 Long – by 2050)	Implementation Entities	Financing source or mode
(v) Adopt integrated spatial and energy planning at the city-scale and promote renewables through urban development regulations					
Sub Actions • Officials from DPDC and SREDA can be involved in committees for development or master planning, providing opportunities to offer inputs and integrate net-zero energy-oriented measures in urban spatial planning. • City planners, DESCO and DPDC to work closely together for effective integration of urban development planning and urban energy planning, specifically electricity planning. Such an integration will enable sustainable energy management at the urban scale and support the integration of renewables, energy efficiency solutions, and e-mobility at an early stage in built infrastructure and electricity networks. • Encourage high-energy consumers such as large commercial complexes, shopping malls, public institutions, industries to use REbased electricity. Include requirements and incentives in the development control regulations for new connections or high-tension loads to have part of their consumption from RE.	Medium	High	Medium-term	**Lead role** • RAJUK • DNCC and DSCC • DESCO and DPDC **Supporting Role** • SREDA • Private and public consumers (residential, commercial, institutional, developers and others)	• Budget/ land value of RAJUK, DNCC and DSCC • Departmental budget of DESCO and DPDC • Private and public consumer investments

Proposed Action	Resilience potential	Feasibility of Intervention	Period to Realise Impact (Short – by 2030 Med – by 2040 Long – by 2050)	Implementation Entities	Financing source or mode
(vi) Develop a local plan for financing and enabling private investment in large-scale RE projects. Financing options such as public funds, low-interest or concessional loans, climate finance should also be assessed.	Medium	Low	Medium-term	**Lead role** • SREDA • BPDB **Supporting Role** • DESCO and DPDC • DNCC and DSCC • Power Division of Ministry of Power, Energy & Mineral Resources • EMRD • Private sector and financing entities	• Budget of SREDA, BDPB, Power Division • Investment from private sector • International grants/ assistance

Strategy 2: Distributed solar PV installation in buildings

Action Area	Target Parameter	Target		
		2030	2040	2050
Rooftop solar PV in residential buildings	Percentage of residential buildings with rooftop solar PV systems installed	10%	20%	30%
Rooftop solar PV in commercial and institutional buildings	Percentage of commercial buildings with rooftop solar PV systems installed	40%	60%	70%

Proposed Action	Resilience potential	Feasibility of Intervention	Period to Realise Impact (Short – by 2030 Med – by 2040 Long – by 2050)	Implementation Entities	Financing source or mode
(i) Identify and implement rooftop solar PV projects in prominent large-size public, institutional, educational and hospital buildings. Implementation and business models (CAPEX, lease, OPEX/RESCo) can be tested in such projects for further scale-up.					
Sub Actions • Identify public and institutional buildings, and DSCC's infrastructure with feasibility for rooftop solar PV deployment in order to maximize solar potential across buildings under public sector and institutional control. • Test implementation and business models (CAPEX, lease, OPEX/RESCo) in such rooftop solar PV projects to support further scale-up.	Very High	High	Long-term	**Lead role** • DSCC • RAJUK • SREDA **Supporting Role** • DPDC • Infrastructure Development Company Limited (IDCOL) • Local Government Engineering Department (LGED) • Technology providers	• Investment by consumer • CSR from institutional/ corporate entities • Departmental budget of IDCOL, LGED, public institutions • Relevant government scheme on RE • RESCO model with private sector investment
(ii) Establish mandates for rooftop solar PV in large buildings and promote solar-ready rooftops					
Sub Actions • Amend building regulations to initially promote installation of rooftop solar PV in large commercial, institutional and industrial buildings, particularly for new buildings. Establish mandates by 2030. • Promote design of new building rooftops so as to support and maximize rooftop solar PV adoption.	High	High	Long-term	**Lead role** • RAJUK • DSCC **Supporting Role** • SREDA • DPDC • Buildings developers, architects, RE technology providers & associations	• City Corporation budget • Departmental budget of RAJUK, SREDA
(iii) Revisit distributed solar PV guidelines and norms to allow consumers to install higher capacity of solar PV systems (i.e., allow solar PV capacity of up to 70% of the sanctioned electricity load)	Medium	Low	Long-term	**Lead role** • SREDA **Supporting Role** • DESCO and DPDC • DNCC and DSCC • RAJUK	• Budget of Ministry of Power, Energy & Mineral Resources • Departmental budget of SREDA, DESCO and DPDC

Proposed Action	Resilience potential	Feasibility of Intervention	Period to Realise Impact (Short – by 2030 Med – by 2040 Long – by 2050)	Implementation Entities	Financing source or mode
(iv) Identify a list of rooftops and spaces with solar PV potential and facilitate aggregated deployment					
Sub Actions • Undertake an identification of rooftop and land area available to earmark and develop a list of priority buildings and spaces at the city-scale for solar PV deployment. • Facilitate renewable energy aggregation for a group of residential, institutional and commercial consumers through community pooling of small RE projects and demand, group captive models and community energy projects[194]. DSCC and SREDA to work with RE technology providers to aggregate demand for multiple consumers and deploy on-site solar PV at reduced capital cost or provide green power at low cost, where space is limited. • Identify potential sites and initiate demonstration projects for floating solar deployment in water bodies.	Average	Low	Long-term	**Lead role** • DNCC and DSCC • RAJUK • SREDA **Supporting Role** • EMRD • DPDC • IDCOL • LGED • BPDB • Technology providers	• City Corporation budget • Budget of RAJUK, IDCOL, EMRD and BPDB • Demand aggregation of multiple projects facilitated by SREDA/DESCO/ DPDC • Investment by consumers • CSR from corporate entities
(v) Facilitate technical support and access to financing for rooftop solar deployment					
Sub Actions • Build awareness among commercial entities, industries and their associations, residents associations on how SREDA can offer support on RE adoption through its solar helpdesk.	High	High	Medium-term	**Lead role** • SREDA • DNCC and DSCC • RAJUK **Supporting Role** • DPDC • IDCOL • National and international financial institutions	• Departmental budget of SREDA, IDCOL for outreach and facilitation • City Corporation budget • International grants/ assistance

[194] Community-based energy projects bring together different community actors such as individuals, organisations, and local governments to pool their resources and knowledge towards planning and deployment of renewables and sustainable energy solutions. Community energy projects can enable active participation, sharing of responsibilities and benefits of renewable energy amongst the local community.

Proposed Action	Resilience potential	Feasibility of Intervention	Period to Realise Impact (Short – by 2030 Med – by 2040 Long – by 2050)	Implementation Entities	Financing source or mode
• Collaborate with low-cost financing facilities[195] such as Bangladesh Bank's green refinance scheme, IDCOL to facilitate access to low-interest loans for rooftop solar, through simplified disbursement process. Ensure dissemination of updated information on such financing options with stakeholders. • Explore offering incentives such as property tax rebates, discounts on building permit fees, and faster building approvals to building owners and occupiers that install distributed solar PV to promote its wider adoption.				• Individual consumers, resident welfare associations, business, and industry associations	

Strategy 3: Energy efficient building design

Action Area	Target Parameter	Target		
		2030	2040	2050
New residential and commercial buildings built to high energy efficiency standards	Percentage of new residential buildings that are green/ climate resilient	100%	100%	100%
	Percentage of new commercial and institutional buildings that are green/climate resilient	100%	100%	100%
New affordable housing built to high energy efficiency standards	Percentage of new affordable housing buildings that are green/climate resilient	100%	100%	100%
	Percentage of existing residential buildings with envelopes retrofitted to high energy efficiency standards	20%	50%	70%
Retrofit building envelopes of existing residential and commercial buildings	Percentage of existing commercial and institutional buildings with envelopes retrofitted to high energy efficiency standards	25%	60%	80%
Cool roof program for energy savings and urban heat island mitigation	Cool roofs in new buildings	100%	100%	100%
	Cool roofs in existing buildings	50%	80%	100%

[195] Bangladesh Bank's green refinance scheme has interest rates from 5 to 6%. The Infrastructure Development Company Ltd. (IDCOL) offers loan for rooftop solar projects at 6%. https://www.nbr.org/publication/building-renewable-energy-in-bangladesh

Proposed Action	Resilience potential	Feasibility of Intervention	Period to Realise Impact (Short – by 2030 Med – by 2040 Long – by 2050)	Implementation Entities	Financing source or mode
(i) Develop easy-to-use guidebooks and implement pilots on energy-efficient and low-carbon building design and construction **Sub Actions** • Prepare practical guidebooks to help building industry stakeholders and citizens adopt green and low-carbon techniques and measures during design and construction of new buildings as well as existing buildings. Low and no-cost measures should be included and promoted in such guidance. • Implement demonstration/pilot projects in affordable housing and private building projects to showcase green building and net-zero concepts	High	High	Medium-term	**Lead role** • SREDA • RAJUK • DNCC and DSCC **Supporting Role** • Building developers' and architects' associations • RWAs, trade/ business associations	• Budget of SREDA and RAJUK • City Corporation budget • CSR funds from corporate entities • International grants/ assistance
(ii) Develop a localised Green Building policy and establish requirements for energy-efficient new buildings and those undergoing major renovation in the building regulations that get more ambitious over time **Sub Actions** • Develop a Green Building Policy specific to the city's building stock and local conditions. • Include and notify provisions to promote green and energy-efficient buildings through codes and standards in the local general development control regulations and building bye-laws.	High	High	Medium-term	**Lead role** • RAJUK • DSCC **Supporting Role** • Ministry of Housing and Public Works • SREDA	• Budget of Ministry of Housing and Public Works and RAJUK • City Corporation budget • International grants/ assistance

Proposed Action	Resilience potential	Feasibility of Intervention	Period to Realise Impact (Short – by 2030 Med – by 2040 Long – by 2050)	Implementation Entities	Financing source or mode
• Promote that new buildings of mid to large size are certified green buildings. Mandates established subsequently in a time-bound manner, including expanding the types and size of buildings covered. Green building compliance to be submitted as one of the documents for securing building permits and approvals. • Set out a clear pathway for building regulations to improve at set intervals over time moving towards net zero buildings. In terms of enforcement, policy interventions and schemes to be initially voluntary for a short time period (about 2-3 years) and be made mandatory overtime.					
(iii) Build local capacity and facilitate access to local solution providers for green building actions **Sub Actions** • Design a targeted training and certification program for architects, developers, technicians, service providers on energy efficient construction and buildings. Highlight long-term financial and environmental benefits of upfront investment in green buildings. • Prepare a formal register or list of green building vendors including material suppliers and technology/service providers. Upload the list of empanelled/approved vendors on the city government's website.	Average	Low	Long-term	**Lead Role:** • DNCC and DSCC • SREDA **Supporting Role** • Building developers' and architects' associations • RAJUK • Green building vendors, technology and solution providers	• City Corporation budget • Budget of SREDA • CSR from corporate entities, and contributions from vendors or technology providers

Proposed Action	Resilience potential	Feasibility of Intervention	Period to Realise Impact (Short – by 2030 Med – by 2040 Long – by 2050)	Implementation Entities	Financing source or mode
(iv) Implement a city-wide Cool Roof program **Sub Actions** • Establish a program for adoption of Cool Roofs in buildings to promote reflective paints and roof materials, green roofs. • Implement pilot projects in affordable housing and low-income communities and informal housing.	Medium	High	Long-term	**Lead role** • DSCC • RAJUK **Supporting role** • Ministry of Housing and Public Works • Building owners/ occupiers, RWAs, CBOs/NGOs • SREDA • Building developers' and architects' associations	• Budget of Ministry of Housing and Public Works • City Corporation budget • Budget and RAJUK • CSR from corporate entities • International grants/ assistance
(v) Introduce a building renovation program for energy efficiency upgrades for existing buildings **Sub Actions** • Roll out a building renovation program to identify and implement specific building envelope and energy efficiency retrofit solutions for different types of buildings. • Establish requirements in the long-term for existing buildings beyond a certain age to implement retrofits.	Medium	Medium	Long-term	**Lead role** • DSCC • RAJUK **Supporting role** • Building owners/ occupiers, RWAs, CBOs/NGOs • Building developers' and architects' associations • Solution providers and vendors	• Budget of RAJUK, SREDA • Private consumer investments (residential, commercial, developers and others) • City Corporation budget • International grants/ assistance • Private sector investments

Proposed Action	Resilience potential	Feasibility of Intervention	Period to Realise Impact (Short – by 2030 Med – by 2040 Long – by 2050)	Implementation Entities	Financing source or mode
(vi) Adoption of sustainable, low-carbon and circular building materials **Sub Actions** • Promote use of locally sourced and certified low-carbon building materials, use of recycled C&D waste and its products. • Establish and enforce mandates for procurement of materials made from C&D waste in new and redeveloped public, commercial, residential and institutional buildings, subject to stringent quality control of such materials. • Develop guidelines and protocols for deconstruction and disassembly of old buildings instead of demolition to salvage and reuse materials.	Very High	Medium	Medium-term	**Lead role** • DSCC • RAJUK **Supporting role** • Ministry of Housing and Public Works • SREDA • Building industry including developers, material suppliers, service providers, architects	• Budget of RAJUK • City Corporation budget • Private sector investments from developers, C&D technology providers, alternate/ green material suppliers • International grants/ assistance, concessional finance
(vii) Promote climate-responsive measures in affordable and informal housing **Sub Actions** • Adopt energy efficient and low-carbon design measures in new affordable housing schemes. Mandate that all new affordable housing schemes are certified green buildings. • Incorporate climate-responsive design features in existing and new informal housing. Measures include use of cost-effective construction techniques and locally sourced materials, constructing structures on elevated locations and with appropriate plinth height to reduce inundation risks, and ensuring natural ventilation, lighting, insulation.	High	High	Short term	**Lead role** • Housing and Building Research Institute (HBRI) • DSCC • RAJUK **Supporting role** • NGOs • CBOs • District Commissioner (DC) Office • Research Institutes/ Universities	• HBRI • DNCC/DSCC • RAJUK • NGOs • Internal Grants

Proposed Action	Resilience potential	Feasibility of Intervention	Period to Realise Impact (Short – by 2030 Med – by 2040 Long – by 2050)	Implementation Entities	Financing source or mode
• Identify existing informal settlements to implement climate resilience measures and retrofits, including use of permeable surfaces to mitigate waterlogging, reinforcing foundations and upgrading building and roof materials, design modifications for better air flow and natural lighting, use of rainwater harvesting systems to address water scarcity, integration of flood resilient sanitation infrastructure to withstand extreme weather events. Involve community members in the design and planning processes to ensure their needs and preferences are considered.					
(viii) Design and implement monetary and non-monetary measures to promote energy efficient buildings **Sub Actions** • Establish promotional schemes, financial incentives and penalties targeted at architects, developers, engineers, consultants and building users to promote adoption of green and energy efficient new and existing buildings. Options include faster building approvals, rebates in taxes, discounts on FSI/FAR charges and fees, reimbursements for green building certificate fees, lower interest rates from financing institutions.	High	Medium	Medium-term	**Lead role** • DSCC • RAJUK **Supporting role** • SREDA • Ministry of Housing and Public Works • Building developers' and architects' associations • Building owners/ occupiers, RWAs	• City Corporation budget, tax rebates/ incentives, fee waiver • Budget of RAJUK, SREDA • Public sector budget • International grants/ assistance, concessional finance

Strategy 4: Uptake of energy efficiency measures in buildings

Action Area	Target Parameter	Target		
		2030	2040	2050
Energy efficiency in residential buildings	Percentage of **existing residential buildings** with high efficiency appliances (refrigerators, fan, AC/advanced cooling system, solar water heater, water efficient fixtures)	20%	40%	80%
	Percentage of **new residential buildings** with high efficiency appliances (refrigerators, fan, AC/advanced cooling system, solar water heater, water efficient fixtures)	100%	100%	100%
	Percentage of **existing residential buildings** with LED lights	80%	100%	100%
	Percentage of **new residential buildings** with LED lights	100%	100%	100%
Energy efficiency in commercial and institutional buildings	Percentage of **existing commercial buildings** with high efficiency appliances (refrigerators, fan, AC/ advanced cooling system, solar water heater, water efficient fixtures)	30%	50%	100%
	Percentage of **new commercial buildings** with high efficiency appliances (refrigerators, fan, AC/advanced cooling system, solar water heater, water efficient fixtures)	100%	100%	100%
	Percentage of **existing commercial buildings** with LED lights	80%	100%	100%
	Percentage of **new commercial buildings** with LED lights	100%	100%	100%

Proposed Action	Resilience potential	Feasibility of Intervention	Period to Realise Impact (Short – by 2030 Med – by 2040 Long – by 2050)	Implementation Entities	Financing source or mode
(i) Conduct energy consumption audits and benchmarking					
Sub Actions • Conduct energy benchmarking study to understand energy consumption patterns across different types of buildings including commercial, institutional, public as well as large residential buildings where possible. Identify buildings with high energy use for energy audits to identify energy improvement measures, and potential energy and cost savings.	Medium	Medium	Medium-term	**Lead role** • DSCC • RAJUK • SREDA	• Budget of BERC, DESCO and DPDC • City Corporation budget

Proposed Action	Resilience potential	Feasibility of Intervention	Period to Realise Impact (Short – by 2030 Med – by 2040 Long – by 2050)	Implementation Entities	Financing source or mode
• Establish process for buildings to report on their energy performance data and prioritize buildings with high energy use for efficiency improvement actions. • Create a pool of certified auditors, service and solutions providers for residential and commercial buildings to undertake energy audits and implement solutions in existing and new buildings. • Establish recognition programmes, incentives at ward-level for being energy efficient. Provide labels or tags to households and buildings with high energy efficiency. • Identify and prioritize mid to large-scale existing commercial buildings, offices, public buildings, shopping malls, hotels and educational institutions for energy audits	High	High	Medium-term	**Supporting Role** • DPDC • Building owners/ occupiers/ consumers • Energy service and solution providers, related technical associations,	• Consumer and private sector investments • ESCO model • International grants/ assistance
(ii) Promote energy efficiency through building regulations and mandates					
Sub Actions • Issue a notification with a mandate for all buildings to switch to LED lights by 2030. Promote adoption of AC type efficient fans and super-efficient brushless type DC fans to replace conventional ceiling fans through requirements in the building development control regulations and identifying incentives as possible. • Establish mandates for energy efficiency adoption in new buildings, particularly in mid and large size commercial, retail, hotels and hospitals. Include requirements in the building approval process for new commercial buildings to use high energy efficiency equipment for energy intensive loads such as cooling. Promote adoption of Building Energy Management Systems in large new and existing public and private commercial buildings.	High	Low	Medium-term	**Lead role** • RAJUK • DSCC **Supporting Role** • SREDA • DPDC • Building owners/ occupiers/ consumers, technology providers and vendors	• City Corporation budget • Aggregated procurement facilitated by SREDA, DSCC, DPDC • Investment by consumers

Proposed Action	Resilience potential	Feasibility of Intervention	Period to Realise Impact (Short – by 2030 Med – by 2040 Long – by 2050)	Implementation Entities	Financing source or mode
• Modify building regulations/bye-laws to include provisions and requirements for rooftop solar PV, energy efficient common utilities (common lighting, water pumping), EV charging infrastructure, water efficient solutions, grey water reuse/ recycling, and decentralised waste management.					
(iii) Enable access to affordable financing and provide financial incentives to ensure greater energy efficiency adoption					
Sub Actions • Create a program for adoption and financing of energy efficient appliances and solutions for low-income households and communities. • Collaborate with key stakeholders such as residential welfare, trade and business associations to provide low-cost credit for energy efficiency measures in collaboration with financing institutions. • Introduce incentives to encourage compliance with green building and energy efficiency compliance such as slabs on property tax rates, based on energy and water consumption • Set up financial programs to overcome some of the barriers around high upfront cost of energy efficient appliances and electric cookstoves and to overcome the split incentive between landlords and tenants.	Medium	High	Short-term	**Lead Role:** • DSCC • SREDA **Supporting Role** • RAJUK • Resident welfare associations (RWAs), business/ commerce/ trade associations, individual consumers	• Low-cost/ concessional finance from public and international financing institutions • Private financing institutions • City Corporation budget, property tax incentives/ rebates
(iv) Setup a Sustainable Energy Cell in DSCC to promote and coordinate energy efficiency actions in City Corporation buildings and with different stakeholders at the city-scale.					
Sub Actions • Partner with SREDA to roll out an energy efficiency program with assistance and energy audits at lower costs • Target adoption of energy efficient common utilities in existing and new buildings	High	High	Short-term	**Lead role** • DSCC **Supporting role** • SREDA • Technology and solution providers/ experts	• City Corporation budget of DNCC and DSCC • Budget of SREDA • CSR from corporate entities

Proposed Action	Resilience potential	Feasibility of Intervention	Period to Realise Impact (Short – by 2030 Med – by 2040 Long – by 2050)	Implementation Entities	Financing source or mode
• Promote adoption of Building Energy Management Systems in large public and private commercial buildings • Share lessons between building owners on how to reduce emissions and save on energy bills				• RWAs, building owners/ occupiers, private sector enterprises, public institutions	• Investment by consumers • International grants/ assistance, concessional finance
(v) Undertake a public IEC campaign to increase awareness on building and appliance energy efficiency **Sub Actions** • Engage business associations, technology providers and sector experts to help improve awareness on solutions including energy efficient appliances such as lighting, fans, refrigerators, space cooling, building energy management systems, solar water heaters, solar PV systems, and water efficient fixtures among others. • Convene forums to target citizens, commercial establishments, businesses, developers and disseminate knowledge on building energy and appliance energy efficiency. Disseminate knowledge materials such as pamphlets and brochures through events, social and print media.	Medium	Medium	Short-term	**Lead role** • SREDA • DSCC **Supporting role** • NGOs, CBOs • RWAs, business and industry associations, and other private sector enterprises	• Budget of SREDA • CSR from corporate entities • City Corporation budget

Strategy 5: Energy efficiency in public buildings and infrastructure

Action Area	Target Parameter	Target		
		2030	2040	2050
Energy efficiency and renewable energy in existing public buildings	Percentage of existing public buildings	80%	100%	100%
Energy efficiency and renewable energy in new public buildings	Percentage of new public buildings	100%	100%	100%
Energy efficiency and renewable energy in public infrastructure and utilities	Percentage of public infrastructure and utilities (water supply, wastewater)	80%	100%	100%
Adopt LED streetlighting	Percentage of LED streetlights	100%	100%	100%

Proposed Action	Resilience potential	Feasibility of Intervention	Period to Realise Impact (Short – by 2030 Med – by 2040 Long – by 2050)	Implementation Entities	Financing source or mode
(i) Adoption of certified green and net-zero public buildings					
Sub Actions • Introduce policy mandate for all new public buildings to be certified green buildings. • Mandate green building codes and rating system compliance in all government office buildings, institutional buildings such as schools, colleges, hospitals, public housings constructed or controlled by DSCC • Mandate that all public buildings are net-zero by 2040. • Undertake pilots to adopt and demonstrate net-zero building concepts in public buildings through new buildings and retrofits in existing buildings. These buildings can serve as model buildings and be used for creating awareness among stakeholders and the community at large.	Very High	Medium	Long-term	**Lead role** • DSCC • RAJUK **Lead role** • SREDA • LGED	• City Corporation budget • Budget of RAJUK, SREDA • Other public budgets and PPPs • International grants/ assistance, concessional finance
(ii) Develop policies promoting energy efficiency in public buildings and infrastructure					
Sub Actions • Develop a Green Public Procurement Policy (GPP) for all public buildings and facilities and for affordable housing. The GPP would guide procurement of low carbon building materials (such as alternative cements, recycled envelope materials, locally sourced materials), energy efficient appliances, and water efficient fixtures during the design and construction phase and ensure adherence to green and net-zero building concepts. • Mandatory adoption of high energy efficiency equipment, LED lights, and low-carbon materials in all new public buildings, facilities and streetlights • Establish a policy for Government offices to periodically replace old low efficiency equipment and appliances with high-efficiency models.	Very High	High	Medium-term	**Lead role** • DSCC • RAJUK **Supporting Role** • SREDA • LGED	• City Corporation budget • Budget of RAJUK, SREDA • Other public budgets and PPPs • International grants/ assistance, concessional finance • Aggregated procurement, • ESCO model

Proposed Action	Resilience potential	Feasibility of Intervention	Period to Realise Impact (Short – by 2030 Med – by 2040 Long – by 2050)	Implementation Entities	Financing source or mode
(iii) Promote green public and institutional buildings					
Sub Actions • Practice green building adoption, implementation and enforcement procedures. • Mandate green building codes and rating system compliance in all government office buildings, institutional buildings such as schools, colleges, hospitals and public housings	Very High	Medium	Long-term	**Lead Role:** • DSCC • RAJUK **Supporting Role** • SREDA • Public organisations, institutions such as schools, colleges, hospitals, correction home and others • LGED	• City Corporation budget • Budget of RAJUK, SREDA • Other public budgets and PPPs • International grants/ assistance, concessional finance
(iv) Track energy performance and implement targeted energy efficiency improvement actions in public buildings and facilities					
Sub Actions • Establish a process for reporting, recording and benchmarking of monthly energy consumption from all public buildings and service provision facilities such as water supply and wastewater treatment. • Identify public buildings and facilities with high energy consumption and undertake energy audits and studies to identify renewable energy and energy efficiency projects for implementation. • Conduct targeted training program for public officials on energy management and implementation of measures.	Medium	Medium	Medium-term	**Lead role** • DSCC • SREDA • DWASA **Supporting role** • RAJUK • SREDA • DPDC • LGED	• City Corporation budget • Budget of SREDA • Other public budgets and PPPs • International grants/ assistance, concessional finance • Aggregated procurement, ESCO model
(v) Conduct capacity building and technical studies					
Sub Actions • Targeted training program for public officials on energy efficiency policy and implementation of measures. • Undertake study to identify road map and bankable projects for RE and EE in public buildings and facilities such as wastewater and water supply.	Medium	High	Short-term	**Lead role** • DSCC • DWASA • SREDA **Supporting role** • RAJUK	• City Corporation budget • Budget of SREDA • Other public budgets and PPPs • International grants/ assistance, concessional finance

Proposed Action	Resilience potential	Feasibility of Intervention	Period to Realise Impact (Short – by 2030 Med – by 2040 Long – by 2050)	Implementation Entities	Financing source or mode
(vi) Promotion of energy-efficient public lighting					
Sub Actions • Mandatory conversion of conventional lights to LEDs in all existing public buildings, facilities and streetlights. • Mandatory adoption of LEDs in all new public buildings, facilities and streetlights.	Very High	High	Medium-term	**Lead role** • DSCC • RAJUK **Supporting role** • SREDA • LGED	• City Corporation budget • Budget of SREDA • Other public budgets • Aggregated procurement, ESCO model • International grants/ assistance, concessional finance

Strategy 6: Switch to cleaner fuel and advanced/electric cookstoves in household and commercial cooking

Action Area	Target Parameter	Target		
		2030	2040	2050
Advanced/electric cookstoves in existing households and commercial buildings (i.e., hotels) along with phase out of wood/wood waste in cooking	Percentage of existing residential buildings that use electricity for cooking	20%	40%	95%
	Percentage of existing commercial buildings (Hotels) that use electricity for cooking	30%	40%	90%
Advanced/electric cookstoves in new residential and commercial (i.e., hotels) buildings	Percentage of new residential buildings that use electricity for cooking	100%	100%	100%
	Percentage of new commercial buildings (Hotels) that use electricity for cooking	100%	100%	100%

Proposed Action	Resilience potential	Feasibility of Intervention	Period to Realise Impact (Short – by 2030 Med – by 2040 Long – by 2050)	Implementation Entities	Financing source or mode
(i) Promotion of clean fuel supply					
Sub Actions • Support oil companies/gas services providers to implement programs to shift consumers to clean fuel for cooking from wood/wood waste. • Enhance the supply of electric cookstoves in the market through policy/regulatory interventions • Attract private investments in the electric cookstove manufacturing industry through regulatory and/or financial incentives. • Disincentivize the use of the PNG while promoting the use of renewable electricity for cooking. LPG cylinders to be used during transition in the short-term while infrastructure to deliver electric cooking is built, with LPG to be gradually phased out in favour of renewable electricity. Implement targeted programs to shift consumers using wood/wood waste to cleaner cooking energy sources such as LPG in the short-term and electric cooking thereafter. • Prepare and implement a plan for phased decommissioning of the existing PNG infrastructure.	High	Medium	Long-term	**Lead role** • SREDA • Ministry of Industries • Power Division, Ministry of Power, Energy and Mineral Resources (MPEMR) • Bangladesh Council of Scientific and Industrial Research (BCSIR) **Supporting Role** • DSCC • Bangladesh Petroleum Corporation (BPC) • EMRD • Titas Gas Transmission and Distribution Company (Titas) • IDCOL • DPDC • Bangladesh Standards and Testing Institution (BSTI)	• Ministry of Industries budget • SREDA budget • Power Division, MPEMR budget • BCSIR budget • Climate Change Funds through Ministry of Environment • Funding from development partners like Clean Cooking Alliance • BPC budget • Private sector investments • International grants/ assistance, concessional loans

Proposed Action	Resilience potential	Feasibility of Intervention	Period to Realise Impact (Short – by 2030 Med – by 2040 Long – by 2050)	Implementation Entities	Financing source or mode
(ii) Adopt demand side interventions to transition to low-emission fuels					
Sub Actions • Financial incentives to existing small-scale commercial and residential consumers to shift to renewable electric-ty-powered cookstoves • Financial support to low-income sections, women, and senior citizens to adopt clean fuel options • Mandating large commercial consumers with high fuel consumption for cooking, such as the hospitality and healthcare sectors, to shift towards renewable electricity-powered cookstoves • Mandatory adoption of electric cookstoves, through regulation, for consumers in new buildings.	Medium	Low	Long-term	**Lead role** • Ministry of Industries • Power Division, MPEMR • BCSIR • SREDA **Supporting Role** • SREDA • DPDC • Building owners/ occupiers/ consumers, technology providers and vendors	• Ministry of Industries budget • SREDA budget • Power Division, MPEMR budget • BCSIR budget • Consumer investment • Private sector investments • CSR from corporate entities

Strategy 7: Reduce conventional energy use in industrial sector

Action Area	Target Parameter	Target		
		2030	2040	2050
Fuel switch to low-carbon electricity	Proportion of industrial fuel (diesel and natural gas) switched to low-carbon electricity	45%	50%	95%
Energy efficiency measures in industries	Percentage improvement in industrial energy efficiency	20%	30%	40%
Rooftop and distributed solar PV in industries	Percentage of industrial buildings with rooftop/ distributed solar PV systems installed	40%	60%	70%

Proposed Action	Resilience potential	Feasibility of Intervention	Period to Realise Impact (Short – by 2030 Med – by 2040 Long – by 2050)	Implementation Entities	Financing source or mode
(i) Scale-up deployment of rooftop and distributed solar energy and high-energy efficiency solutions in industrial units					
Sub Actions • Revise guidelines and norms to allow industrial consumers to install solar PV systems to cater to nearly all of the electricity requirement (90% of the sanctioned electricity load). • Assess potential for renewable energy (such as solar PV, solar thermal) and energy efficiency implementation in industries of different sizes in Dhaka. Identify implementation and business models. • Demand aggregation for generation of renewable energy and deployment of energy efficiency solutions among multiple potential consumers located in close geographical proximity.	Average	Medium	Long-term	**Lead role** • Ministry of Industries • SREDA • Power Division, MPEMR **Supporting role** • DPDC • BERC • DSCC • RAJUK • IDCOL • Private sector/ industry owners, industrial associations	• Ministry of Industries budget • SREDA budget • Investment by industry consumers • Departmental budget/ schemes of SREDA, IDCOL • Power Division, MPEMR budget • Demand aggregation of multiple projects facilitated by SREDA/DPDC

Proposed Action	Resilience potential	Feasibility of Intervention	Period to Realise Impact (Short – by 2030 Med – by 2040 Long – by 2050)	Implementation Entities	Financing source or mode
(ii) Promote fuel switch and transition to renewables					
Sub Actions • Promote shift to renewable-based electricity in MSMEs and industrial estates to help attract investments for developing requisite power infrastructure. • Offer tax incentives and financial support from industrial authorities, associations, SREDA and DSCC to promote fuel shift and switch to renewables. • Promote cluster development initiatives for industries to enhance renewable and clean energy integration at scale.	Low	Medium	Long-term	**Lead role** • SREDA • Ministry of Industries • Power Division, MPEMR • BCSIR budget **Supporting role** • DSCC • RAJUK • BPC • Private sector/ industry owners, industrial associations • BSTI	• Ministry of Industries budget • Power Division, MPEMR budget/ schemes • IDCOL budget/ schemes • BCSIR budget • Investments from private sector/ industries, industrial associations • BPC budget

7. Governance Structure for Implementing the Climate Action Plan

The DSCC is committed to ensuring that the implementation of the CAP is carried out with the highest level of professionalism and expertise. In November 2022, the DSCC established a Climate Core Team for coordinating and directing all activities related to planning, developing, and monitoring of the CAP. Though the administrative boundaries of Dhaka South and Dhaka North are separate, achieving a net zero development target for the entire Dhaka city by implementing the CAPs requires close collaboration between these two local governments. A large number of interventions outlined in the CAPs are shared by both local governments, and can only be achieved to their full potential through joint implementation. Not only the Dhaka North City Corporation, the DSCC should engage with a number of external government agencies, as well as various stakeholders to effectively implement the CAP. Acknowledging that inter-departmental cooperation may pose a significant challenge within the current governance system, this section identifies a new governance structure. This structure aims to facilitate the implementation of the CAP by DSCC in collaboration with other agencies and stakeholders, suggest modes of communication and exchange, identify the legal and policy framework for CAP implementation, and propose the integration of CAP considerations into the corporation budget for financial mainstreaming.

For the preparation of the CAP, a Rapid Strategic Appraisal was conducted to understand the existing policies, regulations, laws, and the internal and external agencies and departments responsible for its execution. This appraisal clarified the institutional roles, coordination needs and regulatory requirements, that are addressed in the proposed governance structure. This structure is designed to facilitate both internal and external coordination, ensuring effective implementation of the CAP.

To visually represent the hierarchical structure and roles within DSCC, a framework (Figure 32) has been developed. As per the framework, the DSCC Mayor and CEO will collectively serve as approval authorities, providing advisory oversight as well as the vision for the CAP. The Climate Core Team will consist of senior officials from different departments in the DSCC, including a nodal department represented by the Department of Urban Planning. This Climate Core Team will function as the central coordinating and monitoring body. It will also be supported by the High-Level CAP Advisory Committee (a format has been proposed in Figure 32) that includes representation from different external stakeholder agencies to facilitate communication and coordination and exchange among departments that share sectoral responsibilities. The Department of Urban Planning, as the nodal department of Climate Core Team, will organise and facilitate internal and external communications, meetings, and oversee all aspects of CAP implementation, along with tracking the implementation progress, developing progress reports, and updates of the CAP. The Environment, Climate Change and Disaster Management Circle will collaborate and support the Urban Planning Department in these efforts. Together, they will present all the findings to the Climate Core Team and High-Level CAP Advisory Committee, who will in turn report to the Mayor and CEO.

Sectoral strategies from the CAP will be implemented by the respective sectoral departments of the DSCC, as indicated in the framework. However, these departments will act in consultation with the Urban Planning Department for instructions and discussions. The Information and Communications Technology (ICT) Cell, Finance Department and Zonal offices will support different internal departments of the DSCC in implementing CAP interventions and in monitoring their progress and outcomes.

Decisions on implementing any component of the CAP will be jointly taken with the Urban Planning Department and Climate Core Team, subject to approval by the Mayor and CEO's office.

To enhance the understanding of each department's roles within the DSCC, the following strategy will be followed:

- **Approval:** Mayor and CEO's office
- **Coordination, Monitoring, Supervision of CAP implementation:** Climate Core Team
- **Facilitation of Internal and External Communications:** Department of Urban Planning
- **Overall CAP planning, implementation, tracking, reviewing, reporting and updation:** Department of Urban Planning
- **Implementation of Sectoral CAP Strategies:** Sectoral departments, in consultation with the Department of Urban Planning, Climate Core Team

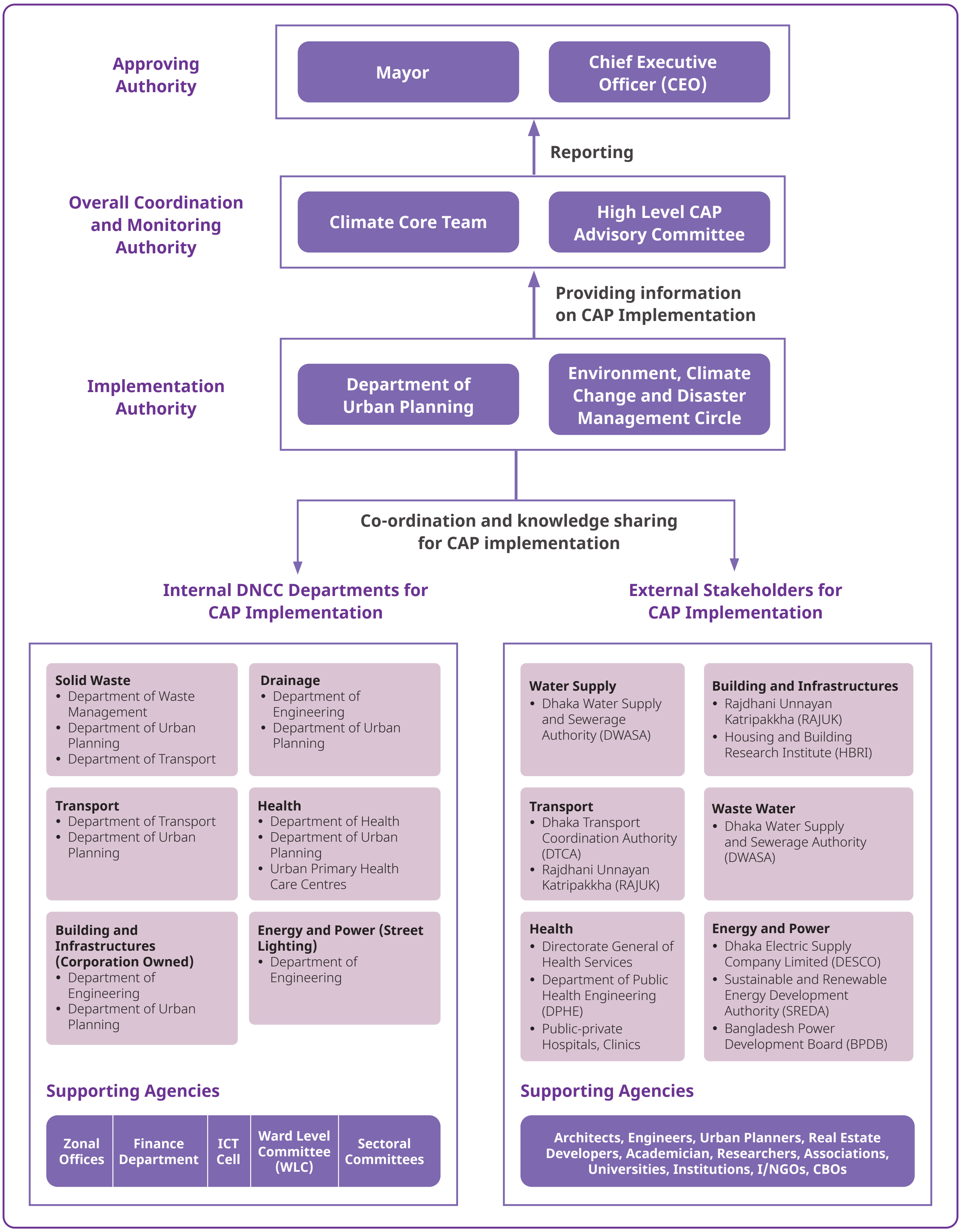


Figure 33: *CAP Implementation Framework*[196]

[196] ICLEI South Asia

To optimise the functioning of the governance structure, the DSCC will follow both internal and external arrangements as outlined in the following sections. These arrangements are recommended to strengthen the capacity of the governance system and ensure its seamless operations.

7.1. Internal Institutional Arrangements – Climate Core Team

The current Climate Core Team consists of members from the DSCC's sectoral departments such as Urban Planning and Engineering. Currency, the team is led by the Chief Town Planner from the Department of Urban Planning who acts as the Chairperson of Climate Core Team and is responsible for its operational functioning under the supervision of the DSCC Chief Executive Officer (CEO).

In the future, the DSCC may review or revise the members of the Climate Core Team to encompass departments like electrical, transport and finance. Regular reviews and adjustments to the team's composition is necessary to ensure full integration of climate initiatives into the existing governance structures of the city and for adjusting or modifying the action plan according to development in the city.

Key functions of the Climate Core Team:

- Participate in inter-department coordination meetings, and thereby support the DSCC's intent to adopt a governance system that embeds climate targets and considerations into decision-making and development infrastructure where possible.
- Ensure that the sectoral departments consider the provisions of the CAP during the preparation of sectoral development plans, perspective plans and master plans (if the statutory plan preparation process is co-terminus with the implementation of the CAP).
- Facilitate effective integration of the city's developmental plans and funding schemes with the CAP.
- Support the sectoral departments in identifying the implementation strategies, actions, and projects as per the CAP to address climate change and promote sustainability with the support of the sectoral departments and by coordinating with external government departments.
- The Climate Core Team of the DSCC will engage with the Climate Core Team of the DNCC to jointly pursue emission reduction targets for sectors wherein the interventions require coordinated and concerted efforts, either independently or in association with concerned line departments.
- Oversee, guide, and coordinate the implementation of the CAP.
- Identify resources needed and allocate adequate resources for the implementation of the CAP and promote allocation of such resources from the corporation budget.
- Ensure that the sectoral departments adopt a gender-balanced and inclusive project planning approach within the DSCC.
- Ensure that the CAP is followed in its entirety while adjusting the scope and scale in emerging contexts.
- Conduct research, engage, collaborate, and consult with stakeholders and raise awareness about climate change.
- Monitor the progress of strategies towards reducing GHG emissions and reducing vulnerability to climate impacts based on the actions indicated in the CAP, using the identified KPIs, as well as modifying them as and when necessary.
- Seek funding and partnerships, promote environmental education, and provide resources and guidance on sustainable practices.
- Advocate for the city's interests and ambitions on climate action and emphasize equity and social justice in climate initiatives.

In order to ensure that the Climate Core Team can function effectively, the DSCC, through its Urban Planning Department, will undertake the following actions:

1. **Define the Climate Core Team's Composition and Responsibilities of Climate Core Team:**
    - Develop a Terms of Reference (ToR), preferably jointly by the Urban Planning Department and the Environment, Climate Change and Disaster Management Circle, to determine the responsibilities of the Climate Core Team, including specific roles and responsibilities of each sectoral department and representative members.

- Clarify how to monitor, supervise and coordinate the implementation of CAP by using different reporting structures and communication channels within the team to ensure effective collaboration.

2. **Periodic Review and Adjustment of Climate Core Team:**

   - Implement a mechanism for periodic reviews and adjustments to the Climate Core Team's composition.

   - Assess the effectiveness of the team's structure and identify any gaps or areas where additional expertise is required.

   - Make changes as needed to ensure that the team reflects a comprehensive set of skills and knowledge.

3. **Ensure Involvement of the Office of the Chief Executive Officer or Mayor:**

   - Consider the inclusion of representatives from the office of the Mayor or Chief Executive Officer (CEO) in the Climate Core Team. This will help to keep the high- level officials informed at all times about climate related work and ease the process of approvals.

   - Ensure that the high-level city leadership is engaged in the team's activities to streamline decision-making processes.

4. **Regular Meetings and Reporting:**

   - Schedule regular meetings within the Climate Core Team and with the High-Level CAP Advisory Committee, and CAP implementing authority (Department of Urban Planning) to discuss progress, challenges and actions.

   - Review the reporting system from time to time to track the implementation of climate initiatives, share updates with relevant stakeholders, and provide recommendations if any adjustments are needed. The Monitoring and Evaluation section in this report gives some indicators that may be used for this purpose.

   - Involve the Standing Committee (SC) of the DSCC and other sectoral committees (e.g. Disaster Management Committee) in this process and collect feedback.

5. **Public Engagement and Awareness:**

   - Support the development of a communication plan for public engagement.

   - Support the implementation of strategies to engage with the public and raise awareness about climate issues.

   - Encourage citizen involvement in climate initiatives and projects.

7.2 Internal Cross-departmental Coordination and Horizontal Integration

Given that each department in the DSCC operates within its own priorities, reinforcing coordination mechanisms is important. To achieve this, the DSCC will adopt a structured approach involving the engagement of different departments through regular review meetings that encourage discussions and collection of feedback. Based on inputs in these review meetings, different departments will prepare their development and project plans with a collaborative and holistic approach with a common goal of achieving climate resilience and net zero development. To establish this process, the Department of Urban Planning will play a central role, spearheading collaboration among departments. Their principal objective would be to harmonize the actions and aspirations of each department within the overarching strategies stated in the CAP.

The seamless integration of climate initiatives in city level administration and development is important. Before implementing different CAP components, the DSCC will consult with Ward Level Committees (WLCs) and sectoral committees to understand their demands. Subsequently, the proposals will be presented at the DSCC's board meetings (monthly or quarterly) for further review and approval.

Initiatives arising from the CAP and their associated benefits will be discussed with Ward Councillors and the local community to ensure their acceptance. This 'bottom-up' approach can ensure that the perspectives and needs of the community are integrated into the decision-making process.

7.3. External Coordination and Vertical Integration

The CAP outlines a range of strategies that call for substantial efforts towards both climate mitigation and adaptation. However, all sectoral responsibilities are not solely with the DSCC. As observed during the rapid strategic appraisal process, there are several external authorities and agencies who are responsible for different sectors. Therefore, implementation of the CAP strategies cannot be completed solely by the DSCC; it requires close coordination and cooperation with various external public institutions, including DWASA, RAJUK, DTCA, DPDC, SREDA, and others.

In the light of this collaborative approach, the DSCC, along with the DNCC, will establish a High-Level CAP Advisory Committee to steer the process. This committee would comprise decision-makers and higher-level officials from these key agencies. Its primary purpose is to offer strategic guidance, harmonise priorities among the various agencies and expedite project implementation. To further enhance its capabilities and ensure comprehensive input, the committee may also include subject matter experts, industry leaders, and representatives from civil society organisations (CSOs). Essentially, the High-Level CAP Advisory Committee should be common to both the DSCC and the DNCC to facilitate better-coordinated implementation of CAP interventions and emission reduction targets that require concerted efforts of DNCC, DSCC and concerned sector's line departments.

Table 18: List of Agencies to be Involved for Each Urban System under CAP[197]

Sectors	Sub-sectors	Internal Departments (DNCC)	External Agencies (Ministry, Department, Agency, NGO, Individuals) 2050
Water Supply System		**Lead:** Department of Engineering **Co-lead:** Department of Urban Planning	DWASA, Rajdhani Unnayan Kartripakkha (RAJUK)
Drainage System		**Lead:** Department of Engineering **Co-lead:** Department of Urban Planning	DWASA, RAJUK, Department of Disaster Management (DDM), Department of Fire Service and Civil Defence
Waste Water System		**Lead:** Department of Engineering **Co-lead:** Department of Urban Planning	DWASA, RAJUK
Solid Waste Management		**Lead:** Department of Solid Waste Management **Co-lead:** Departments of Urban Planning, Engineering, Social Welfare and Slum Improvement	Department of Environment (DoE), NGOs, Solid Waste Management Expert
Transport	Public and Private Transport	**Lead:** Department of Transportation **Co-lead:** Urban Planning, Law	Bangladesh Road Transport Corporation (BRTC), Bangladesh Road Transport Authority (BRTA), Dhaka Transport Coordination Authority (DTCA), Dhaka Metropolitan Police (DMP)
	Non-motorised Mobility and Infrastructure	**Lead:** Department of Transportation **Co-lead:** Departments of Urban Planning, Law	Dhaka Transport Coordination Authority (DTCA), Dhaka Metropolitan Police (DMP), NGOs, Transport and Mobility Expert

[197] ICLEI South Asia

Sectors	Sub-sectors	Internal Departments (DNCC)	External Agencies (Ministry, Department, Agency, NGO, Individuals) 2050
Energy	Electricity/Power	**Lead:** Department of Engineering **Co-lead:** Department of Urban Planning	DPDC, SREDA
	Building and Infrastructure	**Lead:** Department of Engineering **Co-lead:** Department of Urban Planning	RAJUK, DPDC, SREDA
Health System		**Lead:** Department of Health Co-lead: Department of Urban Planning	Public and Private Hospitals, Directorate General of Health Services (DGHS), Institute of Public Health (IPH), Bangladesh Meteorological Department (BMD), Department of Disaster Management (DDM)

In addition to the external government agencies, it is also imperative for the DSCC to coordinate closely with its counterpart, the DNCC. As mentioned above, while there are separate administrative boundaries, the two city corporations share most of their climate challenges and the solutions also need to be jointly implemented for maximum benefit. The CAPs for the DSCC and the DNCC have common targets and goals in a majority of sectors, differing only slightly in some of the sectoral interventions. Particularly, for sectors such as energy and buildings and transport, the targets and goals have been combined for Dhaka city as a whole to be able to address the shared challenges of the two corporations. A majority of the interventions of adaptation for water, drainage, sewerage, and solid waste sectors are also similar for both the corporations. The CAP also identifies many interventions for the energy and transport sectors that are common to both cities and will yield their maximum impact if they can be implemented together. This necessitates that the DSCC and the DNCC coordinate with each other closely and implement solutions in Dhaka with a coordinated effort. The common High Level CAP Advisory Committee can facilitate this coordination.

While it is important and necessary to coordinate with various stakeholders, the DSCC and the DNCC will also collaboratively engage with the national government to integrate CAP implementation projects into national planning and reporting processes. To ensure effective coordination with the national government and ministries, a framework (Figure 34) has been developed to explain the process. The Mayors of the DSCC and the DNCC will contribute to these national platforms based on compiled reviews and progress reports from the internal and external implementing departments.

However, each city corporation will gather necessary information from their respective sectoral departments responsible for implementing sectoral strategies. The Urban Planning Department will compile this information and collaborate with the Climate Core Team and the High-Level CAP Advisory Committee to assess and review progress, which will in turn present the report to the Mayors and CEOs.

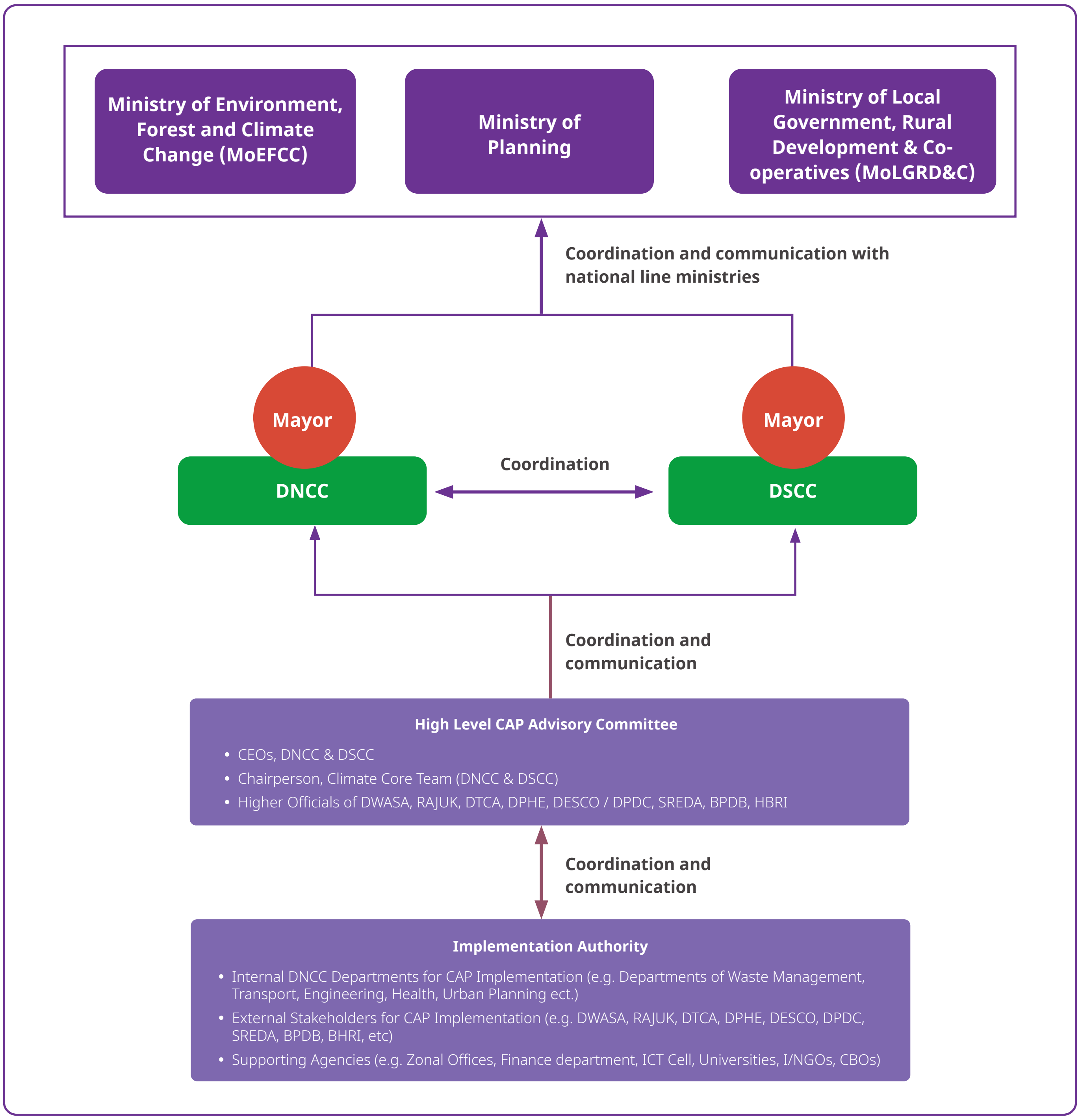


Figure 34: *Framework for Coordinated CAP Implementation by DNCC and DSCC*[198]

[198] ICLEI South Asia

7.4 Legal Framework

In order to foster climate action, supportive local policies can play a vital role. However, in the absence of local policies, the DSCC will utilise national supporting legal and regulatory frameworks for sectoral implementation of CAP. These national acts, laws, and regulations can provide the city with the necessary authority to enforce climate inclusive urban development measures.

The Climate Change Trust Fund Act, 2010 is a significant step of the Government of Bangladesh (GoB) in addressing climate change impacts in the country. The Act formally established the Bangladesh Climate Change Trust Fund (BCCTF) to finance climate adaptation and mitigation projects and programmes in different sectors. A large part of this fund has been allocated to cities for climate action. Some of the other legal and regulatory frameworks are outlined below in Table 20.

Table 19: Regulatory and Legal Frameworks for Different Urban Sectors[199]

Urban Systems	Relevant Acts, Laws and Regulations
Water Supply System	• Local Government (City Corporation) Act, 2009 • Bangladesh Water Act, 2013 • Town Improvement Act, 1953 • Environmental Conservation Act, 1995, 2003 (Amendment) • Environmental Conservation Rules, 1997 • Water Pollution Control Ordinance, 1973 • Urban and Regional Planning Act, 2014
Drainage System	• Local Government (City Corporation) Act, 2009 • Disaster Management Act, 2012 • Standing Orders on Disaster, 2019 • Town Improvement Act, 1953 • Environmental Conservation Act, 1995, 2003 (Amendment) • Environmental Conservation Rules, 2023 • Water Pollution Control Ordinance, 1973 • Urban and Regional Planning Act, 2014
Wastewater System	• Water Pollution Control Ordinance, 1973 • Environmental Conservation Act, 1995, 2003 (Amendment) • Environmental Conservation Rules, 1997 • Water Pollution Control Ordinance, 1973
Solid Waste Management	• Local Government (City Corporation) Act, 2009 • Solid Waste Management Rules, 2021
Transport	• Local Government (City Corporation) Act, 2009 • Road Transport Act, 2018, 2023 (Update) • Dhaka Transport Coordination Authority Act, 2012 • Metrorail Act, 2015 • Bus Rapid Transit Act, 2016 • Bangladesh Urban Transport Authority Act, 2020 (Draft) • Draft DTCA Regulation for Pedestrian Safety, 2021 • Town Improvement Act, 1953 • Urban and Regional Planning Act, 2014

[199] ICLEI South Asia

Urban Systems	Relevant Acts, Laws and Regulations
Energy	• Sustainable and Renewable Energy Development Authority, 2012 • Bangladesh Energy Regulatory Commission Act, 2003
Health System	• Biodiversity Rules, 2012 • Bangladesh Biodiversity Act, 2017 • Air Quality Control Rules, 2012 • Environmental Conservation Act, 1995, 2003 (Amendment) • Environmental Conservation Rules, 1997 • Water Pollution Control Ordinance, 1973

7.5 Mainstreaming Climate Policy

The CAP is closely aligned with and draws inspiration from several national climate change policies and priorities, including the Mujib Climate Prosperity Plan: Decade 2030, the National Adaptation Plan (NAP) of Bangladesh (2023-2050), the Bangladesh Delta Plan 2100, the Nationally Determined Contributions (NDCs) 2021 Bangladesh (Updated) and the Bangladesh Climate Change Strategy and Action Plan, 2009. This alignment is essential, as observed in the rapid strategic appraisal of the city, and ensures that the CAP is firmly rooted in the overarching climate strategies and goals of the nation.

In the course of implementing CAP's sectoral strategies, the DSCC will relook and review the existing sectoral policies to ensure that the CAP projects support and contribute to the national climate discussions. A comprehensive list of available local and national policies is provided in the following table (Table 20).

Table 20: Summary of Relevant Sectoral Policies[200]

Urban Systems	Relevant Policies (National and Local)
Solid Waste Management	**National:** National 3R Strategy for Waste Management, 2010, Bangladesh Climate Change Strategy and Action Plan 2009, Nationally Determined Contributions (NDCs) 2021 Bangladesh (Updated), Mujib Climate Prosperity Plan: Decade 2030 **Local:** New Clean Dhaka Master Plan 2018-2032, Dhaka Structure Plan 2016-2035, Dhaka Detailed Area Plan 2022-2035
Water Supply	**National:** National Water Policy 1999, National Water Management Plan 2001, Bangladesh Delta Plan 2100, National Strategy for Water Supply and Sanitation 2014, Bangladesh Climate Change Strategy and Action Plan 2009, Nationally Determined Contributions (NDCs) 2021 Bangladesh (Updated), Mujib Climate Prosperity Plan: Decade 2030 **Local:** Water Supply Master Plan for Dhaka City 2014, Dhaka Structure Plan 2016-2035, Dhaka Detailed Area Plan 2022-2035
Drainage	**National:** Bangladesh Delta Plan 2100 **Local:** Stormwater Drainage Master Plan for Dhaka City 2015-2040, Dhaka Structure Plan 2016-2035, Flood Risk Management in Dhaka: A Case for Eco-Engineering Approaches and Institutional Reform 2018, Dhaka Structure Plan 2016-2035, Dhaka Detailed Area Plan 2022-2035

200 ICLEI South Asia Analysis

Urban Systems	Relevant Policies (National and Local)
Transport	**National:** National Integrated Multimodal Transport Policy 2013 **Local:** RSTP/Strategic Transport Plan for Dhaka (Urban Transport Policy) 2015, Sustainable Urban Transport Index for Dhaka, Bangladesh 2018, Dhaka Structure Plan 2016-2035, Dhaka Detailed Area Plan 2022-2035
Energy and Power	**National:** Energy Efficiency and Conservation Master Plan up to 2030, National Energy Policy, 2004, Renewable Energy Policy, 2008, Bangladesh Climate Change Strategy and Action Plan (BCCSAP) 2009, Nationally Determined Contributions (NDCs) 2021 Bangladesh (Updated), Mujib Climate Prosperity Plan: Decade 2030 **Local:** Dhaka Structure Plan 2016-2035, Dhaka Detailed Area Plan 2022-2035
Health	**National:** National Urban Health Strategy 2020, National Environmental Policy 1992, National Environmental Management Plan 1995 **Local:** Dhaka Structure Plan 2016-2035, Dhaka Detailed Area Plan 2022-2035
Wastewater	**National:** Bangladesh Standards and Guidelines for Sludge Management, 2015 **Local:** Sewerage Master Plan for Dhaka City 2010-2035, Dhaka Structure Plan 2016-2035, Dhaka Detailed Area Plan 2022-2035

To efficiently implement the CAP, DSCC will endeavour to introduce climate budgeting into its internal financial framework. This involves prioritising projects and programmes from the CAP and allocating funds for their implementation. The DSCC's Finance Department will actively engage in this process to ensure that adequate financial provisions are made within the city's annual budget.

The DSCC will follow the process outlined below to ensure effective mainstreaming of the CAP in Corporation Budget:

- **Needs Assessment and Prioritisation:** Conduct comprehensive needs assessments to identify and prioritise any projects and programs from the CAP that require financial support.
- **CAP Alignment:** For projects and proposals not included in the CAP, ensure alignment with the objectives and goals of the CAP, and as well as the mitigation targets.
- **Financial Evaluation:** Estimate the financial requirements for each identified project and program, considering all relevant costs, including capital, operational and maintenance expenses.
- **Engagement of Relevant Departments:** Collaborate with sectoral departments and committees of the DSCC to ensure the execution of the CAP strategies.
- **Development of Proposal (DPP):** Compile the Development Project Proposals (DPP), detailing the objectives, expected outcomes and budgetary needs. Each proposal should specify how the project contributes to climate resilience and net zero targets in Dhaka South.
- **Budget Allocation:** Once the proposals are approved, funds may be allocated from the DSCC's annual budget to the selected projects and programs. This budget allocation should reflect the DSCC's commitment to climate action and mitigation targets.
- **Periodic Evaluation:** Conduct periodic evaluations to assess the impact and effectiveness of the projects thus funded. Adjustments can be made based on the performance of each initiative to the next Fiscal Year (FY).

Apart from the internal fund, the DSCC can also seek external national and international funds. For the successful implementation of the CAP, the DSCC will actively explore external funding sources. This can be achieved through collaboration with various stakeholders, including the public and private financing institutions (BCCTF, PKSF, IDCOL), bilateral partners (JICA, USAID, GIZ, KfW, AFD) and multilateral agencies (EU, ADB, World Bank)

To augment the city's climate finance resources using international sources of funding, the DSCC will keep abreast of international calls for proposals and grant opportunities. By participating in these initiatives, it can access funds designated for climate-resilient urban development. Collaborating with international climate organisations and networks can further enhance DSCC's chances of securing funding for CAP implementation.

A system for monitoring and evaluation of the CAP implementation process in the city is outlined in the next chapter.

7.7. Communication and Engagement

Having a strong communication plan and mechanism will help the Climate Core Team to coordinate and direct all activities related to the implementation of the CAP.

- **Internal Communication Process:** The internal communication process for the CAP involves the Mayor, Chief Executive Officer (CEO), Climate Core Team and representatives from the sectoral departments. Various communication tools can be utilised, such as email, phone calls, text messaging/ WhatsApp messages, interdepartmental letters, and formal face-to-face meetings.

- **External Communication Process:** The High-Level CAP Advisory Committee can facilitate the external communication with external stakeholder agencies. The High-Level CAP Advisory Committee will also provide a platform for engagement and communication among different agencies largely responsible for different sectors that are part of the CAP. Regular meetings of this Committee will ensure transparency in the implementation process of the CAP. Communication with different agencies can be with various communication tools, and organising regular annual or bi-annual meetings.

One of the most important elements of the external communication process is the launch of the CAP and its publication for the general public. The current CAP document will be available on the DSCC's website. In order to communicate with the general public on the CAP implementation process, the Urban Planning Department will provide information on different activities undertaken by DSCC on a half yearly basis through newspaper articles and on the DSCC website. In addition, once a project is planned to be implemented, the sectoral departments will engage with the public through consultations using existing platforms such as the Ward Level Committees to inform the public about such interventions and encourage their participation in the process. The Urban Planning Department will develop a communication plan in consultation with the Climate Core Team and regularize their participation in Ward Level Committee meetings for engagement with the public.

7.8. Internal Capacity Building to Reduce Resource Challenges

To enhance the capacities of the DSCC's internal team, it will engage local climate professionals for short-term skill development. However, recognising the importance of long-term capacity building, the DSCC will proactively plan and coordinate an array of training programs, workshops, and hands-on sessions for its staff. These initiatives should target not only the technical staff but also extend to administrative and political leadership.

The DSCC may establish a dedicated "Training Cell" to serve as a hub and systematically manage these capacity-building activities. The DSCC will ensure that climate change as an important topic/module is included into their existing monthly/annual training calendars. Experts from universities, research institutions, non-governmental organisations (NGOs) may be invited as external trainers to ensure gathering of timely information.

In the spirit of knowledge exchange, individuals who participate in national and international workshops and training sessions facilitated by the DSCC can play a significant role as knowledge disseminators. They can share the insights and skills gained during these external training experiences by conducting internal seminars or training sessions. The proposed "Training Cell" can act as an enabler, supporting and coordinating these internal knowledge-sharing activities.

8. Monitoring and Evaluation Framework

Effective monitoring, evaluation, and reporting are essential to the success of any action. Achieving these objectives requires a structured approach that revolves around two key pillars. Firstly, it is necessary to establish a structured mechanism for information inputting and receipt through an automated system involving relevant stakeholders. Secondly, this data has to be assembled, collated, integrated, interpreted, and translated into actionable insights to assess progress toward set goals or to identify opportunities for course correction. Implementing these two fundamental pillars will enable the DSCC to make informed decisions, identify areas of improvement, and achieve their targets effectively. By adopting a structured approach to monitoring, evaluation, and reporting, the DSCC can increase the likelihood of achieving their objectives of the CAP.

The monitoring process involves keeping track of activities and progress to ensure that the CAP is being implemented as per the plan. For this, each department of the DSCC needs authorisation from the Mayor's or CEO's Office to be able to carry out activities and will have to report regularly on the outcomes and outputs of the action, through specific data collection formats. These formats can be developed by the Urban Planning Department, in consultation with the Climate Core Team and the High-Level CAP Advisory Committee and used for review and monitoring of the CAP.

In order to implement any development action, each sectoral department can identify their requirements in discussions with the Department of Urban Planning and request approval for such action from the mayor's office or the CEO's office. Once such approval is granted, and funds sanctioned, the activity can be implemented. Ideally, the plan approved by higher authorities should be made available for review and monitoring as needed. Once the action is implemented and outcomes or outputs are visible, each sectoral department should submit information in specific data collection formats, prepared by the Climate Core Team, to identify if such actions are actively contributing to the CAP goals and targets. Since all development activities may or may not contribute actively to the CAP goals and targets, the data should be submitted by the sectoral departments for relevant projects only.

For effective monitoring and transparent reporting of the progress of the CAP implementation, the DSCC will adopt the following approach:

- **Use the Climate Core Team as a Monitoring Cell:** The Climate Core Team will act as a "CAP Monitoring Cell". All monitoring responsibilities of the DSCC's sectoral departments and frequencies should be determined at the beginning of any project planning, through a Terms of Reference (ToR). Primarily, the members will track the progress of the CAP implementation, as well as contribution of other projects to the CAP goals and targets. The progress report should be shared with the High-Level CAP Advisory Committee on a half-yearly basis.

- **Following up Sectoral Key Performance Indicators (KPIs):** A list of "Sectoral Key Performance Indicators (KPIs)" has been added later in this chapter to develop periodic reports based on each target and indicators. To achieve this, the Urban Planning Department will coordinate with the internal departments of the DSCC and external stakeholders (relevant for CAP implementation). The Urban Planning Department will identify the key performance indicators for each sector, against which the sectoral department officials can report on a regular basis, for monitoring of the CAP. The regularity of reporting will depend on the duration of the project and the requirement of different climate action targets identified

- **Ensure Frequent Data Collection:** It is important to collect transparent data and information to develop the KPI reports. The DSCC's Zonal Offices and ICT Cell should support the collection of local level data.

- **Internal and External Reporting:** It is envisaged that the progress of CAP implementation is reported to the Ministry of Environment, Forest and Climate Change (MoEFCC) of GoB so that it contributes to the national reporting system. The DSCC can report their efforts to the United Nations Framework Convention on Climate Change (UNFCCC) through either the Ministry or various international reporting platforms, such as the CDP-ICLEI track, in which the DSCC is already participating.

It is also envisaged that the CAP is a dynamic document that will be reviewed and updated on a regular basis by the DSCC. The main steps of updation of the CAP is outlined:

Review and Analyse: The Urban Planning Department of the DSCC will review the baseline data and GHG emissions inventory every 5 years with the support of the Climate Core Team. It will help to enhance data collection sources, optimise the inventory and identify GHG mitigation opportunities. The data needs to be assessed/analysed to incorporate new information, update baseline data and evaluate both mitigation and adaptation actions with due consideration to the changing ground realities.

Evaluation: To ensure that the CAP is effectively implemented, and its goals are achieved, the Urban Planning Department should conduct a periodic and comprehensive review of its implementation. This review will help to find areas for improvement, and new opportunities and priorities that will enable the team to take necessary actions to achieve the goal of the CAP. This review will be conducted on a half-yearly cycle for monitoring the overall progress of the CAP implementation. This half yearly review will be reported to the Climate Core Teams of the two corporations and High-Level CAP Advisory Committee jointly by the DSCC and the DNCC.

Update and Revise: Though the CAPs are separate for the DSCC and the DNCC, collectively, the entire set of targets is applicable to Dhaka city. It is essential to follow a unified approach for reviewing and updating the CAP simultaneously and jointly for the two corporations, at least at the end of each planning horizon and at least, every 5 years. This ensures alignment with new priorities for the entire Dhaka city and with the targets set for 2030, 2040 and 2050 in the present CAP document. Technology advancement in issues connected to climate change, any changes in national and sub-national priorities, guidelines, targets and programs will also be taken into account during this process.

In addition to the above-mentioned approach of monitoring and evaluation, it is also important for the city to be able to monitor their overall emissions reductions and climate risk reduction (along with the wider benefits) in the city. The Urban Planning Department, with the support of the Climate Core Team, will play a crucial role in this assessment. It is envisaged that, with the mandate from the mayor's office, the Urban Planning Department will coordinate with the different departments and relevant government agencies that are implementing the CAP interventions to understand the impacts of these projects as mentioned above.

The implementation of the CAP interventions and their impacts on emissions reduction and on improving climate resilience impacts will be recorded through the KPIs listed below. A cumulative assessment of the emissions reduction can be conducted on a yearly basis and reported to the High-Level CAP Advisory Committee for informed decision making on allocation of budget in different sectors for greater emission reduction. However, over and above the KPIs, it is envisaged that the Climate Core Team ties up with local universities to carry out assessments of climate risks and vulnerability assessment of the populations within Dhaka city, to understand any changes in the level of risks. Several institutes in Dhaka like Dhaka University and Bangladesh University of Engineering and Technology regularly carry out climate vulnerability assessments and students from these universities may be engaged to monitor the impact of the DSCC resilience interventions that are implemented in the city. This can also help the city to understand co-benefits of different CAP interventions that may help to achieve SDGs and city-wide development goals along with climate benefits. For instance, a project that encourages green area development will not only manage the micro-climate and provide a localised cooling effect, but also serve as a carbon sink in the city as well as provide space for community gatherings and recreation for children and others.

8.1. Sectoral Key Performance Indicators

This CAP identifies a set of KPIs, relevant data points and information sources for each sector as per the mitigation and adaptation actions, outlined in sections 6.3.1 to 6.3.7, to help track progress towards sectoral goals and targets. As noted above, the Climate Core Team will be responsible for identifying the KPIs for each sector and action as per internal and external data sources and for collecting and compiling the data to report semi-annually and track progress of various climate actions. The internal sources include the various departments of the DSCC, and the external data sources include the various national and sub-national government bodies. While an indicative list is provided in the CAP, this list is by no means comprehensive, and the Climate Core Team should regularly review and revise these KPIs as they deem fit.

Table 21: List of KPIs[201]

Action	KPI
Water Supply	
Reduction of Non-Revenue Water	• Percentage of water distribution network with sensors installed • Percentage reduction of identified Unbilled Authorised Consumption • No. of houses with smart water meters • Percentage reduction of leaks in the pipe supply in a year • Water audits completed in a year • Percentage reduction in NRW
Promotion of Rainwater Harvesting (RWH) systems	• Number of residential, commercial, industrial complexes with rainwater harvesting systems • Number of RWH systems with regular maintenance
Promotion of Climate proof infrastructure	• Number of water treatment or pumping stations with renewable energy use or energy efficient pumps used. • Number of energy audits conducted for WTPs • Number of DTWs serviced in the year
Increase the Use of Surface Water	• Percentage of surface water in total water supply • Percentage increase in capacity of surface WTPs • Number of waterbodies rejuvenated per year (type of interventions implemented)
Ensure access to safe and clean water for all citizens	• Increase in percentage of HHs with 24x7 water supply • Percentage of households in low-income communities, migrant settlements, and slum areas with access to a safe and reliable water supply • Percentage of new construction with dual plumbing • Percentage increase in number of industries and commercial consumers reusing treated wastewater • Percentage increase in the number of households in marginalised communities gaining access to safe water compared to a baseline period. • Percentage of household income spent on water bills • The reduction in waterborne diseases
Establish effective water resource management	• Policy for RWH systems • Policy for renewable energy use in WTPs • Policy for water conservation
Stormwater Drainage System	
An efficient stormwater management system to prevent pluvial flooding	• Number of public awareness campaign • Policy to prevent waste disposal in drains • Flood response plan in place

[201] ICLEI South Asia

Action	KPI
Conservation and restoration of khals	• Percentage of total number of natural drains rejuvenated in the city • Number of encroachments removed from khals • Percentage of increase in storm water network coverage
Establishment of an Early Warning System	• Percentage of increase in flood sensors deployed and utilisation of flood early warning system through SCADA
Enhancement of footpath and permeable surface	• Percentage of newly constructed footpaths with permeable surfaces
Waste Water System	
Improve the collection, scientific disposal, and treatment of the sewage	• Percentage of sewerage collected and treated properly • Percentage increase of anaerobic treatment capacity • Percentage of new sewerage network added to centralised system
Enhance the Capacity of Scientific treatment and disposal of Waste - Augmentation of wastewater treatment facility through promotion of centralised and decentralised wastewater management	• Percentage increase in length of new sewerage network • Percentage increase of efficacy of STPs • Number of new STPs set up • Percentage increase in utilisation capacity of improved STP • Percentage increase in installed capacity of tertiary treatment plants • Percentage of tertiary treated water reused (by consumer type and purpose) • Percentage increase in total number of buildings with decentralised wastewater treatment • Total number of STPs with mechanised dewatering systems installed with capacity • Total number of Faecal Sludge Treatment Plants established. • Percentage increase in number of DeWATS in institutional, residential and commercial complexes. • Percentage of gas recovered from anaerobic facilities • Number of treatment plants with solar power or renewable sources of power. • Percentage of sludge treated in sludge hygienisation plant
Access to toilet for all	• Percentage of population practising open defecation • Percentage of population with unsafe toilets • Percentage of toilets with safe disposal of sewage in septic tanks.
Treatment of wastewater and sludge by adopting efficient and scientific treatment technology	• Percentage of old sewerage network replaced with new network • Percentage efficacy of STP increased • Percentage of improved STP utilisation capacity • Percentage of capacity of anaerobic treatment increased • Increase in installed capacity of tertiary treatment plants • Quantity of tertiary treated water reused (by consumer type and purpose)

Action	KPI
Improved performance management of wastewater treatment facilities	• Proportion of wastewater treated through o Aerobic method o Anaerobic method • Quantum of biogas captured through o Aerobic method o Anaerobic method • Total no of decentralised facilities for o Aerobic o Anaerobic • Total no of centralised facilities o Aerobic o Anaerobic
Enhancing sewerage management system	• Policy for treated water reuse • Desludging plan for the city • Number of training and capacity building events
Solid Waste Management	
Waste reduced or recycled before being sent to the DSCC's solid waste stream.	• Total number of awareness campaign, social media campaign, print media campaigns for public awareness • Percentage of reduced quantity of waste generated per capita • Proportion of households segregating waste • Proportion of households practicing 3R policy
Segregated waste collected and transported	• Increased percentage of segregated waste collection from source • No of houses with door-to-door collection • Presence of route rationalisation plan for collection vehicles • Number of waste workers per 1000 population • Increase in waste collection efficiency • Percentage or quantity of segregated waste collection (by type)
Promotion of decentralised waste processing facilities in the city	• Percentage of C&D waste recycled • Percentage of e-waste recycled • Percentage of plastic waste recycled. • Percentage of organic waste composted • Percentage of organic waste processed by biomethanation
Promotion of a Centralised Waste Management Facility	• Percentage of waste processed through biomethanation or RDF facilities

Action	KPI
Scientific Treatment and Disposal – landfill with gas capture and scientific waste processing infrastructure	• No. of sanitary landfills • Quantum of waste disposed in scientific manner in the sanitary landfill • Quantum of methane captured • Percentage of landfill gas captured • Percentage reduction in waste going to landfill • Percentage of compost sold or utilised per year • Percentage of gas disposed in treatment facility • Total no. of decentralised facilities for o Dry waste o Wet waste • Total no. of centralised facilities for o Dry waste o Wet waste • Quantum of dry waste processed o RDF pelleting o MRF- For recovery of dry recyclables • Quantum of wet waste processed o Composting o Biomethanation • Amount (BDT) of cost recovery o Dry waste o Wet waste
Enhancing sustainable waste management system	• Percentage of roads with no litter • Penalties collected for littering • Percentage reduction of illegal dumping of waste • Percentage of hazardous waste properly managed • Frequency of waste audits
Transportation	
Develop plans and policies to promote faster adoption of EV	• Low carbon transport plan with clear targets and goals prepared • E-mobility framework with enabling policies, norms and guidelines for electric mobility and charging infrastructure notified
Incentivise EV adoption	• Guidelines for accessing carbon credits notified o Quantum of emissions (tCO_2e) traded in the voluntary carbon market • Polices offering financial incentives notified o Amount (BDT) of financial incentives availed
Develop and install EV charging infrastructure	• No. of community EV charging stations (privately owned and operated) • No. of community EV charging stations (publicly owned and operated) • No. of community EV charging stations (PPP / FDI) • Area (sq. km) served per EV charging station

Action	KPI
Develop plans and policies for increased adoption of NMT and public transport	• Transport master plan updated to promote NMT and public transportation o Bicycle master plan promoting trips by bicycles and PBS included therein • NMT street design guidelines notified
Incentivise NMT and public transport	• Amount (BDT) offered in the form of discounted fare • Amount (BDT) of subsidised and low-cost credit accessed for procuring bicycles and other NMT modes
Implement demonstrable pilot projects for further scale up/ replication	• No. of beneficiaries of public bicycle sharing scheme • Length (km) of roads redesigned for the benefit of pedestrians and/or NMT • Mode share of NMT and public transport systems • Ridership on public transport systems during o Peak hours o Non-peak hours
Implement IoT and smart measures to promote public transport	• One stop app for all public transport related services launched o No of monthly impressions on the app o No of ticket sales through the app o Proportion of grievance redressal through the app
IEC measures to promote NMT and public transport	• No. of IEC campaigns launched to increase awareness • No. of people reached • No. of campaigns conducted
Implement traffic management system to reduce congestion	• Proportion of traffic junctions redesigned to promote NMT and/or public transport • Proportion of traffic signals redesigned • No. of traffic personnel per 1000 population
Improve transportation related infrastructure from smoother flow of traffic	• Length (km) of congested stretches redesigned to promote NMT • Length (km) of dedicated freight corridors earmarked/developed • Length (km) of dedicated bus corridors earmarked/ developed • Length (km) of dedicated NMT lanes earmarked/ developed
Prepare policies to eliminate encroachments along Right of Way	• Length (km) of footpaths freed from encroachments • Length (km) of road freed from encroachments • No. of people affected rehabilitated
Promote adoption of better engines for vehicles	• Standards set for vehicle engines and conventional fuel o Proportion of vehicles adhering to engine standards o Proportion of fuel sold which adheres to standards o Proportion of non-compliant vehicles phased out

Action	KPI
Energy and Power	
Advocate to power sector decision-makers and electricity suppliers for more ambitious and faster integration of renewables in Dhaka's power supply to achieve net-zero goals	• Policies drafted/amended to reflect increased RE integration. • Master plans/road maps/action plans identifying clear checkpoints to achieve target
Expand the capacity and adoption of renewable power in the electricity grid	• Installed capacity of RE in grid energy mix • Percentage of renewable electricity in the grid • Quantum of green power procured. • Capex and Opex invested in RE integration • Installed capacity of large-scale aggregated demand/cluster projects
Offer assistance and streamline procedures for private sector and RE developers	• Amendment in rules/policies/guidelines to enable increased private sector participation • Established one-stop clearance window for RE projects o No. of RE projects facilitated through the one stop clearance window • Online platform for RE project documents created No. of RE projects submitted for approval • Technical assistance extended to RE developers
Establish partnerships for research and to implement pilots	• Knowledge incubators fostered in partnership in local, national and international organisations and institutions • Capacity building and knowledge exchange programmes conducted at the local, national and international levels • RE pilots with scale-up potential implemented
Adopt integrated spatial and energy planning at the city-scale and promote renewables through urban development regulations	• Amendments in building regulations to promote RE integration o Installed capacity of such RE integrated buildings • Policies drafted at the DSCC incentivising RE integration • Area earmarked in city master plans for RE projects
Develop a local plan for financing and enabling private investment in large-scale RE projects. Financing options such as public funds, low-interest or concessional loans, climate finance should also be assessed.	• Committee involving all concerned stakeholders like BPDB, DESCO, DPDC, SREDA, RAJUK etc. constituted o No. of meetings convened • Local plans with clear enablers of attracting private investment drafted • Amount (BDT) of public fund leveraged • Amount (BDT) of private investment/no. of PPPs attracted • Amount (BDT) of FDI/international assistance attracted
Identify and implement rooftop solar PV projects in prominent large public, institutional, educational and hospital buildings. Implementation and business models (CAPEX, lease, OPEX/RESCo) can be tested in such projects for further scale-up.	• Installed capacity of pilot rooftop solar PV systems • Capex and Opex invested in pilot rooftop solar PV systems • Installed capacity of aggregated demand/cluster solar PV projects public, institutional, educational and hospital buildings • Percentage of DSCC's assets with solar PVs installed • Mode of implementation

Action	KPI
Establish mandates for rooftop solar PV in large buildings and promote solar-ready rooftops	• Amendments in building regulations to promote solar PV installation and adoption of solar ready rooftops o Installed capacity of such solar PV installations • Policies drafted at ULB incentivising RE integration • Area of solar-ready rooftops
Revisit distributed solar PV guidelines and norms to allow consumers to install higher capacity of solar PV systems (i.e., allow solar PV capacity of up to 70% of the sanctioned electricity load)	• Increased capacity of solar PV systems with respect to per cent of sanctioned load allowed • Amendment in net metering guidelines facilitating increased uptake of solar PV systems • Proportion of residential, commercial/institutional buildings with solar PV installations
Identify a list of rooftops and spaces with solar PV potential and facilitate aggregated deployment	• Proportion of rooftop and land area available for solar PV installation mapped • Installed capacity of aggregated demand/cluster projects in commercial and residential buildings • Installed capacity of floating solar PV projects
Facilitate technical support and access to financing for rooftop solar deployment	• Solar help desk established by SREDA/RAJUK • IEC conducted among commercial, industrial and residential associations on how the solar help desk can offer support on RE adoption • Amount (BDT) of low-cost finance accessed for solar PV • Amount (BDT) public finance leveraged for solar PV • Amount (BDT) of private loans accessed for solar PV
Conduct energy consumption audits and benchmarking	• Benchmarks set to establish optimal levels of energy consumption by buildings • Energy audits conducted to estimate per building energy consumption o No. of buildings audited o No. of buildings successfully achieving benchmarks • Standards set for energy efficient appliances o No. of buildings audited o No. of buildings where appliances adhere to set standards • Electricity consumption by o Residential buildings o Commercial buildings • Certified pool of auditors created o Average no of buildings assessed per auditor • Public recognition programmes established o Proportion of buildings publicly recognised
Promote energy efficiency through building regulations and mandates	• Amendments/ notification mandating switch to LEDs o Proportion of LEDs in residential and commercial buildings • Amendments/ notification mandating use of energy efficient appliances o Proportion of energy-efficient equipment in residential and commercial buildings • Amendments/notifications mandating energy efficiency in building envelopes and design

Action	KPI
Enable access to affordable financing and provide financial incentives to ensure greater energy efficiency adoption	• Program for financing of energy efficient appliances and solutions for low-income households and communities launched • Amount (BDT) of low-cost credit accessed by households, businesses and institutions for energy efficiency measures • Amount (BDT) of financial incentives to enforce green building and efficiency compliance offered
Setup a Sustainable Energy Cell in DSCC to promote and coordinate energy efficiency actions in DSCC's buildings and with different stakeholders at the city-scale.	• Sustainable Energy Cell set up in the DSCC in association with SREDA • Energy efficiency program launched offering assistance and energy audits at lower costs • No. and proportion of existing buildings with energy efficient common utilities • No. and proportion of new buildings with energy efficient common utilities • No. and proportion of large public and private commercial buildings with Building Energy Management Systems
Undertake a public IEC campaign to increase awareness on building and appliance energy efficiency	• No. of IEC campaigns launched to increased awareness on building and appliance energy efficiency • IEC to promote reflective paints and roof materials, green roofs launched • Proportion of households reached • Proportion of commercial units reached
Develop easy to use guidebooks and implement pilots on energy efficient and low-carbon building design and construction	• Practical guidebooks on adoption of green and low-carbon techniques and measures during design and construction of new and existing buildings prepared. • Demonstrable pilot projects in affordable housing showcasing green building and net-zero concepts implemented o No. of beneficiary households/population • Demonstrable pilot projects in private buildings showcasing green building and net-zero concepts implemented o No. of beneficiary households/population
Develop a localised Green Building policy and establish requirements for energy efficient new buildings and those undergoing major renovation in the building regulations that get more ambitious over time	• Mandates for new buildings or mid to large size to be certified green buildings notified • Provisions mandating green building compliance for securing building permits and occupancy notified • Green building policy specific to the city's building stock and local conditions drafted • Provisions promoting green and energy efficient buildings notified in the local general development control regulations and building bye-laws
Build local capacity and facilitate access to local solution providers for green building actions	• Targeted training and certification program on energy efficient construction and buildings launched. No. of personnel trained No. of courses offered • Register of green building vendors including material suppliers and technology/ service providers compiled. • List of empanelled/approved vendors uploaded on the city government's website.
Implement a city-wide Cool Roof program	• Programme for adoption of cool roofs in buildings launched o Roof area covered (sq. m/ sq. ft) o Amount (BDT) of fund leveraged

Action	KPI
Introduce a building renovation program for energy efficiency upgrades for existing buildings	• No. of buildings identified for envelope and energy efficiency retrofit solutions in the short and medium term o No. of buildings where envelope and energy efficiency retrofit solutions have been implemented • No. of buildings identified for envelope and energy efficiency retrofit solutions in the long term o No. of buildings where envelope and energy efficiency retrofit solutions have been implemented
Adoption of sustainable, low-carbon and circular building materials	• Proportion of buildings using locally sourced and certified low-carbon building materials • Proportion of buildings using recycled C&D waste and its products. o Mandates notified for procurement of materials made from C&D waste subject to stringent quality control of such materials. • No. of buildings identified for demolition during monitoring period o No. of buildings deconstructed and disassembled instead of demolished o Guidelines and protocols for deconstruction and disassembly developed.
Promote climate-responsive measures in affordable and informal housing	• Demonstrable pilot projects in affordable housing showcasing green building and net-zero concepts implemented o No. of beneficiary households/population • Pilot projects on cool roofs in affordable housing and low-income communities implemented o No. of beneficiary households and population o Proportion of affordable housing buildings constructed through green procurement
Design and implement monetary and non-monetary measures to promote energy efficient buildings	• Schemes offering financial incentives, and penalties, for better adoption of green and energy efficient buildings. o Proportion of building approvals wherein incentives were claimed o Proportion of building approvals wherein penalties were invoked
Adoption of certified green and net-zero public buildings	• Policies notified mandating adoption of green and net zero buildings • Proportion of green buildings in o Residential sector o Commercial sector • Proportion of net zero buildings in o Residential sector o Commercial sector • Provisions notified mandating compulsory green building and net zero building concept adoption in all government and institutional buildings • Proportion of green buildings among o Government buildings o Institutional buildings • Proportion of net zero buildings among o Government buildings o Institutional buildings

Action	KPI
Develop policies promoting energy efficiency in public buildings and infrastructure	• Green Public Procurement Policy (GPP) notified o Proportion of public buildings undertaking green procurement o Proportion of public facilities undertaking green procurement • Proportion of streetlights converted to LEDs • Proportion of equipment that are energy efficient in public buildings and facilities • Proportion of LEDs in public buildings and facilities • Percentage of DSCC's assets with solar PVs installed
Promote green public and institutional buildings	• Provisions notified mandating compulsory green building and net zero building concept adoption in all government and institutional buildings • Proportion of green buildings among o Government buildings o Institutional buildings • Proportion of net zero buildings among o Government buildings o Institutional buildings
Track energy performance and implement targeted energy efficiency improvement actions in public buildings and facilities	• Electricity consumption by o Public buildings o Public facilities o Institutional buildings • Benchmarks set to establish optimal levels of energy consumption by public buildings and facilities • Energy audits conducted to estimate per public building/facility energy consumption o No. of buildings audited o No. of facilities audited o No. of buildings successfully achieving benchmarks o No. of facilities successfully achieving benchmarks • Standards set for energy efficient appliances o No. of buildings audited o No. of facilities audited o No. of buildings where appliances adhere to set standards o No. of facilities where appliances adhere to set standards
Conduct capacity building and technical studies	• Targeted training programmes for public officials on energy management o No. of training programmes conducted o No. of officials trained • Studies on RE and EE integration in public facilities conducted o Proportion of public buildings covered through these studies o Proportion of public facilities (excluding streetlights) through these studies o Proportion of streetlights covered through these studies
Promotion of energy-efficient public lighting	• Proportion of streetlights converted to LEDs • Proportion of LEDs in public buildings and facilities

Action	KPI
Promotion of clean fuel supply	• Quantum of PNG supplied for cooking • Quantum of LPG supplied for cooking • Quantum of wood/waste used for cooking • Mandates notified to boost electric cookstove supply in the market o Incentives offered to manufacturers/importers o Incentives offered to sellers
Adopt demand side interventions to transition to low-emission fuels	• No. of households only using electric cookstoves • No. of households partially using electric cookstoves • No. of hotels/restaurants and other commercial units only using electric cookstoves • No. of hotels/restaurants and other commercial units partially using electric cookstoves • Quantum of electricity used for cooking in the residential sector • Quantum of electricity used for cooking in the commercial sector • Mandates notified to boost electric cookstove sale o Incentives offered to low-income groups and communities o No. of low-income group beneficiaries o Incentives offered to other residential and commercial groups o No. of residential beneficiaries o No. of commercial beneficiaries • Incentives offered to sellers
Scale-up deployment of rooftop and distributed solar energy and high-energy efficiency solutions in industrial units	• Installed capacity of rooftop solar PV systems in industries o Capex invested in such rooftop solar PV systems • Installed capacity of aggregated demand/cluster solar PV projects in industries • Amendments/ notification mandating use of energy efficient appliances o Proportion of energy efficient equipment in industries o Proportion of LEDs in industries • Amendments/notifications mandating energy efficiency in building envelopes and design o Proportion of industrial buildings adhering green building/net zero building concepts
Promote fuel switch and transition to renewables in industries	• Quantum of PNG used in industrial process • Quantum of electricity used in industrial processes • Electricity consumption by industries • Financial incentives offered to switch to electricity o No. of industries with 100% electrified industrial processes o No. of industries with partially electrified industrial processes o No. of industries with 100% dependency on conventional fuels

Action	KPI
Health Sector	
Prevention and reduction of heat stress and water/vector borne disease	• Percentage increase of heat waves in the city. • Percentage decrease in number of heat-related illnesses and related hospitalisations in the city • Number of insecticide sprays during monsoon • Percentage of population with access to clean and safe drinking water • Percentage of increase in green roofs • Number of cooling shelters set up • Area of green space created
Capacity building of health workers and establishment of an Early Warning System and linked it with the health sector	• Percentage of healthcare professional trained for climate related health challenges • Number of engagement activities with communities • Percentage decrease in response time after disasters • Early warning systems set up for urban floods and heat waves
Access to health care facilities to all citizen	• Number of citizens with access to government health facilities within 1.5 km • Number of health-care centres with renewable energy power supply.

9. Conclusion

The DSCC has demonstrated strong leadership in creating a GHG inventory and developing a science-based CAP that will steer the city towards a Net Zero Emissions future. Advancing towards and Realising its ambitious goals and targets will set an example for other cities, showing that climate action can deliver resilience benefits and reduced GHGs while promoting economic growth and social equity.

The current CAP document has identified the sectoral priorities and listed out both infrastructural and policy/regulatory measures that are required to move towards a net-zero future. However, to implement the CAP, the DSCC needs to set up institutional structures that can help in implementing the actions outlined in the CAP document. While such a structure and a monitoring mechanism are outlined in this document, this document is meant to be kept live and regularly updated as per the changes in the city.

It will not be enough, however, to simply implement the climate actions indicated in this CAP, such as investing in renewable energy and green building solutions, protecting and restoring natural ecosystems, improving drainage and health facilities and so on. It is also essential to foster stakeholder collaboration, build internal capacity, engage with local communities and mobilize financial resources.

Internal Capacity Building: To improve the availability of local climate professionals, the DSCC can involve experienced practitioners for short-term capacity improvement. However, long-term capacity building is crucial, and the DSCC should organize and coordinate training programs, workshops, and hands-on training, addressing not only the technical staff, but also the administrative and political leadership. Leveraging existing training and capacity building initiatives in the country as well as collaborating with technical stakeholders – national and international – can provide a means of increasing local capacity within the DSCC. It should foster collaborative partnerships between universities, research institutions, NGOs, CSOs, and climate focused organisations to build the city's local pool of climate experts.

Green Procurement: The DSCC will consider the creation of a green public procurement policy that can facilitate the use and procurement of pro-climate goods and services such as high energy efficiency appliances and equipment, renewable energy, E-vehicles, certified green and sustainable construction materials for urban infrastructure, among others in public procurement contracts.

Communication to Improve Public Awareness and Engagement: Public awareness and engagement are pivotal for driving climate action. The DSCC must at all stages keep an open channel of communication for all climate related actions that are undertaken. It is not sufficient to simply inform the public regarding the CAP. While implementing the CAP, the DSCC must encourage public participation in decision-making processes, such as through citizen assemblies or consultations, to foster ownership and commitment. At times, a pro-climate action (such as removal of encroachment on a natural drain) may be construed as anti-people. This requires taking a balanced approach and the long-term benefits should be highlighted to encourage public support to such hard decisions.

Financing Climate Action: Substantial financial resources will be required to implement actions and solutions at the necessary scale and advance towards the DSCC's ambitious goals. It is necessary to identify funding opportunities and propose solutions to tap into climate finance mechanisms in order to ensure sufficient support for climate adaptation and mitigation projects. The DSCC must explore innovative financing models such as voluntary carbon credits, green bonds, and public-private partnerships, and can reach out to national and international organisations, private sector entities and experts to design and offer financial support and incentives for implementing climate actions. Grants, funding opportunities, and partnerships can alleviate the financial burden of data gathering, technical analyses, and implementation of solutions.

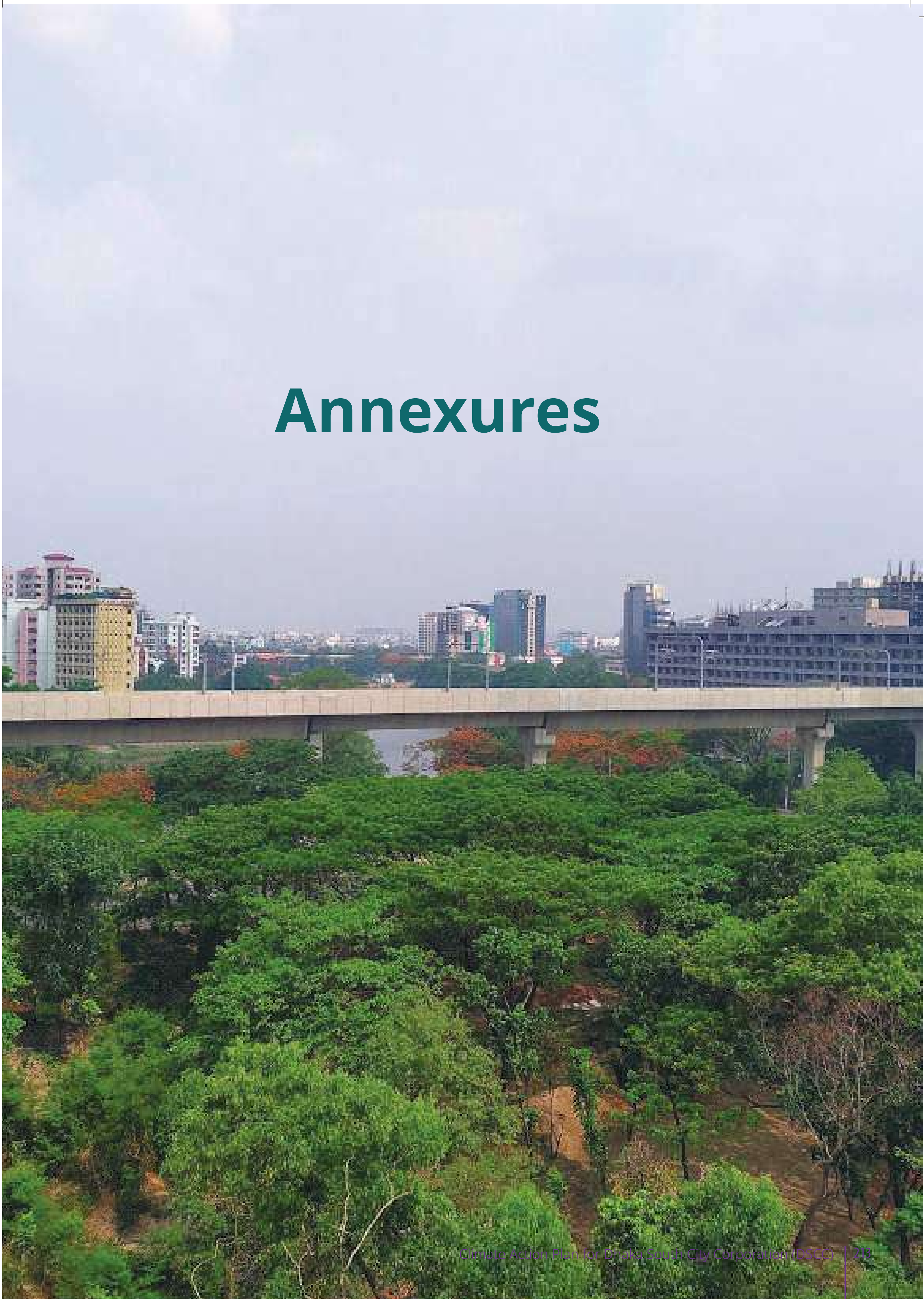
This Climate Action Plan (CAP) has been developed by considering the specific context of DSCC and following the national policies and guidelines such as the 8th five-year plan, National Action Plan (NAP), Detailed Area Plan (2022-2035), Perspective plan 2041, etc. The CAP outlines the key sectoral strategies, implementation policies, and MER guidelines. It provides a guiding framework for the Dhaka South City Corporation (DSCC) based on the scope of services mentioned in the City Corporation Act, 2009, to translate its climate ambition into effective on-ground action.

It is essential to mention that DSCC is already working in various sectors to improve livability, attain climate resilience and create a better city for the dwellers. This CAP is prepared for a period of five years, within which DSCC intends to work based on the scenario developed in the CAP. They will also apply their expertise and resources to build their work-frame. Revisions and updates will be made in the next revised CAP based on practical experience and field observations.

This CAP provides a guiding framework for the DSCC to seize the opportunity and translate its climate ambition into effective on-ground action.

This Climate Action Plan (CAP) has been developed by considering the specific context of DSCC and following the national policies and guidelines such as the 8th five-year plan, National Action Plan (NAP), Detailed Area Plan (2022-2035), Perspective plan 2041etc. The CAP outlines the key sectoral strategies, implementation policies, and MER guidelines and provides a guiding framework for the Dhaka South City Corporation (DSCC) based on the scope of services mentioned in City Corporation Act, 2009 to translate its climate ambition into effective on-ground action.

It is important to mention that DSCC is already working in various sectors to improve livability, attain climate resilience and create a better city for the dwellers. This CAP is prepared for a time period of five years, within which DSCC intends to work based on the scenario developed in the CAP. They will also apply their expertise and resources to develop their own work-frame. Revisions and updates will be made in the next revised CAP based on practical experience and field observations.



Annexures

Annexure 1

ঢাকা দক্ষিণ সিটি কর্পোরেশন
DHAKA SOUTH CITY CORPORATION
নগর ভবন, ঢাকা-১০০০।

"শেখ হাসিনার মূলনীতি
গ্রাম শহরের উন্নতি"

সূত্র: 46.207.000.14.00.349.2022.324(7) তারিখ: 13/11/2022

To,
Emani Kumar
Deputy Secretary General of ICLEI Global,
and Executive Director of ICLEI South Asia.

Subject : Collaboration between DSCC & ICLEI- Local Governments for Sustainability, South Asia (ICLEI South Asian Secretariat) to develop "Climate Action Plan".

Dear Emani Kumar,

Dhaka South City Corporation has acknowledged and accepted C40 and ICLEI South Asia teams propositions for forming a core team and providing seating arrangements for two (02) staff. In this regard, kindly find the following table comprising the members of the core team:

Sl. No.	Name & Designation	Position in Core Team	DSCC Department
1.	MD. Sirajul Islam Chief Town Planner	Chairperson	Urban Planning Department
2.	Fatima Kabir Sharna Assist. Town Planner	Project Nodal Officer	Urban Planning Department
3.	MD. Nazrul Islam Kazi Assistant Engineer	Member (e.g from Water Supply Department)	Environment, Clemate and Disaster Management Circle.
4.	Ibrahim Khalil Assist. Engineer (Mechanical)	Member (e.g Conservancy Department)	Waste Management Department
5.	Kazi Nur Kowser Assist. Town Planner	Member	Urban Planning Department

The sitting arrangement has also been arranged in the "Urban Planning Department, DSCC". You are welcome to conduct the next steps from your end for the preparation of the "Climate Action Plan".

13/11/22

Md. Sirajul Islam
Chief Town Planner
Dhaka South City Corporation
Phone-02-223357055.

C.C
1. Secretary, DSCC.
2. PS to honorable Mayor, DSCC.
3. Kazi Nur Kowser, Assist. Town Planner, DSCC
4. Fatima Kabir Sharna, Assist. Town Planner, DSCC.
5. MD. Nazrul Islam Kazi, Assistant Engineer, DSCC.
6. Ibrahim Khalil, Assist. Engineer (Mechanical), DSCC.
7. Office Copy.

Annexure 2

List of Stakeholders
Dhaka South City Corporation (DSCC)

Sl. No.	Name of the Organisation	Name of the Official/ Department	Contact Details
Government (National, Local/City/Trustee/Autonomous)			
1.	Ministry of Environment, Forest and Climate Change (MoEFCC)	Office of the Secretary	Will be nominated by Secretary's Office based on our request/letter.
2.	Department of Environment (DoE)	1. Mirza Shawkat Ali, Director (Climate Change & International Convention) 2. Md. Ziaul Haque, Director	1. **Email:** mirzasa1@yahoo.com, mirza@doe-bd.org, dircc@doe.gov.bd 2. **Email:** zia@doe.gov.bd, zhaque27@gmail.com
3.	Bangladesh Planning Commission (BPC), Ministry of Planning	General Economic Division Programming Division	Will be nominated by both offices based on our request/letter. The initial contact is Dr Nurun Nahar, Joint Chief, Programming Division **Email:** n.nurun@gmail.com
4.	Power Division, Ministry of Power, Energy and Mineral Resources	Office of the Director General (DG), Power Cell	Will be nominated by DG of Power Cell. Contact details of DG: Mohammad Hossain **Email:** dg@powercell.gov.bd 5Q.A. Sharhan Sadique Deputy Director (Sustainable Energy & SDG) and Director (Sustainable Energy), Additional Charge **Email:** dd.sus@powercell.gov.bd
5.	Sustainable and Renewable Development Authority (SREDA)	Farzana Mamtaz, Member (Additional Secretary), Energy Efficiency & Conservation	Further nomination can come through the Member of SREDA. **Email:** member.eec@sreda.gov.bd
6.	Dhaka South City Corporation (DSCC)	Honorable Mayor, Chief Executive Officer, Heads of Sectoral Department and the members of Climate Core Team	The initial contact persons are Chairperson and Focal Person of the Core Team.

Sl. No.	Name of the Organisation	Name of the Official/ Department	Contact Details
7.	Rajdhani Unnayan Kartripakkha (RAJUK)	Planning Wing of RAJUK Head Office And appropriate Zonal Offices fall in DSCC area.	Will be nominated by RAJUK based on our request/ letter. The initial contact person is: Md. Ashraful Islam Town Planner and Project Director, Dhaka Detailed Area Plan (DAP) **Email:** dirtp@rajukdhaka.gov.bd
8.	Dhaka Water Supply and Sewerage Authority (Dhaka WASA)	Office of the Managing Director (MD) And appropriate Zonal Offices/ Modes fall in DSCC area.	Will be nominated by WASA Head Office based on our request/letter. The initial contact person is: Engr. Taqsem A Khan Managing Director, Dhaka WASA **Email:** taqsem@yahoo.com
9.	Local Government Engineering Department (LGED)	1. Gopal Krishna Debnath, Additional Chief Engineer & Director (Additional Chief Engineer) (Deputation), Climate Resilient Local Infrastructure Center (CReLIC) 2. S.M. Nazrul Islam, Project Director, Climate Resilient Inclusive Smart Cities (CRISC)	1. **Email:** ace.climate@lged.gov.bd, gopal_fkr@yahoo.com
10.	Palli Karma-Sahayak Foundation (PKSF)	Dr. Fazle Rabbi Sadeque Ahmed, Deputy Managing Director	**Email:** frsa1962@yahoo.co.uk,
11.	National Housing Authority (NHA)	Md. Shahjahan Ali, Chairman (In Charge)	The initial invitation can go to the Chairman's office. Further nomination can expect from the Planning, Design and Project Wing of NHA. They have zonal offices in Dhaka. Therefore, they can nominate zone-based officials. **Email:** chairman@nha.gov.bd
12.	Bangladesh Road Transport Authority (BRTA)	Nur Mohammad Mazumder, Chairman	The initial contact can go to the Chairman's office with a request to nominate appropriate official(s). **Email:** chairman@brta.gov.bd
13.	Dhaka Transport Coordination Authority (DTCA)	Shabiha Pervin, Executive Director	Further nomination can come from the ED office based on our request/letter. **Email:** ed@dtca.gov.bd

Sl. No.	Name of the Organisation	Name of the Official/ Department	Contact Details
14.	Department of Public Health Engineering (DPHE)	Md. Sarwar Hossain, Chief Engineer	Further nomination can come from the CE's office based on our request/letter. **Email:** ce@dphe.gov.bd
15.	Department/Ministry of Disaster Management and Relief	Md. Mijanur Rahman, Director General (DG)	Further nomination can come from the DG's office based on our request/letter. **Email:** dg@ddm.gov.bd
16.	Urban Development Directorate (UDD)	Dr. Khurshid Zabin Hossain Taufique, Director	Further nomination can come from the Director's office based on our request/letter **Email:** director.UDD1965@gmail.com, bdutpal@gmail.com
17.	Department Fire Service and Civil Defense	Brigadier General Md Main Uddin, BSP (Bar), ndc, psc, G, M phil. Director General (DG)	Further nomination can come from the DG's office based on our request/letter. **Email:** dg@fireservice.gov.bd
18.	Infrastructure Development Company Limited (IDCOL)	1. Alamgir Morshed, Executive Director & CEO 2. Mafruda Rahman, Assistant Vice President, Green Climate Fund	Further nomination can come from the ED's office based on our request/letter. **1. Email:** amorshed@idcol.org **2. Email:** mafruda@idcol.org
19.	Institute of Water Modelling (IWM)	Md. Tarikul Islam, Head of Climate Change Cell	**Email:** mti@iwmbd.org
20.	Centre for Environmental and Geographic Information Services (CEGIS)	Malik Fida A Khan, Executive Director	**Email:** mkhan@cegisbd.com
Local NGOs/CBOs/Donors/Development Partners			
21.	BRAC International	Dr Md. Liakath Ali, Director of Climate Change Programme	**Email:** liakath.ali@brac.net
22.	UNDP	A. K. M. Mamunur Rashid, Climate Change Specialist	**Email:** mamunur.rashid@undp.org
23.	ADB	Mousumi Pervin, Senior Climate Change Officer	**Email:** mousumi.pervin@abd,org
24.	World Bank	Nadia Sharmin, Senior Environmental Specialist	**Email:** nadia.sharmin@worldbank.org
25.	Center for Participatory Research and Development (CPRD)	Md Shamsuddoha, Executive Director	**Email:** m.shamsuddoha@hotmail.com

Sl. No.	Name of the Organisation	Name of the Official/ Department	Contact Details
26.	Asian Disaster Preparedness Centre (ADPC)	Mr. Rouf Mohammad Abdur, Country Project Lead	**Email:** abdur.rouf@adpc.net
27.	Care Bangladesh	Palash Mondal, Advisor – Climate Change Adaptation	**Email:** palash.mondal@care.org, palash.shuvo@gmail.com
28.	GIZ Bangladesh	Mohammad Hamidul Islam Chowdhury, Officer Responsible for Commission, CRISC Project	**Email:** hamidul.chowdhury@giz.de
29.	Global Centre on Adaptation (GCA)	Shaikh Muhammed Mehedi Ahsan, Country Manager	**Email:** mehedi.ahsan@gca.org, mehedi.ahsan2025@gmail.com
30.	International Centre for Climate Change and Development (ICCCAD)	Prof. Dr Saleemul Huq, Director	**Email:** saleemul.huq@icccad.org
31.	International Union for Conservation of Nature (IUCN)	Raquibul Amin, Country Representative	**Email:** raquibul.amin@iucn.org
32.	Bangladesh Centre for Advanced Studies (BCAS)	Dr. Atiq Rahman	**Email:** atiq.rahman50@gmail.com,
33.	Center for Natural Resource Studies (CNRS)	M Mokhlesur Rahman PhD, Executive Director	**Email:** mokhles@cnrs.org.bd, mokhles_cnrs@yahoo.com
34.	Christian Commission for Development in Bangladesh (CCDB)	Md. Ashrafuzzaman Khan, Acting Coordinator, Climate Technology Park	**Email:** ashraf@ccdbbd.org
35.	Practical Action	Uttam Kumar Saha, Strategic Lead- Urban & Energy	**Email:** uttam.saha@practicalaction.org.bd
36.	Nature Conservation Management (NACOM)	S.M Munjurul Hannan Khan, Executive Director	**Email:** munjurulkhan@gmail.com,
37.	Centre for Urban Studies (CUS)	Initial contact Professor Nazrul Islam, Chairman, CUS	Further nomination can come from the Chairman's office based on our request/letter. **Email:** cus@dhaka.net
Associations			
38.	Municipal Association of Bangladesh	Dewan Kamal Ahmed, President	**Email:** mab_2003@yahoo.com
39.	Bangladesh Institute of Planners (BIP)	Mohammad Fazle Reza Sumon, President	**Email:** sumon93ku@gmail.com

Sl. No.	Name of the Organisation	Name of the Official/ Department	Contact Details
40.	Institute for Planning and Development (IPD)	Dr Adil Muhammad Khan, Executive Director	**Email:** adilmk@juniv.edu
41.	Bangladesh Poribesh Andolon (BAPA)	Initial contact Sultana Kamal, President	Further nomination can come from the President's office based on our request/letter. **Email:** bapa2000@gmail.com; info@bapa.org.bd
42.	Bangladesh Environmental Lawyers Association (BELA)	Initial contact Syeda Rizwana Hasan, Chief Executive	Further nomination can come from the CE's office based on our request/letter. **Email:** bela@bangla.net
43.	Bangladesh Garment Manufacturers and Exporters Association (BGMEA)	Initial contact Faruque Hassan, President	Further nomination can come from the President's office based on our request/letter **Email:** info@bgmea.com.bd
44.	Leather goods and Footwear Manufacturers & Exporters Association of Bangladesh	Initial contact Syed Nasim Manzur, President	Further nomination can come from the President's office based on our request/letter **Email:** info@lfmeab.org
45.	Institution of Engineers, Bangladesh (IEB)	Initial contact Engr. Md. Nurul Huda, President	Further nomination can come from the President's office based on our request/letter **Email:** info.iebhq@gmail.com; info@iebbd.org
46.	Institute of Architects Bangladesh (IAB)	Initial contact Ar. Professor Dr. Khandaker Shabbir Ahmed, President	Further nomination can come from the President's office based on our request/letter **Email:** Email: mail@iab.com.bd
Academic Institutions			
47.	Bangladesh University of Engineering and Technology (BUET)	Dr. Mohammad Shakil Akther, Professor, Department of Urban and Regional Planning IWFM (Dr Saiful)	**Email:** shakil@urp.buet.ac.bd, shakil.akther@gmail.com
48.	University of Dhaka	Dr. Md. Humayun Kabir, Professor, Department of Geography and Environment	**Email:** mh_kabir@yahoo.com
49.	Centre for Climate Change and Environmental Resaerch (C3ER), BRAC University	Ainun Nishat, PhD, Professor Emeritus	**Email:** nishat@bracu.ac.bd

Sl. No.	Name of the Organisation	Name of the Official/ Department	Contact Details
50.	Jahangirnagar University	Initial contact Md. Jamal Uddin, Chairman, Department of Environmental Sciences	Further nomination can come from the Chairman's office based on our request/letter **Email:** jamaluddinrunu@juniv.edu
51.	Stamford University	Prof. Dr. Ahmad Kamruzzaman Majumder, Dean & Chairman, Department of Environmental Sciences	**Email:** kamrul_sub@hotmail.com
52.	North South University IUB	Dr Saiful Momen	
Community Representatives			
53.	Ward Councilors	Selected (Maximum 3, will be nominated by DSCC)	Will be collected from DSCC office at later stage.
54.	CDC[1]/WLCC[2]/TLCC[3] Members	Selected (Maximum 3, will be nominated by DSCC)	Will be collected from DSCC office at later stage.
Individual Experts			
55.	Dr. Haseeb Irfanullah	Visiting Resrach Fellow, CSD, ULAB, Independent Consultant	**Email:** hmirfanullah@yahoo.co.uk
56.	Dr Asaduzzaman	Former Director, Bangladesh Institue of Development Sutides (BIDS)	**Email:** asaduzzaman.m@gmail.com

[1] Community Development Committee
[2] Ward Level Coordination Committee
[3] Town Level Coordination Committee

Annexure 3

Report:

Stakeholder Consultation Workshop

on

“Preparation of Climate Action Plans for Dhaka North City Corporation and Dhaka South City Corporation”

Contents

1. Introduction

Under the project "Developing Climate Action Plan for Dhaka North City Corporation and Dhaka South City Corporation" C40 Cities and ICLEI South Asia is supporting the cities to prepare their Climate Action Plans. As part of the project, a significant amount of data has been collected to prepare the Green House Gas emission inventory of the cities, as well as to conduct the climate and risk vulnerability assessment based on secondary data. In order to validate the results obtained from the data collected thus far, and get first hand information from local stakeholders of DNCC, a Stakeholder Consultation was conducted with local stakeholders of DNCC and DSCC.

As part of the project, ICLEI South Asia is closely engaging with different government agencies to collect data to develop a GHG emission inventory, as well as conduct a climate and risk vulnerability assessment based on secondary data. The stakeholders comprise members from various external public departments, private organisations, institutions, associations, NGOs, and individual experts. These stakeholders participated in the workshop to discuss and contribute towards developing the Climate Action Plan for the city.

The one day consultation was held on 12th September 2023 in Empyrean Hotel, Dhaka. The consultation was attended by 51 participants including the core team members of Dhaka North City Corporation and Dhaka South City Corporation, ward councilors, panel mayors, experts, representatives of different government agencies and representatives of local and national NGOs.

2. Summary of the workshop

The workshop was divided into 2 sessions

I. Inaugural session

II. Technical session: Overview on the GHG emission data and CCRA Process, possible strategies

The agenda for the workshop is attached in Annex 1 and the Attendance Sheet for Stakeholder Consultation workshop is attached in annex 2.

2.1 Inaugural session

The workshop was inaugurated by Mr. Selim Reza, CEO, DNCC. Mr. Jubaer Rashid, Country Representative, Bangladesh, ICLEI-South Asia, invited the nodal officers from the two core teams of DNCC and DSCC – Ms. Farzana Boby from DNCC and Ms. Fatima Kabir Sharna from DSCC to provide an overview of the project's goal, target, obstacles, and progress. In his inaugural address, Mr. Reza commented on the iniatiives of DNCC on climate change and their importance given the impacts of climate change on the city that is being felt widely. Ms. Saloni Gupta Consultant, C40 (South and West Asia) commented on the importance of the CAP work being carried out in DNCC and DSCC particularly in the global arena.

At the end of the inaugural session, the participants introduced themselves briefly.

2.2 Technical Session

2.2.1 Overview on the GHG emission data and CCRA Process

In this session, the climate action planning process was discussed, as well as the results of the GHG emission inventorisation and the Climate Change Risk Assessment.

Ms. Bedoshruti Sadhukhan, Associate Director, ICLEI South Asia introduced the Climate Action Planning process that was followed in the project to the stakeholders and explained the city and climate profile that has been used for the work. An analysis of the urban systems (water supply, wastewater management, storm water drainage transportation system, energy and power system, health system) was presented to the stakeholders.

Mr. Souhardo Chakraborty, Deputy Manager, ICLEI South Asia explained (via video conference) the GHG emission inventory prepared for DNCC and DSCC, the trends of emissions and emission scenarios.

Finally the projected climate and risk assessment of the urban systems was explained to the stakeholders. The vulnerable areas and risks to each urban system was explained with maps.

There was also a discussion on the illustrative strategies that could be proposed in the final Climate Action Plan to demonstrate what kind of actions are being considered.

2.2.2 Discussion

The primary points of discussion in the consultation were:

1. It was suggested to use data about slums and slum populations from UNDP who is already working on slums and migrant populations in Dhaka. It was requested to UNDP representatives to support the project by providing some data regarding slum population and initiatives. Dhaka team of ICLEI will contact UNDP representatives from the Consultation to procure any relevant population data that may be missing with the team.

2. During the discussion on GHG Emission Inventory, it was suggested to calculate the emissions from not only the city level, but also surrounding areas, since Dhaka is impacted by emissions occurring outside the city. However, it was explained that this will not be covered in the analysis. The constraints of time, budget and feasibility of calculating emissions of surrounding areas was explained to the participants. The GHG emission calculations are being done following the GPC protocol that is a globally accepted methodology. It is covering only Scope 1 and Scope 2 emissions for calculation and scope 3 emissions are not included. The calculations are as per the Basic level of reporting, since the BASIC level covers emission sources that occur in almost all cities (Stationary Energy, in-boundary transportation, and in-boundary generated waste) and the calculation methodologies and data are more readily available.

3. During the discussion on vulnerability assessment, it was mentioned that some data on location of health centres is missing from DSCC. Data is to be shared by DNCC and DSCC.

4. Some of the existing and ongoing initiatives in Dhaka were highlighted by the stakeholders – such as, UNDP project on slum rehabilitation, plantation project for heat action in DNCC.

5. Stakeholders suggested some actions to be included in the CAP such as installing solar PV systems to make shades on footpath, promoting rail or water transport, monitoring and conserving green and blue areas, and rain water harvesting. It was explained that this will eventually be taken up at the stage of identifying climate actions for the plan.

6. To select the vulnerable wards, it was suggested to get in touch with the ward councilors in DNCC and DSCC with a simple questionnaire to identify major issues in their wards and areas affected by these issues. The core team had expressed their willingness to support the initiative, and a simple questionnaire to identify areas of vulnerability in the city has been shared with them. They will be sharing this with the local councilors and requesting them to fill up the questionnaire and send it to us. Currently, the questionnaire has been shared with the councilors of DNCC and DSCC and enough responses have been collected by the Dhaka ICLEI team. This is being used to revise the vulnerability maps for the 2 corporations.

7. Before ratification of the CAPs by the DNCC and DSCC, the CAP should be shared with national experts for validation. It was informed by the core team that for the ratification of the final CAP, the DNCC and DSCC would possibly submit the report to national experts from universities in Dhaka for their comments. It was therefore suggested to present the report to such experts before submission for ratification. ICLEI and C40 is exploring the possibility of doing this in an appropriate manner.

8. Monitoring and evaluation framework was suggested to be included as a vital part of the report. It was explained that this will be a critical section in the report and is already planned.

3. Way forward

It was decided to share the presentation with the stakeholders for them to carefully consider the illustrative proposed actions and provide detailed feedback. ICLEI and C40 will finalise the GHG emission inventory scenarios and CCRA assessment and share the findings with the core team through smaller consultations. The final report will be shared with DNCC and DSCC core team and other national experts before putting it up for ratification.

Annex 1

AGENDA

First Stakeholder Consultation on Climate Action Plans for Dhaka North City Corporation and Dhaka South City Corporation

Date: 12th September 2023

Place: Empyrean Hotel, BAF Base Bashar, Shaheen Bagh, Beside Falcon Tower, Dhaka – 1215, Bangladesh

TIME	PARTICULARS	
INAUGURAL SESSION		
10:30 – 11:00	Welcome Address Speech of the Special Guest	C40 Representative Chief Executive Officer, DNCC Chief Executive Officer, DSCC
11:00 - 11:15	**Tea Break**	
TECHNICAL SESSION & GROUP WORK		
11:15 – 12:00	Introduction, context and methodology	ICLEI South Asia
12:00 – 13:00	Overview on the GHG emission data – progress till date	ICLEI South Asia
13:00 to 14:00	**Lunch**	
14:00 – 14:30	Risk Assessment of Fragile Urban Systems and Vulnerability Assessment	Powerpoint presentation
14:30 – 15:15	Exercise on vulnerable areas and actors – with maps	Group Discussion and presentation
15:15 – 15:45	Discussion on possible strategies for each urban system	Moderated open discussion
15:45 – 16:00	**Tea and Closure**	

Annex 2

Stakeholder Consultation Workshop on Preparation of Climate Action Plans for Dhaka North City Corporation and Dhaka South City Corporation

Date: 12 September, 2023 I **Time:** 10:30 AM - 16:00 PM (Bangladesh Time) I **Venue:** Empyrean Hotel, Dhaka, Bangladesh

ATTENDANCE SHEET

Sl. No.	Name (s)	Designation and Organization	Mobile and E-mail	Signature
1.	Mohammed Masud Alam Siddique	Secretary DNCC		
2.	Md. Jahangir Ali	Deputy Director (Physical Planning) (Addl chg)		
3.	Maqsud Hashem	CTP, DNCC		
4.	Md. Remon Ahmed Asif	Assistant Urban Planner		Asif
5.	JUBORAJ SARKER	Assistant Maintenance Engineer		

Page - 1

Stakeholder Consultation Workshop on Preparation of Climate Action Plans for Dhaka North City Corporation and Dhaka South City Corporation

Date: 12 September, 2023 I **Time:** 10:30 AM - 16:00 PM (Bangladesh Time) I **Venue:** Empyrean Hotel, Dhaka, Bangladesh

ATTENDANCE SHEET

Sl. No.	Name (s)	Designation and Organization	Mobile and E-mail	Signature
6.	Md. Zahid Hasan	Asst. Manager (Gabtoli Bus Terminal) DNCC		Hasan
7.	Hasib Us Shahid Shohan	Assistant Program officer, NACOM		
8.	MD MARUF HOSSAIN	Town Manager LIUPC Project- UNDP Dhaka North City Corporation		
9.	Md. Kamruzzaman Palash	Urban Planning and Governance Coordinator, LIUPC Project, UNDP		
10.	Hasina bari chowdhury	councillor ward. 1,17.18 DNCC		HB. Chowdhury.

Page - 2

ICLEI Local Governments for Sustainability SOUTH ASIA

C40 CITIES

Stakeholder Consultation Workshop on Preparation of Climate Action Plans for Dhaka North City Corporation and Dhaka South City Corporation

Date: 12 September, 2023 I **Time:** 10:30 AM - 16:00 PM (Bangladesh Time) I **Venue:** Empyrean Hotel, Dhaka, Bangladesh

ATTENDANCE SHEET

Sl. No.	Name (s)	Designation and Organization	Mobile and E-mail	Signature
11.	SARDER SHAFIQUL ALAM	COORDINATOR ICCCAD		
12.	Md. Shamsuddoha	cprd/ Chief Executive		
13.	Mohammad Abul Kalam	SE, DNCC		12/9/23
14.	Md. Shirajul Islam	Councillor, DSCC Ward No-06		12.09.2023
15.	Md. Saiful Islam	Deputy Town Planner Zone - 3		12.09.23

Page - 3

ICLEI Local Governments for Sustainability SOUTH ASIA

C40 CITIES

Stakeholder Consultation Workshop on Preparation of Climate Action Plans for Dhaka North City Corporation and Dhaka South City Corporation

Date: 12 September, 2023 I **Time:** 10:30 AM - 16:00 PM (Bangladesh Time) I **Venue:** Empyrean Hotel, Dhaka, Bangladesh

ATTENDANCE SHEET

Sl. No.	Name (s)	Designation and Organization	Mobile and E-mail	Signature
16.	Dr. TARIQ BIN YOUSUF	SWM Expert		
17.	MAHMUD AL MASUD	Assistant Director (EE&C) SREDA		
18.	Md. Faridul Islam	Sub-Assistant Engr. DNCC		
19.	Engr. Ibrahim khalil	Assistant Engineer DSCC		
20.	Rafid Mahmud Khan	Deputy Manager, Climate Change Programme, BRAC		

Page - 4

Stakeholder Consultation Workshop on Preparation of Climate Action Plans for Dhaka North City Corporation and Dhaka South City Corporation

Date: 12 September, 2023 I **Time:** 10:30 AM - 16:00 PM (Bangladesh Time) I **Venue:** Empyrean Hotel, Dhaka, Bangladesh

ATTENDANCE SHEET

Sl. No.	Name (s)	Designation and Organization	Mobile and E-mail	Signature
21.	Shajal Mehedi	WR Engineer & Climate Change Expert	[redacted]	Sajal
22.	Md. Tanvir Ahmed	Assistant Manager. ICT Revenue Department Dhaka Power Distribution Company Ltd (DPDC)	[redacted]	12-09-23
23.	Abdullah Al Mamun	Assistant Urban Planner TROYEE	[redacted]	12.09.23
24.	MD HUMAYOUN RASHID	Councillor word-14th	[redacted]	12-9-23
25.	TANMIN ISLAM	Assistant Secretary DNCC	[redacted]	12-9-23

Page - 5

Stakeholder Consultation Workshop on Preparation of Climate Action Plans for Dhaka North City Corporation and Dhaka South City Corporation

Date: 12 September, 2023 I **Time:** 10:30 AM - 16:00 PM (Bangladesh Time) I **Venue:** Empyrean Hotel, Dhaka, Bangladesh

ATTENDANCE SHEET

Sl. No.	Name (s)	Designation and Organization	Mobile and E-mail	Signature
26.	Nilufa Akhtar	Assistant Secretary DNCC	[redacted]	12.09.2023
27.	Farzana Boki	Assistant Town planner	[redacted]	12.09.2023
28.	Feisal Rahman	GCA	[redacted]	12/09/23
29.	Raiyan Rahman	Project Intern, DNCC	[redacted]	Raiyan Rahman 12/09/2023
30.	Fatima Kabir Sharna	Assistant Urban Planner DSCC	[redacted]	12-09-23

Page - 6

ICLEI Local Governments for Sustainability SOUTH ASIA | C40 CITIES

Stakeholder Consultation Workshop on Preparation of Climate Action Plans for Dhaka North City Corporation and Dhaka South City Corporation

Date: 12 September, 2023 I **Time:** 10:30 AM - 16:00 PM (Bangladesh Time) I **Venue:** Empyrean Hotel, Dhaka, Bangladesh

ATTENDANCE SHEET

Sl. No.	Name (s)	Designation and Organization	Mobile and E-mail	Signature
31.	MD. MUZAHID AL SAFID	Social welfare officer DNCC	[redacted]	[illegible]
32.	Md. Arafath Hossain	Assistant Chief Waste Management officer, DNCC	[redacted]	[illegible]
33.	Bushra Afreen	Chief Heat Officer (Arsht-Rock)	[redacted]	[illegible]
34.	SOWKAT JAHAN	Sociologist DSCC	[redacted]	[illegible]
35.	Md. Reaz Hasan	Information Officer to Dhaka North City Corp.	[redacted]	[illegible]

Page - 7

ICLEI Local Governments for Sustainability SOUTH ASIA | C40 CITIES

Stakeholder Consultation Workshop on Preparation of Climate Action Plans for Dhaka North City Corporation and Dhaka South City Corporation

Date: 12 September, 2023 I **Time:** 10:30 AM - 16:00 PM (Bangladesh Time) I **Venue:** Empyrean Hotel, Dhaka, Bangladesh

ATTENDANCE SHEET

Sl. No.	Name (s)	Designation and Organization	Mobile and E-mail	Signature
36.	Md. Rakibul Hasan	Assistant Secretary & Taxation Officer	[redacted]	[illegible]
37.	M. Masum Billah	Int'l Sectory Durjoy Amra, Team leader, Director hs	[redacted]	[illegible]
38.	Shikhon Roy	Co-ordinator Save the nature	[redacted]	[illegible]
39.	Shahid Ullah Minu	Panel Mayor D.S.C.C	[redacted]	[illegible]
40.	Rezaul Karim	APS to Panel Mayor D.S.C.C	[redacted]	[illegible]

Page - 8

ICLEI Local Governments for Sustainability SOUTH ASIA

C40 CITIES

Stakeholder Consultation Workshop on Preparation of Climate Action Plans for Dhaka North City Corporation and Dhaka South City Corporation

Date: 12 September, 2023 I **Time:** 10:30 AM - 16:00 PM (Bangladesh Time) I **Venue:** Empyrean Hotel, Dhaka, Bangladesh

ATTENDANCE SHEET [Special / Chief Guest]

Sl. No.	Name (s)	Designation and Organization	Mobile and E-mail	Signature
01.	Md. Selim Reza	CEO DNCC		
02.	Khandoker Mahbub Alam	SE (Env) DNCC		
03.	Faria Kabir	Research Associate (GIS) C3ER, BRACU		
04.	Taufiq Rahman	Admin		
05.	Bedoshruti Sadhukhan	ICLEI SA		

Page - 9

ICLEI Local Governments for Sustainability SOUTH ASIA

C40 CITIES

Stakeholder Consultation Workshop on Preparation of Climate Action Plans for Dhaka North City Corporation and Dhaka South City Corporation

Date: 12 September, 2023 I **Time:** 10:30 AM - 16:00 PM (Bangladesh Time) I **Venue:** Empyrean Hotel, Dhaka, Bangladesh

ATTENDANCE SHEET

Sl. No.	Name (s)	Designation and Organization	Mobile and E-mail	Signature
46.	Makame Mahmud	Project Officer, ICLEI South Asia		
47.	Chaity Dev	Project associate ICLEI - South Asia		
48.	SADEQUE MAHMUD	Project Officer ICLEI SA		
49.	Dipak Bhowmick	Project Officer ICLEI SA		
50.	MD. JUBAER RASHID	Country Rep. ICLEI SA		

Page - 10

Stakeholder Consultation Workshop on Preparation of Climate Action Plans for Dhaka North City Corporation and Dhaka South City Corporation

Date: 12 September, 2023 I **Time:** 10:30 AM - 16:00 PM (Bangladesh Time) I **Venue:** Empyrean Hotel, Dhaka, Bangladesh

ATTENDANCE SHEET

Sl. No.	Name (s)	Designation and Organization	Mobile and E-mail	Signature
51.	Saloni Gupta	Consultant C40 Cities		Sgupta
52.				
53.				
54.				
55.				

Page - 11

Annexure 4

Rapid Appraisal of City powers and related capacity

The document assesses the city´s power and capacity to implement climate action in key sectors – which will help identify potential barriers to climate action implementation and key external stakeholders to be involved in the process. The document provides a high level overview of the City´s power and capacity assessment.

City Powers Category	Who owns the main/primary responsibility?	City Power	City Capacity	Comments / Improvement opportunities
Water Supply	DWASA[1]	M	M	**Increased coordination is needed** - Coordination between DSCC and DWASA is still a complex process, though both organisations fall under the same Ministry. Being autonomous bodies, both Dhaka WASA and DSCC take decisions independently. Some coordination happens over formal letters and phone calls. Still, the situation becomes complex during monsoon (when water logging increases at a significant level) and augmentation works of drains and sewerage lines. Therefore, the coordination, vision and work plan of both organisations would be aligned and organised.
Solid Waste Management	DSCC	H	M-H	**Increased awareness of people and more financing in the sector** - Considering the generated amount of waste, DSCC needs to improve their capacities both in manpower, equipment and technologies. Thus more finance is required. Apart from the maximum efforts of DSCC, citizens need more awareness to minimise open defecation in roadsides, waterbodies, drains etc.
Storm Water Drainage	DWASA, DNCC	M	M	**Increased coordination, incorporation and construction of appropriate drains, long-term management strategies and proper enforcement of laws** - This is one of the critical sectors in Dhaka city, especially during monsoon. The roads are being inundated after a small amount of rainfall. The system collapsed not only because of an inappropriate drainage network but also for clogging of drains for solid waste and open defecation. Therefore, in addition to implementing the drainage master plan properly by Dhaka WASA, DSCC would take responsibility for enforcing the law and management.

[1] Dhaka Water Supply and Sewerage Authority

City Powers Category	Who owns the main/primary responsibility?	City Power	City Capacity	Comments / Improvement opportunities
Green Area Development (Parks and Gardens, water body conservation)	DSCC	M-H	H	**Develop green space development plan, enforcement of appropriate laws and increased management strengths** - Illegal encroachment and misuse of open spaces are issues for Dhaka city. However, DSCC has taken initiatives to upgrade and regenerate open spaces, particularly the parks and playgrounds existing within DSCC jurisdiction. This can be considered as well efforts from their side. In addition, the inclusion of all community people in using these open spaces and long-term strategies (green open space development and management plan) for sustainable management is essential, which can be ensured through public-private partnerships.
Street Lighting	DSCC, DESCO[2]	M	M	**Increased coordination** - DSCC is primarily responsible for providing and installing street lights in their jurisdiction, but DPDC provides the electricity connection. To strengthen this service, both organisations can increase coordination, especially during power cuts and higher demand for electricity during peak hours.
Electricity	DESCO, BPDB[3]	L	L	**Moving towards renewable energy** - Recently the country, including Dhaka, faced significant power cuts (before winter season) because of limited generation due to gas and fuel shortages. This is happening because of the war between Russia and Ukraine and the imbalance in the world trade market (e.g. increasing fuel prices and higher foreign exchange rates). However, the country needs to restore electricity and supply on a priority basis. The city needed to adapt to the situation over the last couple of months. Therefore, people can be encouraged to move towards renewable energy usage in the coming days.

[2] Dhaka Electric Supply Company Ltd.

[3] Bangladesh Power Development Board

City Powers Category	Who owns the main/primary responsibility?	City Power	City Capacity	Comments / Improvement opportunities
Buildings	DSCC, RAJUK[4]	M	M	**Increased coordination, management, and strictly following Dhaka City Master Plan** - RAJUK provides the building approvals in Dhaka Metropolitan Area. Thus, DSCC does not have the authorisation to monitor and follow up on building construction and the overall development of the area. Rather, DSCC and other utility service-providing organisations (Dhaka WASA, DESCO, Titas Gas Ltd. etc.) are responsible for providing basic facilities/ services to such buildings/areas (e.g. street lights, roads, electricity, gas etc.). Therefore, DSCC collects holding taxes from each building. In this case, DSCC can improve coordination with RAJUK to ensure proper building regulations and appropriate use of Floor Area Ratio (FAR) to utilise land properly.
Transport	DNCC, BRTA[5], BRTC[6], DTCA[7], DMP[8]	M	L	**Increased coordination and enforcement of laws** - DTCA is the main responsible authority for developing, implementing and regulating transport policies in Dhaka. To reduce transport issues, DTCA is implementing the Revised Strategic Transport Policy (STPA), which includes BRT, MRT and bus franchise projects. DSCC can join in these efforts by improving footpaths, road connectivity, traffic management etc. Thus, increased coordination among all these organisations is needed.
Decarbonising the electricity grid	Under the responsibilities of SREDA[9] under the Ministry of Power, Energy and Mineral Resources	L	L	N/A
Optimising energy use in buildings (consider adding rows to assess individually by building type owner: public, residential, commercial and industrial)	SREDA, RAJUK, DNCC	L	L	**Increased coordination -** DSCC can increase coordination with RAJUK and SREDA for implementing such policies to optimise energy use in buildings, as the country needs to restore a huge amount of power in the coming days.

[4] Rajdhani Unnayan Kartipakkhya
[5] Bangladesh Road Transport Authority
[6] Bangladesh Road Transport Corporation
[7] Dhaka Transport Coordination Authority
[8] Dhaka Metropolitan Police
[9] Sustainable and Renewable Energy Development Authority

City Powers Category	Who owns the main/primary responsibility?	City Power	City Capacity	Comments / Improvement opportunities
Enabling next generation mobility	DTCA, DSCC	M	M	**Develop clean mobility strategy/action plan, increased coordination** - though DTCA is primarily responsible for developing such policy, DSCC can coordinate and develop jointly because some components of such action plan can be implemented by DSCC (e.g. electric city bus, wider walkway/ footpaths, a green zone for passenger stoppage/rest etc.)
Enhancing climate resilience (structurally reducing and preventing impacts from identified climate risks)	DWASA, DSCC, RAJUK	M	M	**Develop climate resilience action, increase coordination and implement climate actions jointly** - increasing climate resilience of Dhaka City is not possible through a single (i.e. DSCC) organisation's initiative; rather needs joint initiatives. Initially, Dhaka WASA, DSCC and RAJUK can be the responsible organisation to develop such a plan/policy and its implementation - considering the potential climate risk in Dhaka (e.g. flood/ waterlogging, heat stress, air pollution etc.)
Emergency management during extreme weather events (e.g., cyclones, tsunamis, extreme rain, heat or drought)	**Flood and Storms**			
	DSCC, Dhaka WASA, FSCD[10], DMP[11]	M	M	**Increased coordination, technology transfer, effective implementation, and update of the current version of DRR action plan** - DSCC has established an emergency management team, on screen surveillance monitoring system and a team of volunteers in collaboration with FSCD and important city-level stakeholders. This can be considered a good strength. However, the overall technological knowledge may be increased among other staff (if not sufficient as of now) so that in critical conduction, more staff can be engaged. Effective implementation, monitoring and evaluation of DRR action plan are required.
	Fire hazards			
	FSCD, DSCC, DMP	H	H	Primary responsible organisation is the FSCD office.
	Earthquake			
	FSDC, DSCC, DMP	H	H	Primary responsible organisation is the FSCD office. As per the DRR action plan, DSCC can strengthen their activities with FSDC as well.

[10] Fire Service and Civil Defence
[11] Dhaka Metropolitan Police

Some recommendations based on identified improvement opportunities from the strategic appraisal of DSCC are outlined below:

Section	Improvement opportunities	Recommendations
Climate vision and political commitment. Policy context review. Goals & targets	Limited consideration of energy, conservation, sustainable urban development in city plans DSCC is committed to progress on climate actions with developing climate actions plan and its implementation. This is a visionary commitment, specific goals, targets for climate adaptation and mitigation can be set during CAP formulation.	As multiple strategies and action plans (e.g. Clean City Master Plan, DRR action plan etc.) are being developed one after another, institutionalisation and ownership of the process of CAP are essential. However, DSCC's climate core team is recommended to be involved in the CAP formulation process rigorously. On the other hand DSCC is also implementing projects like DCNUP, URP and World bank and ADB assisted projects to fight against climate vulnerability and making city more resilient. Essentially, the city needs to take the proper lead by itself for implementing CAP rather than being limited to only commitments.
Climate governance	Environment, climate change and disaster circle in the DSCC needs to be strengthened and CAP can be institutionalised within this circle without creating further institutions.	The Climate Core Team, formed under the CAP project, should take the lead and own the policies to establish the need for climate actions with regular development works in coordination with other and DSCC's internal departments. In addition to this responsibility, stakeholders (formed under the CAP project) involvement should be ensured on a long-term basis. Detailed policies and techniques will be included in the climate governance chapter of CAP.
Powers and related capacity	DSCC has limited jurisdictional authority over different urban services, except public health and solid waste management.	Increased coordination with internal and external departments/organisations might help to improve the power and capacity of DSCC. However, forceful initiatives would not be sustainable; rather, it is recommended to consult and negotiate the urgency of implementing climate-relevant projects/integration of climate components into different schemes.
GHG emissions baseline and reduction trajectories	Existing GHG study does not look at specific emissions from DSCC. lack of technical capacity in DSCC to develop or maintain GHG emission inventories.	Need to establish a dedicated team for GHG emission incentivisation and create a position or post in DSCC within the Environment, Climate Change and Disaster circle.
Climate Hazards, Risks & Impacts baseline status. Socio-economic context and wider benefits.	No formal assessment was conducted.	CRVA can support the identification of current risks and vulnerabilities in DSCC and help to identify CAP measures for adaptation.

Annexure 5

C40 CITIES Climate Action Planning

C40 Climate Change Risk Assessment (CCRA) Report

Dhaka South City Corporation

Document Information

Lead author

Rahul, ICLEI South Asia

Contributing authors

Bedoshruti Sadhukhan, ICLEI South Asia

Vasavi Yarram, ICLEI South Asia

Kirsty Griffin, C40

Reviewer

Kirsty Griffin, C40

Document Date

3 November 2023

Version

Version 1.0

Copyright Information

Table of **Contents**

Abbreviations

BAU	Business As Usual
CAP	Climate Action Plan
CCRA	Climate Change Risk Assessment
CEO	Chief Executive Officer
DNCC	Dhaka North City Corporation
DPHE	Department of Public Health and Engineering
DSCC	Dhaka South City Corporation
DTCA	Dhaka Transport Coordination Authority
EXT	Extreme Scenario
GCOM	Global Covenant of Mayors

Table of **Tables**

Table of **Figures**

Section A: Introduction

1. Background

Dhaka (including Dhaka North City Corporation and Dhaka South City Corporation). the capital city of Bangladesh, is highly vulnerable to natural disasters; and climate change is expected to exacerbate the situation with altered rainfall patterns, and increased temperatures. The city's topography makes it particularly susceptible to flooding, which poses a significant threat. Increasing land surface temperature causing heat stress is also a serious threat to the residents of the city. These risks not only impact the local population, but also impact the natural and urban systems of the city. Therefore it is important to understand the potential impacts of climate change on the city and its urban systems.

The Dhaka municipality was upgraded to become the Dhaka Municipal Corporation in 1978, which was later renamed the Dhaka City Corporation in 1990. Subsequently, given the size of the city of Dhaka, in 2011 the Dhaka City Corporation was divided into two separate entities, namely the Dhaka South City Corporation (DSCC) and Dhaka North City Corporation (DNCC).

In recent years, the entire Dhaka city has experienced rapid growth and the Dhaka South City Corporation (DSCC) area is facing multiple challenges such as insufficient open space, unplanned development and inadequate solid waste and drainage management system. The impacts of climate change are expected to worsen the situation in DSCC. The erratic rainfall and increased temperature are climate risks that make the Dhaka South city susceptible to urban flooding and heat stress. These risks not only impact the population of the city, but also the natural resources and crucial urban systems of the city. Hence, it is crucial for urban planners, decision makers and DSCC officials to prioritise the development of a Climate Action Plan for Dhaka South City to strengthen the resilience of urban systems, including related infrastructure, and the community in response to the impacts of climate change.

In order to assess the city's vulnerabilities and develop an evidence-based Climate Action Plan (CAP) that can help to reduce the impact of climate change on vulnerable communities and urban systems a Climate Change Risk Assessment (CCRA) has been developed for Dhaka South City (DSCC). The Climate Change Risk Assessment (CCRA) has been developed using the C40 Climate Change Risk Assessment[1] framework and ICLEI ACCCRN Process (IAP) tool[2]. The CCRA follows a robust methodology that is aligned with global standards such as GCOM and C40 cities' requirements. The IAP of ICLEI South Asia is a step-by-step methodology for local governments to assess climate risks and vulnerability of urban sectors and identify resilience interventions, developed based on a number of resilience planning methodologies derived from the practical experience of a group of pioneering cities across Asia. The assessment aims to better understand the specific climate risk faced by the DSCC and subsequently develop a Climate Adaptation Plan to reduce or mitigate the impact of climate change on vulnerable communities and urban systems.

2. Setting the scene: Climate risk and the need for adaptation

Both Dhaka North and Dhaka South Cities have already started experiencing the impact of climate change. The entire Dhaka city has seen a significant observed increase in the annual day temperature. From 2000 to 2019, there was an observed increase in the mean temperature of the annual daytime Surface Urban Heat Island Intensity (SUHII), with a rise from 2.20°C to 3.18°C[3]. The city is also reportedly one of the worst affected cities in the world in terms of urban heat[4]. Low-income groups and labourers are disproportionately affected by urban heat, which has led to health risks and reduced economic productivity.

1 https://www.c40knowledgehub.org/s/guide-navigation?language=en_US&guideArticleRecordId=a3s1Q000001iahxQAA&guideRecordId=a3t1Q0000007lEWQAY
2 https://southasia.iclei.org/publication/iclei-acccrn-process-iap-a-toolkit-for-local-governments/
3 Surface urban heat island intensity in five major cities of Bangladesh: Patterns, drivers and trends
4 https://www.tbsnews.net/bangladesh/dhaka-worst-affected-city-world-urban-heat-says-us-study-311839

Climate change has been significantly impacting the Dhaka South City Corporation (DSCC). The city is grappling with issues of heat stress as well as urban flooding due to clogged drains. The DSCC has also seen a sharp increase in vector borne diseases such as dengue and malaria. The rapid pace of development and encroachment has reduced green spaces significantly in the DSCC area. The capacity of the storm drainage system is not sufficient to tackle the runoff. As a result, there is frequent occurrence of urban flooding in the area. Moreover, due to the increase in urban population, the DSCC has been facing challenges in providing essential services such as reliable transportation, continuous water and energy supply, effective sanitation and solid waste management. Additionally, the economic and climate induced migration from different parts of the country has become a major concern for Dhaka South City Corporation. Hence, it is utmost important for the DSCC's planners and decision makers to initiate a resilience-building journey by assessing its climate risk and vulnerability, and identifying resilience actions to address the challenges posed by climate change.

3. Methodology

This CCRA has been compiled using the methodology set out in the CCRA Guide developed by C40 and the IAP developed by ICLEI South Asia. Both these tools enable local governments to assess their existing and future climate risks, the related climate hazards and their impacts on the city, its systems or sectors, and their inhabitants. The CCRA process has included:

- **Engagement:** Engagement among local authority officials and local stakeholders and the formation of a climate core team and stakeholder committee for conducting the exercises of the tool. The climate core team is responsible for the execution of project activities in the city and comprises key officials from the city government. The climate core team is also responsible for conducting shared learning dialogues.

  The development of this CCRA was led by DSCC in partnership with Dhaka Water Supply and Sewerage Authority, Local Government Engineering Department, Dhaka Transport Coordination Authority, Department of Public Health Engineering, Ministry of Environment, Forest and Climate Change and numerous other external stakeholders, including representatives from LIUPC Project of UNDP, NACOM, ICCCAD, BRAC, SREDA, DPDC, GCA, Save the Nature, water resource engineers, solid waste experts, etc. The full list of stakeholders consulted is attached in Annex 1.

Table 1: List of Core Team Members of DSCC

1.	MD, Sirajul Islam, Chief Town Planner	Chairperson
2.	Ms. Fatima Kabir Sharna, Assistant Town Planner	Project Nodal Officer
3.	Ibrahim Khali, Assistant Engineer	Member
4.	Kazi Nur Kowser, Assistant Town Planner	Member

- Assessment of Climate Risk and Related Hazards: An assessment of the past climate trends and future climate projections has been conducted through secondary research. Based on the assessment, climate risks and related hazards have been identified in the city. The assessment identifies the most frequent and severe hazards which have the potential to have widespread impact on the city's urban systems/services/sectors and citizens. These are validated through the analysis of available city-level/regional-level data as well as local perceptions from city stakeholders through consultations and shared learning dialogues (SLD).

- Vulnerabilities Assessment: Vulnerability Assessment identifies the key vulnerable areas within the city that are impacted by the climate risk and hazards. It also assesses the adaptive capacity of vulnerable populations and fragile urban systems/sectors/services in the context of identified climate risks and hazards. It considers the existing impact of hazards (in terms of people and area affected) and the projected impact of the hazard on the city. The exercise is completed in consultation with the Stakeholder Committee and climate core team through an SLD. Based on the information collected and collated, vulnerability assessment maps and hotspots have been prepared for the city.

- Identification of Adaptation Measures/Actions: Information and analysis from the previous phases are used to identify the relevant resilience interventions, and set goals and broad objectives for the Climate Action Plan. These interventions are prioritised based on their feasibility and applicability to the city.

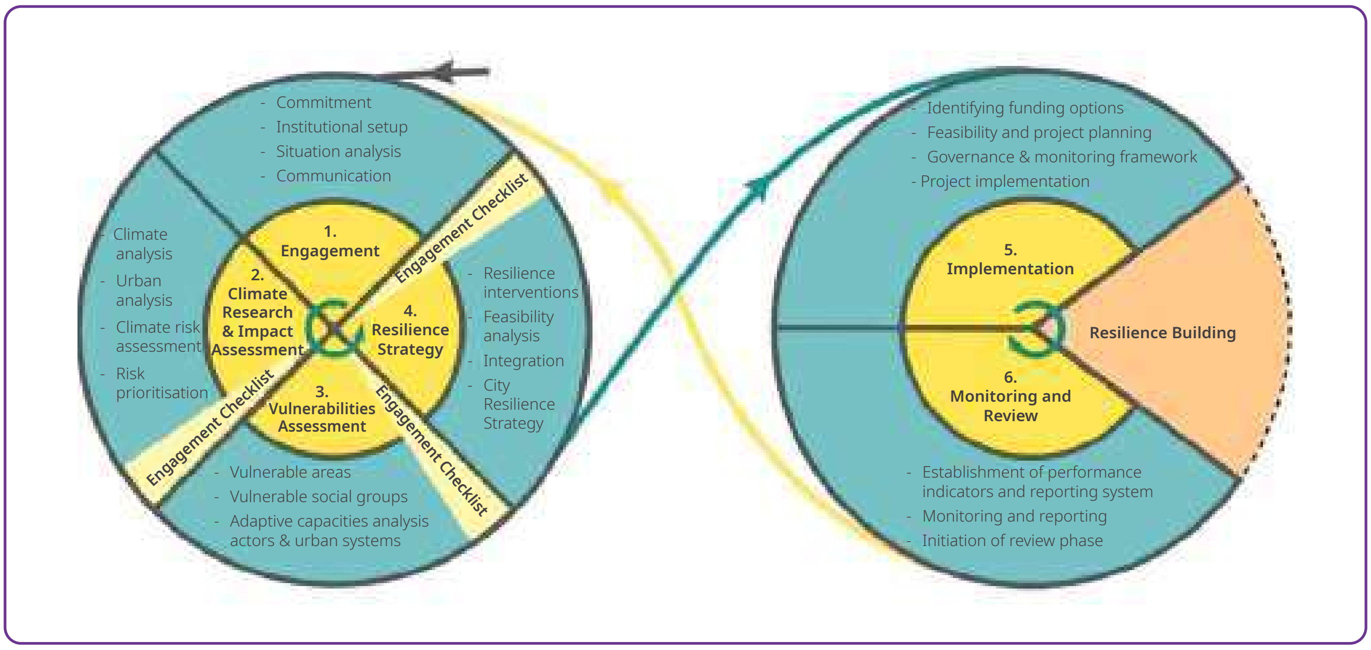


Figure 1: *ICLEI ACCCRN Process Methodology for Vulnerability Assessment and Development of Climate Resilient Strategy*[5]

[5] ICLEI ACCCRN Process

Section B: Climate Change Risk Assessment

4. Current and Historic Context and Trends

In this section, historical climate trends and future projections have been analysed to evaluate potential climate exposure scenarios. This analysis is based on recent studies of local and regional climate phenomena. To substantiate the climate data, input is gathered from various sources, including thematic experts of the different urban systems, stakeholder groups, and the core team. The goal was to create a comprehensive and accurate understanding of the potential risks posed by climate change, despite challenges of access to data, which collectively can be used to inform decision-making processes and develop appropriate adaptation strategies.

DSCC serves a 115 sq km area of Dhaka city, making it a smaller corporation (in terms of area coverage) than DNCC. DSCC is responsible for providing municipal services to 75 wards in 10 zones of the city. The Dhaka South City Corporation is located on the eastern banks of Buriganga river and lies in the lower reaches of the Ganges Delta. It is susceptible to urban flooding during rains especially in the monsoon season[6]. The DSCC's rivers and natural canal systems play a vital role in drainage, ecological balance and biodiversity conservation. However, encroachment, pollution, and illegal dumping of waste have resulted in the degradation of these water bodies over the years.

DSCC performs multi-dimensional functions for its residents living within the corporation area. Its

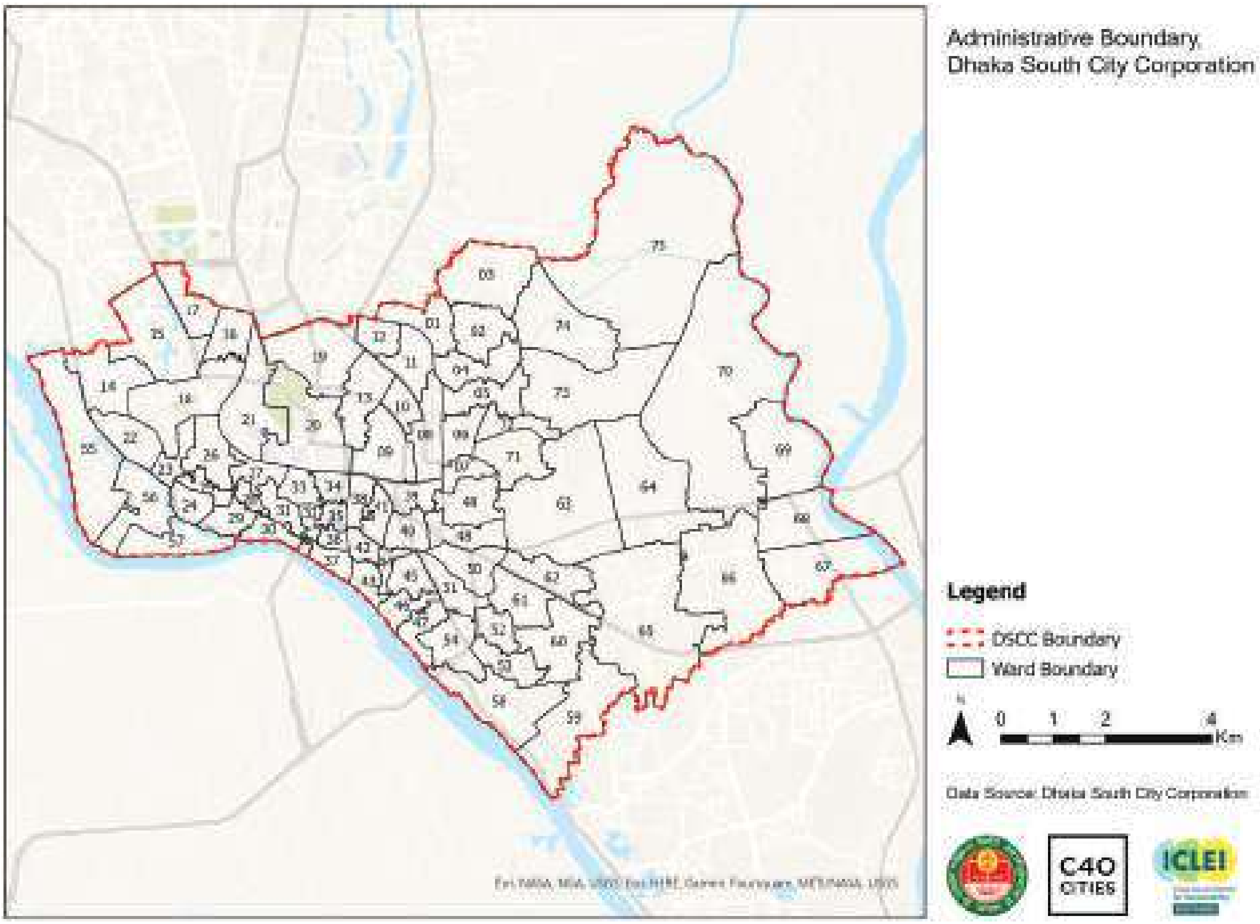


Figure 2: Administrative Map of Dhaka South City Corporation[7]

[6] New Clean Dhaka Master Plan 2018–2032

[7] Waste Management Report 2019-2020 (DSCC)

functions included public health, water supply and drainage, matters related to food and drink, animals, construction and maintenance of roads, street lighting, street watering, public safety, maintenance of parks and gardens and forests, education, culture, social welfare and general development of the city. In addition, the City Corporation may perform any functions delegated to it by the government.

4.1 Demographic and Socio-economic Context and Trend

With a growth rate of 3.4% annually, the Dhaka city (Including Dhaka South and Dhaka North) is the home to 32% of the population of the country[8] and is the only megacity within Bangladesh. Rapid growth occurred between 2001 and 2015 when the population increased from 10 million to 17.6 million[9], resulting in sprawling unplanned urban growth and a marked increase in the slum population (60% between 1997 and 2014) of the city[10]. Additionally, Dhaka city (including Dhaka South) is experiencing a significant influx of a rural-urban migration that also increases the slum population in the city. While migration for economic reasons remains the predominant factor, a notable 8% of slum dwellers cited river flooding, erosion, and natural disasters as their primary motivations for migrating. It is projected that by the year 2075, the population of Dhaka could reach 58 million, potentially making it the most populous city in the world[11].

Rapid urban growth, rural-urban migration and densification of DSCC are placing unprecedented pressure on existing infrastructure and municipal services.

Table 2: Demographic Analysis of Dhaka South City Corporation

The population of Dhaka South City Corporation (Year 2022)[12]	4,299, 345
Population Density of DSCC (Year 2022)[13]	39,352 person/sq.Km.
Year 2022 Male[14] Female[15] Other[16]	 2,334,858 1,963,834 653
Total Number of Wards (Year 2022)[17]	75
Zone	10
Ward with Highest Population Density (Year 2020)[18]	33 (234,875 Person/sq.km)
Ward with Minimum Population Density (Year 2020)[19]	69 (2,466 Person/sq.km)
Number of Slum area in both Dhaka North and Dhaka South[20]	3,394

8 https://www.gfdrr.org/en/publication/flood-risk-management-dhaka
9 https://www.gfdrr.org/en/publication/flood-risk-management-dhaka
10 https://www.gfdrr.org/en/publication/flood-risk-management-dhaka
11 https://flexbooks.ck12.org/cbook/ck-12-college-human-biology-flexbook-2.0/section/25.5/primary/lesson/future-population-projections-chumbio/
12 Population and Housing Census 2022
13 Population and Housing Census 2022
14 Population and Housing Census 2022, https://sid.portal.gov.bd/sites/default/files/files/sid.portal.gov.bd/publications/01ad1ffe_cfef_4811_af97_594b6c64d7c3/PHC_Preliminary_Report_(English)_August_2022.pdf#page=16&zoom=100,92,77
15 Population and Housing Census 2022
16 Population and Housing Census 2022
17 Waste Management Report 2019-2020 (DSCC)
18 Waste Management Report 2019-2020 (DSCC)
19 Waste Management Report 2019-2020 (DSCC)
20 http://www.dncc.gov.bd/sites/default/files/files/dncc.portal.gov.bd/annual_reports/826bcbc3_59aa_4eed_9cb7_16c254d180d1/2021-12-22-08-41

4.2 Environmental Context and Trends

4.2.1 Administrative and physical geography

As mentioned above, the DSCC was formed in 2011 as a result of the division of Dhaka CIty Corporation and merger of some new municipalities. The DSCC spreads over a 109.251 sq Km area[21] and has jurisdiction over 75 wards. The city corporation consists of several key members including the mayor,ward councillors and women councillors. The mayor is elected head of the corporation and exercises the executive authority of the corporation. The Chief Executive Officer (CEO) with the support of the secretary assists the Mayor in carrying out their responsibilities and executes all development plans. The CEO controls the authority of all departments of the city corporation. The city corporation also establishes several standing committees to monitor activities of the organisation. The DSCC is obliged to provide certain services such as public health, sanitation, water supply, urban planning, drainage, road construction and maintenance, animal welfare, street lighting etc, to the citizens within its jurisdiction. Figure 2 below shows the organisation structure of Dhaka South City Corporation.

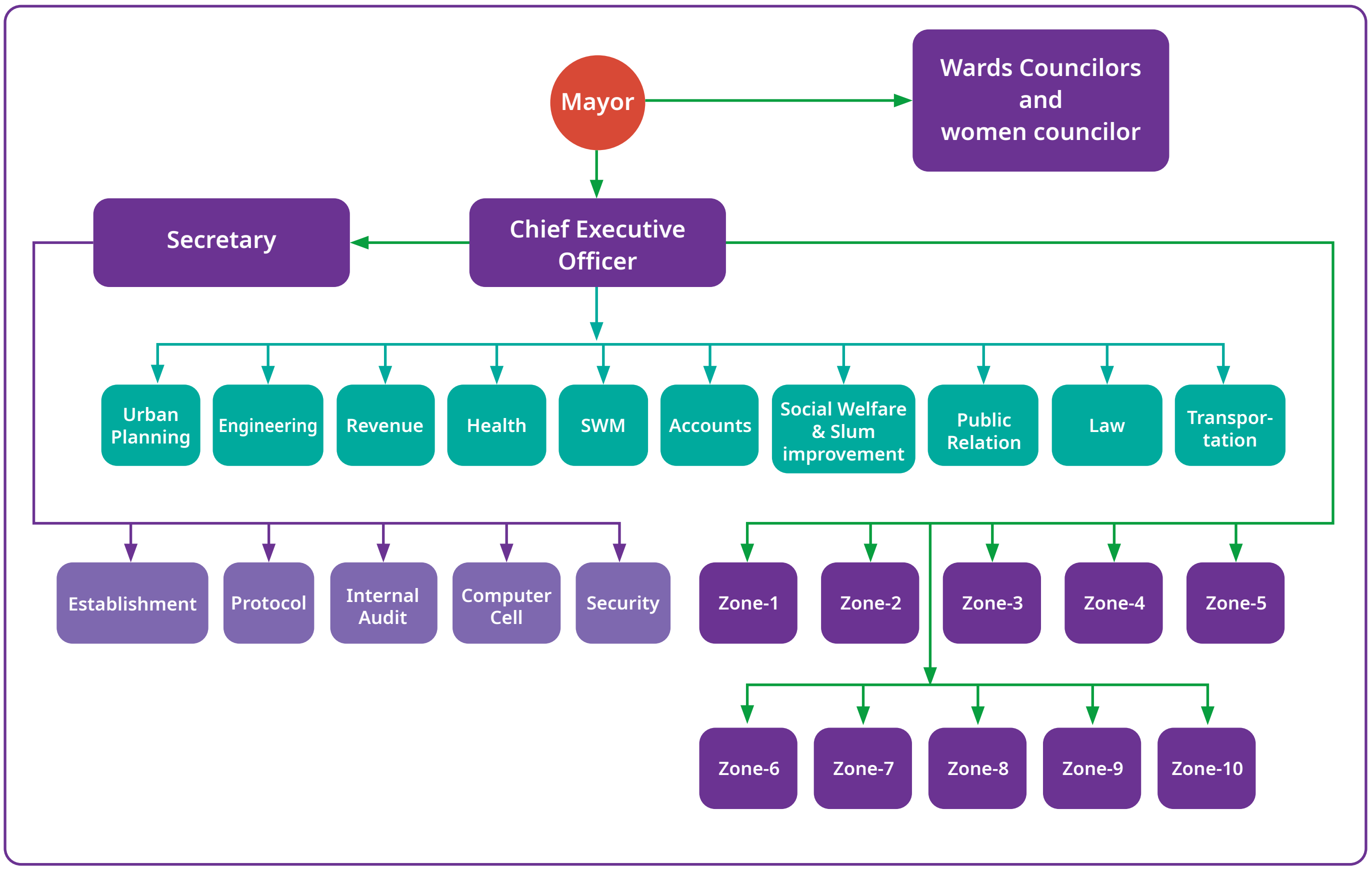


Figure 3: *Organisation chart of Dhaka South City Corporation*[22]

[21] Dhaka South City Corporation
[22] Dhaka South City Corporation

4.2.2 Climate Risk in Dhaka City

DSCC has been affected by climate change, leading to observable changes in temperature and rainfall patterns. **A rise in average temperature and increasingly erratic rainfall** are two major observed climate risks for the city, and the main reason behind heat stress and urban flooding in the city. This section provides regional (country level) and city assessment studies on prevailing climate patterns for Dhaka South City Corporation.

Dhaka experiences a tropical climate characterised by distinct monsoon patterns. The city typically observes a dry period extending from November to March, followed by a rainy season spanning from May to October. The city experiences an average yearly temperature of 25°C[23] and an approximate annual rainfall of 2,000 mm[24], the majority of which falls during the rainy season between May to September.

Temperature Trend

Dhaka City as a whole (including Dhaka North and Dhaka South) experiences some of the highest temperatures in the country. The city typically sees a maximum average temperature of around 34°C in the month of April while in the month of January, the temperatures drop significantly, with an average maximum temperature of around 25°C[25] (observable climate data from between 1988 to 2018). In winter season, the city experiences average minimum temperature 11 to 12°C[26].

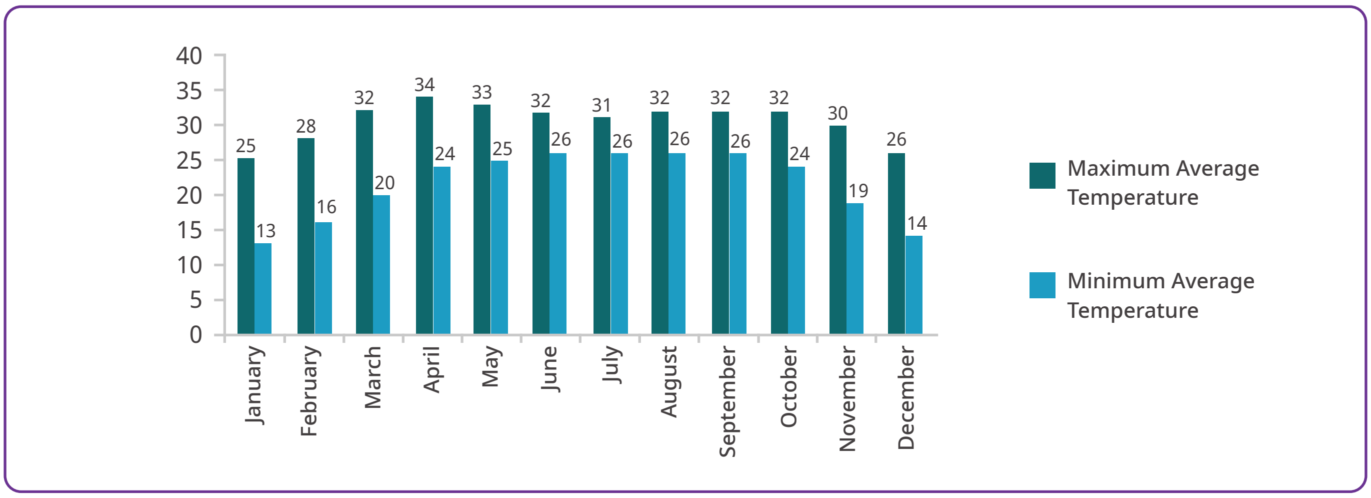


Figure 4: *Maximum and Minimum average Temperature of Dhaka City during the span 1988 to 2018*[27]

Between the period of 1980 to 2008, Dhaka city experienced a noticeable rise in average temperatures, particularly between the months of March and November[28]. Additionally, a significant and rapid increase in temperature occurred specifically between 2005 and 2009, with a rate of approximately 0.11°C[29] per year. This temperature spike had severe consequences for Bangladesh as a whole, as the country faced intense heat waves during this period. The impact of the heat waves was particularly felt in Dhaka, exacerbating the already high temperatures experienced in the city. The heat waves caused discomfort and health risks for the residents and highlighted the vulnerability of the region to extreme heat events associated with climate change.

23 Climate Change Implication of Dhaka City: A need for immediate measures to reduce the vulnerability

24 https://www.researchgate.net/publication/251165788_Climate_Change_Implications_for_Dhaka_City_A_Need_for_Immediate_Measures_to_Reduce_Vulnerability

25 https://www.researchgate.net/publication/353495426_Effects_of_Global_Emission_of_Greenhouse_Gases-CO2_N2O_and_CH4_on_Climate_Change_of_Dhaka_City

26 https://www.climatestotravel.com/climate/bangladesh/dhaka

27 https://www.researchgate.net/publication/353495426_Effects_of_Global_Emission_of_Greenhouse_Gases-CO2_N2O_and_CH4_on_Climate_Change_of_Dhaka_City

28 Climate Change Implication of Dhaka City: A need for immediate measures to reduce the vulnerability

29 https://www.researchgate.net/publication/251165788_Climate_Change_Implications_for_Dhaka_City_A_Need_for_Imdiate_Measures_to_Reduce_Vulnerability

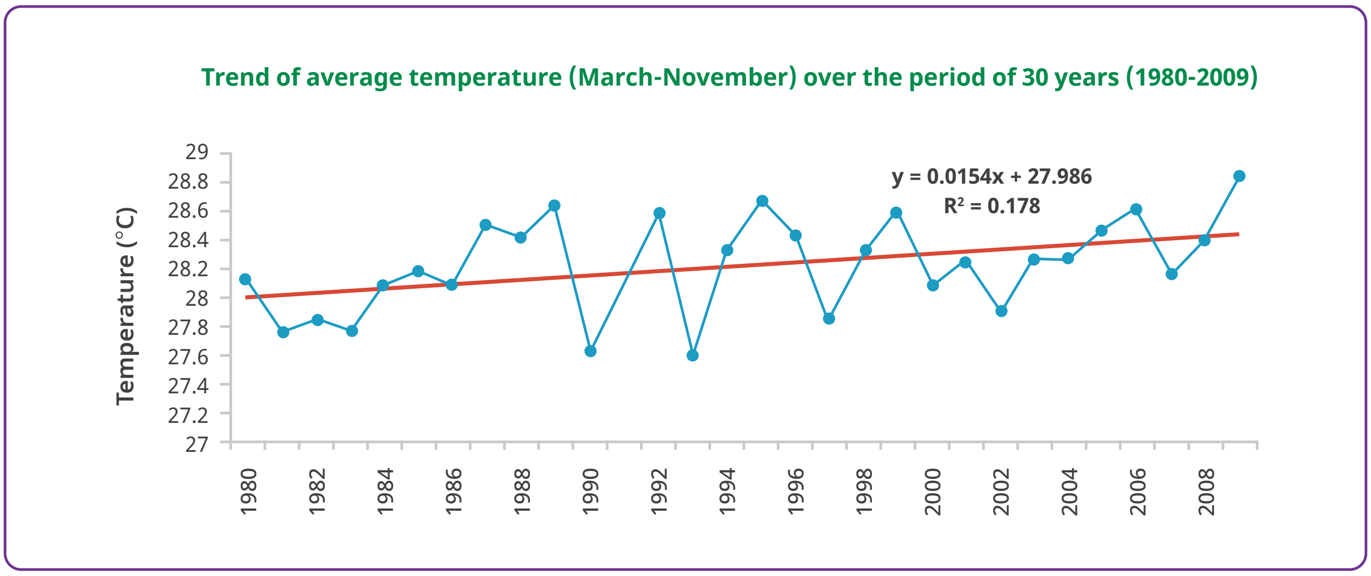


Figure 5: Trend of average temperature of Dhaka City (March to November) over 30 Years[30]

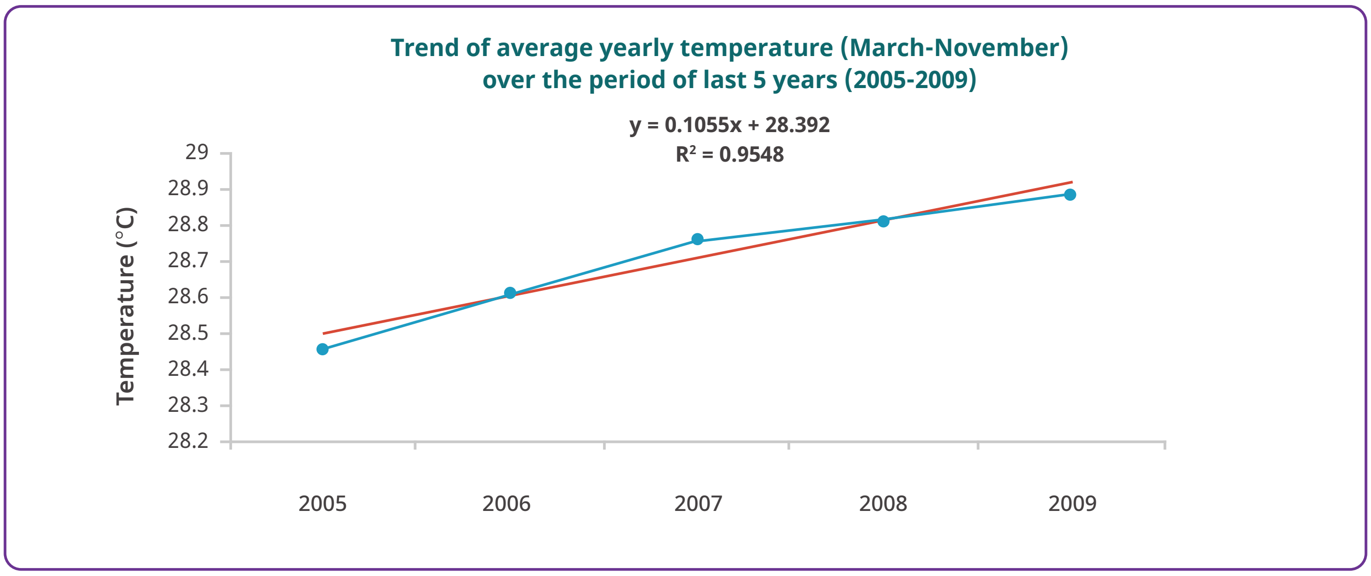


Figure 6: Trend of average yearly temperature of Dhaka city (March to November) from 2005 to 2009[31]

A comparison study of temperature between Dhaka city and its neighbouring less populated and built up city (Tangile) reveals that Dhaka has experienced a significant rise in its minimum temperature between 1988 and 2012[32] compared to other cities in the region. This indicates an increasing heat island effect within Dhaka City.

---

[30] https://www.researchgate.net/publication/251165788_Climate_Change_Implications_for_Dhaka_City_A_Need_for_Immediate_Measures_to_Reduce_Vulnerability

[31] https://www.researchgate.net/publication/251165788_Climate_Change_Implications_for_Dhaka_City_A_Need_for_Immediate_Measures_to_Reduce_Vulnerability

[32] Shahid, Shamsuddin & Wang, Xiaojun & Minhans, Anil & Harun, Sobri & Shamsudin, Supiah & Ismail, Tarmizi. (2015). Climate variability and changes in the major cities of Bangladesh: observations, possible impacts and adaptation. Regional Environmental Change. 16. 10.1007/s10113-015-0757-6.

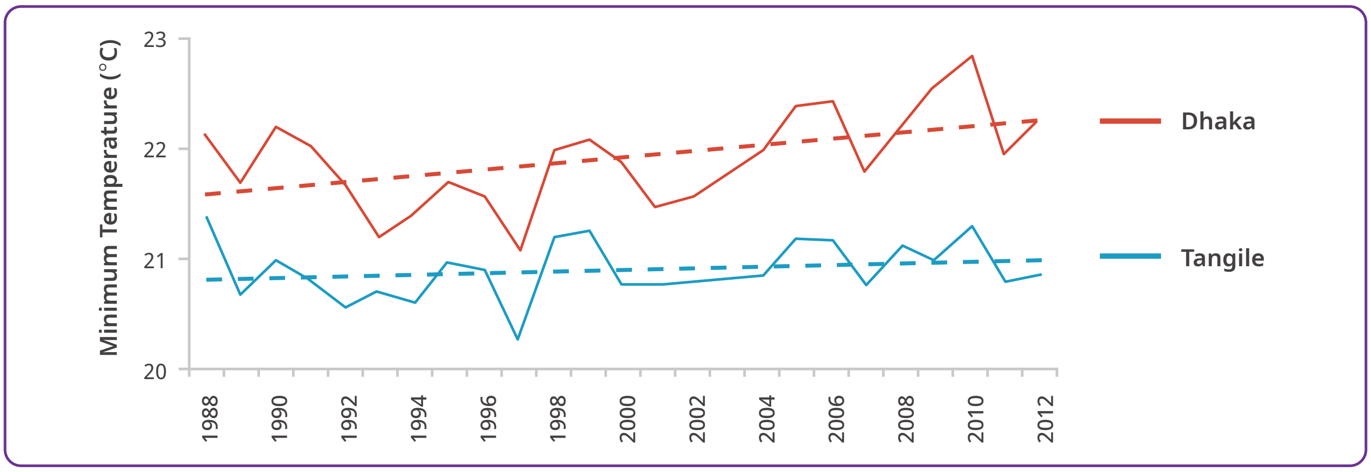


Figure 7: *Comparison of minimum temperature between Dhaka and Tangile city*[33]

Rainfall Trend

Dhaka city (Including DSCC) receives the highest amount of rainfall in the month of August (average rainfall of 338 mm)[34]. December and January are the driest months in terms of rainfall with an average rainfall of 5 mm and 8mm [35] respectively.

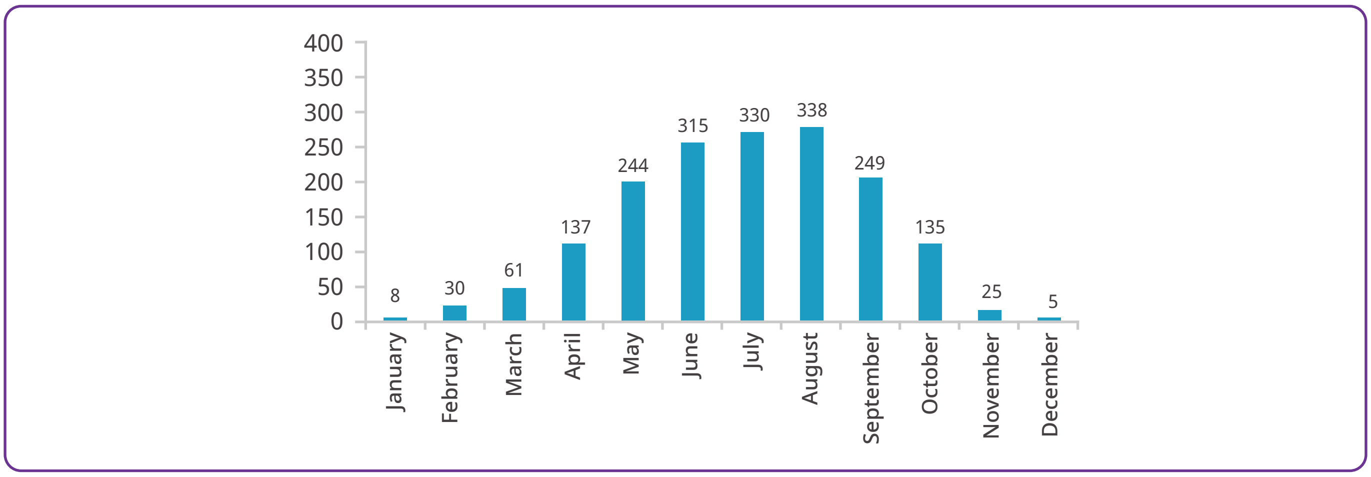


Figure 8: *Average Rainfall (mm) in Dhaka City (1988 to 2018)*[36]

Between 1978 and 2003, Dhaka city experienced a notable rise in its annual rainfall. However, there were contrasting trends observed in the seasonal distribution of rainfall[37]. The monsoon season (June-August) and winter season (December-February) witnessed a decrease in rainfall amounts during this period[38], indicating a possible shift in rainfall patterns in the city. On the other hand, there has been an increase in the occurrence of sporadic heavy rainfall events. Additionally, the frequency of sudden rainfall has been on the rise in Dhaka city.

[33] Source:Shahid, Shamsuddin & Wang, Xiaojun & Minhans, Anil & Harun, Sobri & Shamsudin, Supiah & Ismail, Tarmizi. (2015). Climate variability and changes in the major cities of Bangladesh: observations, possible impacts and adaptation. Regional Environmental Change. 16. 10.1007/s10113-015-0757-6.

[34] Source:https://www.researchgate.net/publication/353495426_Effects_of_Global_Emission_of_Greenhouse_Gases-CO2_N2O_and_CH4_on_Climate_Change_of_Dhaka_City

[35] Source:https://www.researchgate.net/publication/353495426_Effects_of_Global_Emission_of_Greenhouse_Gases-CO2_N2O_and_CH4_on_Climate_Change_of_Dhaka_City

[36] Source:https://www.researchgate.net/publication/353495426_Effects_of_Global_Emission_of_Greenhouse_Gases-CO2_N2O_and_CH4_on_Climate_Change_of_Dhaka_City

[37] Source:https://www.researchgate.net/publication/251165788_Climate_Change_Implications_for_Dhaka_City_A_Need_for_Immediate_Measures_to_Reduce_Vulnerability

[38] Source:https://www.researchgate.net/publication/251165788_Climate_Change_Implications_for_Dhaka_City_A_Need_for_Immediate_Measures_to_Reduce_Vulnerability

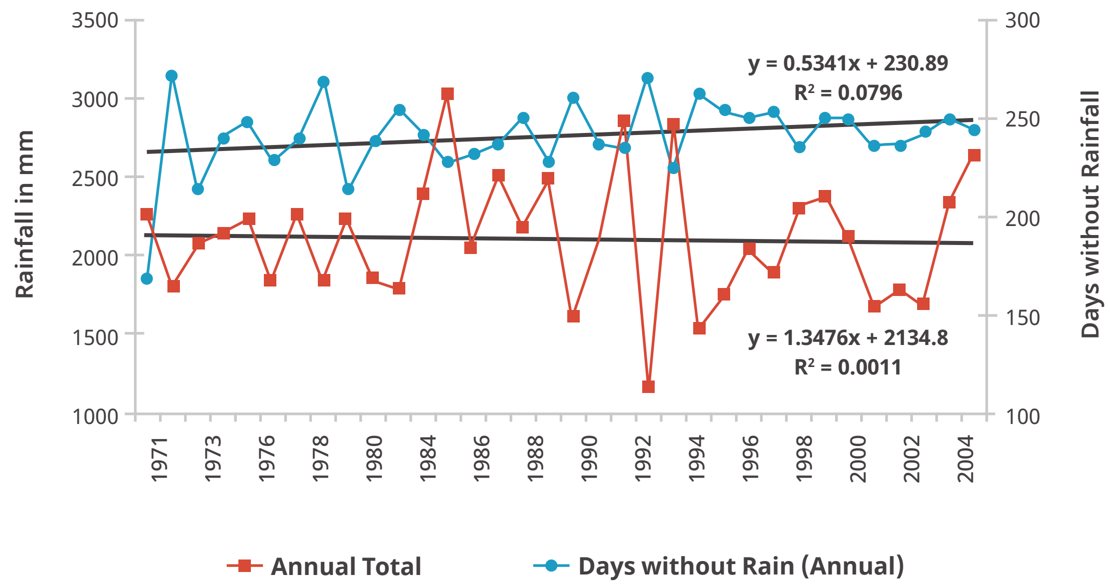


***Figure 9:** Trend of rainfall and number of days without rain in Dhaka City[39] (1970 -2004)*

Due to the unavailability of city-level climate risk projection data and information, the report has utilised country-level projections for the region to understand the projected risks for Dhaka City. To support the assessment of climate change impacts on Dhaka City, encompassing both Dhaka North and Dhaka South, three key documents were consulted: the National Adaptation Plan for Bangladesh (2023-2050), the Bangladesh Delta Plan for 2100, and a Climate Change Information fact sheet specific to Bangladesh. These reports were utilised to provide substantial evidence for understanding the projected consequences of climate change on the city. The following set of key terms elucidate the various scenarios employed within the reports to illustrate their findings.

- **Business As Usual (BAU) Scenario[40]:** The Business as Usual (BAU) scenario revolves around a moderate climate change projection, taking into account ongoing global and national endeavours to mitigate Greenhouse Gas (GHG) emission.
- **Extreme (EXT) Scenario[41]:** The Extreme scenario envisions an extreme climate change outlook, characterised by limited global and national initiatives to curtail GHG emissions, coupled with an economy heavily reliant on fossil fuels.
- **Representative Concentration Pathway (RCP):** RCPs usually refer to the portion of the concentration pathway extending up to 2100, for which Integrated Assessment Models are produced corresponding to different emission scenarios[42].

39 Source:https://www.researchgate.net/publication/251165788_Climate_Change_Implications_for_Dhaka_City_A_Need_for_Immediate_Measures_to_Reduce_Vulnerability

40 Bangladesh Delta Plan- 2100

41 Bangladesh Delta Plan- 2100

42 IPCC AR5

- **RCP 8.5[43]:** It represents a high-emission pathway in which radiative forcing exceeds >8.5 W m–2 by 2100 and may continue to increase for a certain period.

- **RCP4.5[44]:** It falls within one of two intermediate stabilisation trajectories, where radiative forcing is stabilised at around 4.5 Watts per square meter (W m-2) by the year 2100.

- **Shared Socio-economic Pathway (SSP):** The SSP scenario makes assumptions on how population, education, energy use and technology may change over the next century and couples them with assumptions about level of ambition for mitigation of climate[45]. SSP-based scenarios were used in the most recent set of climate model experiments, known as the Sixth Phase of the Coupled Model Intercomparison Project, or CMIP6 for short.

Temperature Projection

Due to the unavailability of city-level climate risk projection data and information, the report will utilise country-level projection values for the region to assess the risk projection for Dhaka City.

- According to Bangladesh Delta Plan 2100, the temperature of the country will rise about 1.4°C to 1.9°C in the Business As Usual (BAU) scenario while it will be increased by 2°C in the Extreme scenario[46] by 2050.

- According to the USAID report on Climate Projection of Bangladesh, it is projected that the mean annual temperature of the country is increased by 0.23°C, 0.79°C, and 1.69°C for the 10th, 50th, and 90th percentiles for the RCP4.5 model by 2030[47]. While mean annual temperature is projected to increase by 0.54 OC, 1.23 OC, and 2.16 OC for the 10th, 50th, and 90th percentiles for the RCP4.5 model by 2050[48].

- Mean annual temperature of the country is projected to increase by 0.23°C, 0.79°C, and 1.45°C for the 10th, 50th, and 90th percentiles for the RCP8.5 model by 2030. However, it will be increased by 0.91°C, 1.69°C and 2.76°C for the 10th, 50th, and 90th percentiles for the RCP8.5 model[50] by 2050.

- According to the Bangladesh Delta Plan 2100, it is projected that the country will experience a temperature rise ranging from 1.4°C to 1.9°C under the Business As Usual (BAU) scenario by 2050. Additionally, in the Extreme Scenario (EXT), the temperature rise is expected to be around 2°C by the same year[51].

- According to National Adaptation Plan (NAP-2023-2050), Bangladesh is expected to experience a rise in temperature from 0.44°C to 0.69°C by 2030s under the SSP1 2.6 and SSP5 8.5 Scenario while the country the projected temperature rise widens to a range of 1.3°C to 2°C under these scenarios, encompassing the potential extent of temperature change[52].

---

43 Climate Change Information Fact Sheet BANGLADESH cited from IPCC AR5

44 Climate Change Information Fact Sheet BANGLADESH cited from IPCC AR5

45 https://climatedata.ca/resource/understanding-shared-socio-economic-pathways-ssps/

46 Bangladesh Delta Plan 2100

47 https://www.climatelinks.org/sites/default/files/asset/document/Bangladesh%20Climate%20Info%20Fact%20Sheet_FINAL.pdf

48 https://www.climatelinks.org/sites/default/files/asset/document/Bangladesh%20Climate%20Info%20Fact%20Sheet_FINAL.pdf

49 https://www.climatelinks.org/sites/default/files/asset/document/Bangladesh%20Climate%20Info%20Fact%20Sheet_FINAL.pdf

50 https://www.climatelinks.org/sites/default/files/asset/document/Bangladesh%20Climate%20Info%20Fact%20Sheet_FINAL.pdf

51 https://oldweb.lged.gov.bd/UploadedDocument/UnitPublication/1/756/BDP%202100%20Abridged%20Version%20English.pdf

52 https://www4.unfccc.int/sites/SubmissionsStaging/Documents/202211020942---National%20Adaptation%20Plan%20of%20Bangladesh%20(2023-2050).pdf

Future Projected Annual Average Temperature (°C)					
Climate Stress Area	Base (1981-2010)	SSP 1-2.6		SSP 5-8.5	
		2030s (2016-2045)	2050s (2036-2065)	2030s (2016-2045)	2050s (2036-2065)
SWM	25.8	26.5	27.1	26.2	27.7
SEE	25.6	26.2	26.8	26.1	27.5
CHT	25.3	26.1	26.7	25.9	27.4
FPE	24.9	25.7	26.4	25.4	27.0
HFF	24.5	25.3	26.0	25.1	26.8
DBA	25.5	26.2	26.9	25.8	27.5
NNW	24.9	25.6	26.3	25.2	26.9
CBL	25.3	26.0	26.8	25.7	27.4
CHI	25.2	25.9	26.6	25.7	27.3
URB	25.3	26.0	26.7	25.8	27.3
BD	25.5	26.1	26.8	25.9	27.4
BoB*	28.1	28.7	29.0	28.7	29.4

***Figure 10:** Projection of Rise in Temperature in Bangladesh in SSP1-2.6 and SSP5 8.5 Scenario[53] (National Adaptation Plan-2023-2050)*

Climate stress areas:* **SWM: *south-western coastal area and Sundarbans;* **SEE:** *south-east and eastern coastal area;* **CHT:** *Chattogram Hill Tracts;* **FPE:** *river, floodplain and erosion-prone area;* **HFF:** *haor and flash flood area;* **DBA:** *drought-prone and Barind area;* **NNW:** *northern and north-western region;* **CBL:** *Chalan Beel and low-lying area of the north-west region;* **CHI:** *Char and islands;* **BoB:** *Bay of Bengal and ocean and* **URB:** *urban areas.*

Rainfall Projections

- According to Bangladesh Delta Plan 2100, the country will experience an increase in pre-monsoon and monsoon rainfall during 2030 under the BAU scenario. However, the rainfall pattern will show a reduction by 2050.
- For RCP 4.5 and 8.5, the annual rainfall of the country is predicted to be increased by 0.2mm/ day by 2030[54] (Climate Change Information Fact Sheet of Bangladesh, USAID).
- For RCP 4.5 and 8.5, the annual average rainfall of the country is projected to increase by 0.2mm/day and 0.4mm/day respectively by 2050[55] (Climate Change Information Fact Sheet).
- Pre-monsoon and monsoon rainfall in Bangladesh will be increased under BAU Scenario by 2030. Most regions of the country can expect a rise in rainfall. However, the southern part of the country along with the eastern hill will see a reduction in rainfall by 2050[56] (Bangladesh Delta Plan-2100).

[53] Source:https://www4.unfccc.int/sites/SubmissionsStaging/Documents/202211020942---National%20Adaptation%20Plan%20of%20Bangladesh%20(2023-2050).pdf

[54] Source:https://www.climatelinks.org/sites/default/files/asset/document/Bangladesh%20Climate%20Info%20Fact%20Sheet_FINAL.pdf

[55] Source:https://www.climatelinks.org/sites/default/files/asset/document/Bangladesh%20Climate%20Info%20Fact%20Sheet_FINAL.pdf

[56] Source:https://oldweb.lged.gov.bd/UploadedDocument/UnitPublication/1/756/BDP%202100%20Abridged%20Version%20English.pdf

- According to the National Adaptation Plan (NAP-2023-2050), the projected rainfall pattern of Bangladesh will vary between 0.1%-0.4% in 2030 and 2.4% -3.5% in 2050. Moreover, the urban areas of the country will receive higher rainfall than all others except the South East coastal areas, the Haor areas and the Chittagong hill tracts[57].

Future Projected Annual Average Rainfall (mm)					
Climate Stress Area	Base (1981-2010)	SSP 1-2.6		SSP 5-8.5	
		2030s (2016-2045)	2050s (2036-2065)	2030s (2016-2045)	2050s (2036-2065)
SWM	2129	2138	2210	2185	2215
SEE	3266	3300	3411	3374	3431
CHT	2912	2943	3040	3010	3069
FPE	2558	2579	2598	2647	2667
HFF	3653	3652	3683	3712	3783
DBA	1560	1588	1631	1638	1643
NNW	2157	2193	2191	2281	2255
CBL	1663	1692	1724	1745	1741
CHI	2686	2699	2750	2769	2800
URB	2759	2785	2840	2839	2882
BD	2579	2582	2640	2615	2669
BoB*	**1560**	**1353**	**1393**	**1628**	**1707**

mm 1300 1800 2300 2800 3300 3800

***Figure 11:** Projected rainfall in Bangladesh in SSP1-2.6 and SSP5 8.5 Scenario[58] (National Adaptation Plan)*

Climate stress areas: **SWM: south-western coastal area and Sundarbans; **SEE:** south-east and eastern coastal area; **CHT:** Chattogram Hill Tracts; **FPE:** river, floodplain and erosion-prone area; **HFF:** haor and flash flood area; **DBA:** drought-prone and Barind area; **NNW:** northern and north-western region; **CBL:** Chalan Beel and low-lying area of the north-west region; **CHI:** Char and islands; **BoB:** Bay of Bengal and ocean and **URB:** urban areas..*

The majority of the reports reviewed agree that temperatures are likely to increase significantly by 2050 (between 1.4°C- 1.9°C) under the Business as-usual Scenario. The reports also largely agree that rainfall is also projected to increase across the majority of the country in the near term (by 2030) and mid term under the BAU Scenario but will likely decrease in the eastern part along with the eastern hill by 2050. This indicates that certain areas within the country may experience a decrease in rainfall rather than an increase. It highlights the regional differences and complexities associated with the impacts of climate change on rainfall patterns in Bangladesh.

[57] Source:https://www4.unfccc.int/sites/SubmissionsStaging/Documents/202211020942---National%20Adaptation%20Plan%20of%20Bangladesh%20(2023-2050).pdf

[58] Source:https://www4.unfccc.int/sites/SubmissionsStaging/Documents/202211020942---National%20Adaptation%20Plan%20of%20Bangladesh%20(2023-2050).pdf

4.3 Major Climate Hazards and Trends

The Dhaka South City Corporation is prone to **severe heat stress, urban flooding caused by river flooding and heavy rainfall and cyclones and storm surges**. The city's susceptibility to flooding is exacerbated by erratic rainfall patterns and its low-lying terrain. A brief overview of the likelihood, frequency, intensity and scale of the hazards are presented in the table below:

Table 3: Overview of Hazardous Events in the Dhaka city (including DNCC and DSCC) on a scale of Low (yellow), Medium (orange), High (red)

Sl. No.	Hazard	Likelihood	Frequency	Intensity	Scale
1	Heat Waves	High (In case of increase of global temperature up to 2 degree celsius)	Medium (Occurs every one to two years)[59]	High (In case of increase of global temperature up to 2 degree celsius[60])	City wide
2	Urban Flooding	High (Flood risk may increase 18-65% in 2050 without Intervention[61])	High (occurs every year)	High (Dhaka South is lower than DNCC, there is greater flooding and water logging impacts.	Low lying areas of the city[62]
3	Cyclones	High[63]	High (occurs every year, sometimes multiple times in a year)	Low[64] as Dhaka North is not a coastal city. However, this risk is likely to increase as per the Delta Plan 2100.	City wide

Dhaka South City Corporation is prone to severe heat stress, river and rain-induced urban flooding, and cyclones. The erratic rainfall and terrain of the city make it very vulnerable to flooding through rivers and rainfall.

The table below aims to offer a comprehensive summary of the identified climate hazards and their implications on various aspects such as the development sector, city area, and population. Its purpose is to provide a concise overview of the perceived risks posed by these hazards in relation to the aforementioned factors. By presenting this information in a structured format, the table enables a better understanding of how climate hazards may impact the development sector, city areas, and the population at large.

59 https://www.theweek.in/news/india/2023/05/17/heatwaves-in-india-to-get-more-frequent-and-longer.html

60 https://apnews.com/article/climate-change-heat-wave-south-asia-india-bangladesh-laos-thailand-9343bb3fafbbd1ca737129d43a2574f6

61 https://www.researchgate.net/publication/319877184_Future_developments_in_Bangladesh_urbanisation_scenarios_to_assess_flood_risk

62 https://www.researchgate.net/publication/319877184_Future_developments_in_Bangladesh_urbanisation_scenarios_to_assess_flood_risk

63 https://nhess.copernicus.org/articles/21/1313/2021/nhess-21-1313-2021.pdf

64 Saha, Manik & Khan, Niaz. (2014). Changing Profile of Cyclones in the Context of Climate Change and Adaptation Strategies in Bangladesh. Journal of Bangladesh Institute of Planners. 63-78.

Table 4: Past Hazardous Event and Their Impact on Dhaka City (Including Dhaka North and Dhaka South)

Past Hazardous Event	Year	Impacts Sectors	Impacted Area	Affected Population
Flooding and Water Logging[65]	1988,	Drainage System, system, Solid Waste Management System, and Water supply.	85% of Dhaka city was impacted[66].	Residents, slum population, Childern, Women
Flooding and Water Logging	1998	Drainage, Solid Waste Management and water supply system	56% of Dhaka was inundated. Most of the city's eastern portion suffered from river flooding, and 23% of its western part was affected by urban flooding[67]	Residents, slum population, Women
Flooding and Water Logging	2004	Water pipeline were damaged, and Drainage System were impacted	More than 5 million people—two-fifths of city residents—were affected. Out of the city's 22 thanas (subdistricts), 18 were inundated. Gulshan, Banani, Baridhara, and Nikunja experienced prolonged inundation, while the Motijheel commercial area, including Arambagh and Gopibagh, was underwater for a few days as a result of drainage congestion	Residents, slum population,
Flooding and Water Logging	2009	Drainage and Solid Waste system		Residents, slum population, Childern, Women
Flooding due to heavy rain triggered by Cyclone	2020	Impacted Transportation system and drainage system and power supply	Washed away 7 km embankment[68]	Residents, slum population, Childern, Women
Flooding due to heavy rain triggered by Cyclon	2022	Impacted Transportation system	9 people died in Dhaka, Khulna and Barisal[69]	Residents, slum population, Childern, Women
Heat Stress/Heat Stress	2003	Transportation System and economy	62 People died due to heat wave in Bangladesh, with feel-like temperatures reaching 40oC because of humidity of 50%.[70]	Resident, Slum, Van puller, street vendors, and agriculture labour, children, Women, rickshaw pullers, construction workers.
Heat Stress/ heatwaves	2005	Transportation System and economy	The heat wave swept over Dhaka, Khulna, Rajshahi and Chittagong, claiming near 100 lives. The temperature reached 40°C[71].	Residents, rickshaw pullers, van pullers, street hawkers, construction workers, agriculture labourers

65 https://documents1.worldbank.org/curated/en/683381468001782892/pdf/100228-PUB-REVISED-Box393232B-PUBLIC-PUBDATE-10-26-15-DOI-10-15969781464807107-EPI-1464807108.pdf

66 https://documents1.worldbank.org/curated/en/683381468001782892/pdf/100228-PUB-REVISED-Box393232B-PUBLIC-PUBDATE-10-26-15-DOI-10-15969781464807107-EPI-1464807108.pdf

67 https://documents1.worldbank.org/curated/en/683381468001782892/pdf/100228-PUB-REVISED-Box393232B-PUBLIC-PUBDATE-10-26-15-DOI-10-15969781464807107-EPI-1464807108.pdf

68 https://www.sciencedirect.com/science/article/abs/pii/S2212420921001138

69 https://www.aljazeera.com/news/2022/10/25/bangladesh-cyclone-sitrang-bhola-coast

70 Feasibility Study of Heat Wave in Dhaka

71 http://ikcest-drr.osgeo.cn/static/upload/2b/2b66a81c-366e-11ea-9a1b-00163e0618d6.pdf

Past Hazardous Event	Year	Impacts Sectors	Impacted Area	Affected Population
Heat Stress/Wave	2023	• Agriculture • Water	The heat wave swept over Dhaka, Khulna, Rajshahi and Chittagong, claiming near 100 lives. The temperature reached 40°C[72].	Residents, rickshaw pullers, van pullers, street hawkers, construction workers, agriculture labourers
Cyclone Sidr	2007	Transportation Water Service Electricity	Severe winds and flooding. Killed around 3000 people in different parts of Bangladesh[73].	Residents, Rickshaw pullers, van pullers, street hawkers,
Cyclone Roanu	2016	Transportation	Heavy rain in Dhaka city, 24 people killed in different part of Bangladesh	Residents, Rickshaw pullers, van pullers, street hawkers
Cyclone Sitrang	2022	Transportation Power	9 people died in Dhaka, Khulna and Barisal[74]	Residents, Farmers

5. Future Climate Hazards and Impacts

5.1 Projected Climate Hazards

Recent studies show that the Dhaka South City Corporation is highly vulnerable to **heat stress** and **river and rain induced flooding**. Impacts from cyclonic storm surges are limited to impacts due to excessive rainfall and urban flooding, and there is little impact of high-speed winds since DSCC is not coastal.

Heat Stress: According to the Think Hazard assessment, for Dhaka City prolonged exposure to extreme heat, resulting in heat stress is expected to occur at least once in the next five years[75]. Heat stress and humidity in Dhaka city have been impacting the productivity of the city. According to Adrienne Arsht-Rockefeller Foundation Resilience Center, Dhaka city is losing around $ 6 billion every year due to heat stress[76] (more than 8% of annual output of Dhaka City). According to the Feasibility Study on Heat Wave in Dhaka 2018, workers (who work outside such as rickshaw pullers, van pullers, street hawkers, construction workers, agriculture labourers) are the most vulnerable group from heat waves. It also highlights 25% daily income lost of the rickshaw pullers due to heat waves. If the current trend of increasingly dangerously hot days continues, it is estimated that the impacts of extreme heat will become more severe by 2050, with women and girls likely to bear a disproportionate burden[77].

In Bangladesh, under the business-as-usual (RCP 8.5) scenario, the heat stress is projected to be increased in frequency and intensity[78] (Choi et.al. 2021). According to another report, if the global average temperature increases by 2°C compared to the levels of the 1800s, Bangladesh is expected to encounter heatwaves approximately once every one to two years[79]. The frequency and intensity of heatwaves are significantly amplified by climate change.

Urban Flooding: In terms of vulnerability to flooding, Bangladesh holds sixth position among the most flood prone countries[80]. In the context of a changing climate, Bangladesh is particularly vulnerable, and Dhaka, its capital city, has been recognised as one of the leading Asian cities in terms of population susceptible to flooding by the 2070[81]. The Think Hazard web-based tool[82] indicates that Dhaka is expected to experience frequent urban floods and river floods, posing significant risks to both property and lives. These

72 http://ikcest-drr.osgeo.cn/static/upload/2b/2b66a81c-366e-11ea-9a1b-00163e0618d6.pdf
73 https://www.theweathernetwork.com/en/news/weather/severe/this-day-in-weather-history-november-15-2007-bangladesh-beaten-down-by-sidr
74 https://www.aljazeera.com/news/2022/10/25/bangladesh-cyclone-sitrang-bhola-coast
75 https://thinkhazard.org/en/report/577-bangladesh-dhaka/EH
76 https://onebillionresilient.org/hot-cities-chilled-economies/
77 https://onebillionresilient.org/2023/05/03/bushra-afreen-dhaka-chief-heat-officer/
78 https://link.springer.com/article/10.1007/s00382-021-05856-z
79 https://apnews.com/article/climate-change-heat-wave-south-asia-india-bangladesh-laos-thailand-9343bb3fafbbd1ca737129d43a2574f6
80 https://link.springer.com/content/pdf/10.1007/s13753-013-0020-z.pdf
81 https://documents1.worldbank.org/curated/en/683381468001782892/pdf/100228-PUB-REVISED-Box393232B-PUBLIC-PUBDATE-10-26-15-DOI-10-15969781464807107-EPI-1464807108.pdf
82 https://thinkhazard.org/en/report/577-bangladesh-dhaka/CY

damaging and potentially life-threatening events are projected to occur at least once every 10 years.

According to the National Adaptation Plan of Bangladesh-2030-2050, under SSP5-8.5 Scenario, the projected mean annual flow of the Ganges, Brahmaputra and Meghna (GBM) river basins will increase by 17-28%, 2-5% and 1-4% respectively by 2050. The higher increase in Ganges basins will elevate the likelihood of flooding in the country.

NAP-2030-2050 also highlighted that rapid urbanisation has already rendered various cities susceptible to urban flooding, especially cities located at low lying areas (including Dhaka) and escalating by the extreme rainfall events.As projected, iIncrease and sudden rainfall will amplify the hazard associated with urban flooding and water logging.

Cyclone: The impact of climate change is expected to result in an increase of cyclone intensity in Bangladesh, potentially leading to a more severe impact on the country. It is expected that 17 million people would be exposed to inundation depths exceeding 1 metre, while approximately 13.5 million people would encounter depths surpassing 3 metre[83]. According to the NAP-2030-2050 report, 50 cm of sea level rise could potentially inundate large parts (11%-12%) of the coastal area of Bangladesh. The cyclone's primary impact has been concentrated along the coastal regions of Bangladesh. However, Dhaka city has been grappling with waterlogging issues triggered by the heavy rainfall associated with the cyclone. These downpours have disrupted both the city's power supply infrastructure and its transportation systems but the city does not experience any major impacts of high speed winds.

According to Think Hazard[84] The cyclone risk in Dhaka City is categorised as High. This implies that there is a probability exceeding 20% of experiencing infrastructure-damaging wind speeds.

Coastal regions in Bangladesh (particularly in Cox's Bazar and Chittagong), face a heightened vulnerability to the occurrence of super cyclonic conditions, which may happen as often as once every 20 to 100 years[85].

However, in Dhaka, the maximum gust speeds are expected to reach 35 m/s (68 kn) in only 1% of weather events, and 25 m/s (48 kn) in a range from 5% to 50% of weather events, which makes the city susceptible to such extreme conditions[86].

5.1.1 Climate Impact Assessment of Urban System

To assess the impact of climate change on the urban system and services of the city, a climate impact assessment was conducted. This assessment focused on urban systems that are particularly vulnerable due to inefficient services, inadequate infrastructure, high energy consumption, and greenhouse gas emissions. The selection of these urban systems was based on past climatic hazards and their impact on the systems and services.

Situation Analysis of Solid Waste Management

Dhaka South City Corporation is responsible for the overall management of solid waste. The DSCC area generates around 5099 TPD municipal waste. According to DSCC, the collection efficiency of solid waste in the city is about 90% whereas only 20% of segregated waste is being collected by the waste collectors. DSCC is not involved in the door-to-door collection or primary collection of solid waste. Primary waste collection is being done through Primary Collection Service Providers (PCSPs) or households dump their waste in waste collection bins, containers, or Secondary Transportation Stations (STSs). 75 PCSPs[87] are actively involved in primary waste collection in the DSCC area. 5346 cleaners are responsible for street cleaning, drain cleaning, road cleaning, and STS cleaning. DSCC’s secondary waste collection vehicles, including compactors, dumper placers, and arm loaders collect waste from dustbins, containers, and secondary transfer stations and transfer it to the Matuail Landfill site.

- **Fragility Statement**

  Rapidly expanding population, economies, and urbanisation have put pressure on the existing waste management infrastructure. Inadequate waste management infrastructure can lead to various environmental and health issues.

83 https://www.sciencedirect.com/science/article/pii/S2212094714000826#bib23

84 https://thinkhazard.org/en/report/577-bangladesh-dhaka/CY

85 https://nhess.copernicus.org/articles/21/1313/2021/nhess-21-1313-2021.pdf

86 https://nhess.copernicus.org/articles/21/1313/2021/nhess-21-1313-2021.pdf

87 Waste Management Report 2019-2020, (DSCC)

Climate Impacts

The urban flooding risk severely impacts the solid waste management system in the city. Since waste is not fully collected, solid waste can clog the drains during excessive rainfall, since the water will carry the litter to the drains. This causes stagnation of water and may result in vector borne diseases, impacting health of the population through knock-on impacts.

During heat wave conditions, workers in the solid waste dumpsite are adversely impacted due to higher rates of decomposition leading to foul odour, percolation of leachate and chances of landfill fires.

Situation Analysis of Water Supply System

Dhaka Water Supply & Sewerage Authority (DWASA) is responsible for providing water supply, sewerage, and drainage service in Dhaka City. It covers more than 401 sq km service area with around 12.5 million people[88]. Dhaka City heavily relies on the extraction of groundwater to meet its water supply needs. Over 78%[89] of the supplied water is coming from groundwater extraction while 22% of supplied water comes from surface water sources such as rivers. This extensive reliance on groundwater extraction has resulted in a high rate of depletion of the groundwater table. Daily water demand of the city is estimated to be around 350 crore litres by 2023[90]. The city has five water treatment plants to treat surface water. According to Dhaka Water Supply Master Plan, Dhaka Water Supply and Sewerage Authority (WASA) encounters various challenges, including uncontrolled urban expansion and informal settlements, illegal connections and the shift towards surface water use instead of groundwater.

- **Fragility Statement**

The water supply distribution network in Dhaka South City Corporation is struggling to keep up with the demands of the current population. The loss from unaccounted for water (UFW) due to leakages and unauthorised connections is high. Excessive groundwater use is leading to depletion of the water table, raising concerns among city planners and policymakers.

Climate Impacts

During heat waves and heat stress, the water demand in the city increases. This results in greater extraction of ground water, which is the primary source of water, leading to depletion of the ground water table.

During excessive rainfall, there are chances of contamination of water resources due to water logging and leakages in pipelines.

Situation Analysis of Drainage System

Dhaka South City Corporation along with Dhaka Water Supply & Sewerage Authority (DWASA) is responsible for managing the drainage system in the city. The urban drainage infrastructure consists of storm sewer lines and open channels or canals, locally called Khals. These khals, along with wetlands and ponds are also considered the natural drainage system of the city. Since the clay soil composition of Dhaka hampers the percolation of water into the ground. Therefore, the city relies on natural drainage systems and storm sewer lines to efficiently evacuate stormwater from the city to avoid urban flooding[91]. These open channels are facing blockage issues due to the dumping of solid waste and irregular cleaning. They also become inaccessible due to encroachments. On the other hand, only one-third of the city covers the sewerage system[92]. Like DNCC, DSCC also has only 40 dedicated staff to manage the drainage system of the DSCC[93]. As a consequence, during rainfall, there is a frequent occurrence of water logging in the city. The situation of DSCC is comparatively more challenging than the DNCC due to DSCC being more urbanised than DNCC and other areas of Dhaka. The higher level of urbanisation increases the greater infrastructure demands for the drainage system.

---

89 https://www.researchgate.net/publication/348752376_Analysis_of_Groundwater_Level_Fluctuations_in_Dhaka_City/link/607844c08ea909241efeaa67/download

90 https://www.researchgate.net/publication/348752376_Analysis_of_Groundwater_Level_Fluctuations_in_Dhaka_City/link/607844c08ea909241efeaa67/download

91 https://www.researchgate.net/publication/265941623_Readdressing_Dhaka's_Public_Water_Bodies_A_Design_Research_Readdressing_Dhaka's_Public_Water_Bodies_A_Design_Research/download

92 http://dscc.portal.gov.bd/sites/default/files/files/dscc.portal.gov.bd/news/c7a5b927_0929_4d19_bf66_52a5aa4bdfb8/DSCC%20DUUP%20EMF%20final%20versn%2023%20Apr2018%20rev%20%282%29.pdf

93 https://openknowledge.worldbank.org/server/api/core/bitstreams/4b511e5c-f20f-550c-902d-b828f8abb4c2/content

- **Fragility Statement**

  Encroachment, poor condition of the natural drainage system (including Khals, Pond, and Wetland), indiscriminate dumping of solid waste and liquid waste into the drains inadequate coverage of the drainage system are resulting in many parts of the city being waterlogged and susceptible to disease.

  Climate Impacts:

  The drainage system is highly vulnerable to excessive rainfall. Since they are already often clogged with debris and solid waste, excessive rainfall results in urban flooding. Rapid urban development is resulting in lesser open spaces for percolation of water while encroachment is taking over natural drainage systems, thus exacerbating drainage issues.

Situation Analysis of Transportation

Dhaka Transportation and Coordination Authority (DTCA) is the nodal agency to manage public transportation in the Dhaka South City Corporation and other parts of Dhaka city. Commuters in the DSCC utilizes various mode of transportation, including public buses, private cars, ferries (water transportation), and rickshaws, to meet their daily transportation needs. According to the UNESCAP report on Sustainable Transportation Index for Dhaka-Bangladesh 2018, 38% of commuters of Dhaka city use rickshaws, followed by public buses, walking, and auto rickshaws[94]. The DSCC has both registered and non-registered rickshaw pullers. According to data provided by BRTA, the DSCC has a total of 2233 buses and 14946 private cars. The major issues faced by the DSCC are illegal encroachment of footpaths and the lack of proper infrastructure facilities for public transportation. Although the DSCC has recently increased its public bus fleet (100 electric buses) these are not enough to manage the growing demand for public transportation. Like DNCC, DSCC has also been facing traffic congestion, traffic management, and a lack of infrastructure issues. As a consequence, the transportation system in the DSCC area becomes inefficient and unreliable.

- **Fragility Statement:**

  Illegal encroachment of footpaths, inadequate infrastructure and rapid urbanisation and population growth make the transportation system and related services of DSCC fragile. As a consequence, traffic congestion is very common in the city.

  Climate Impacts

  Both heat waves and urban flooding can significantly impact the transportation system. When heat waves occur, it exacerbates the challenges faced by commuters, particularly in over-crowded public transport systems. This often prompts individuals to opt for personal modes of transportation, such as cars or motorcycles, as a means to cope with the discomfort and inconvenience. Unfortunately, this shift towards personal vehicles during heatwaves can contribute to an increase in emissions, as more vehicles hit the road. This, in turn, further worsens air quality and adds to the environmental burden.

Excessive rain can damage road infrastructure, and waterlogging can increase travel time, impacting livelihoods and productivity in general. Dhaka City which is already notorious for its traffic congestion is severely impacted due to urban flooding and waterlogging as reported in various reports of climate disasters.

Situation Analysis of Energy and Power System

Bangladesh mainly uses Domestic Natural Gas as an energy source[95]. To facilitate its economic and social progress, Bangladesh has prioritised the provision of electricity. Dhaka Power Distribution Company (DPDC) is the main agency responsible for the distribution of electricity in the city. Like DNCC, DSCC also has a residential area as a major consumer of electricity followed by industrial and commercial sectors. The slum area of the DSCC faces significant energy and power challenges. Due to considering an illegal settlement, the urban poor often face barriers in applying for and accessing legal energy services in Dhaka city[96]. Therefore, there is a prevalence of illegal

---

94 https://www.unescap.org/sites/default/files/16.%20Urban%20transport%20in%20Dhaka%20-%20Mr.Noor-e%20Alam.pdf

95 https://powerdivision.portal.gov.bd/sites/default/files/files/powerdivision.portal.gov.bd/page/4f81bf4d_1180_4c53_b27c_8fa0eb11e2c1/(E)_FR_PSMP2016_Summary_revised.pdf

96 https://dergipark.org.tr/en/download/article-file/361247

connections within these areas as the community resort to unauthorised means to meet their energy needs. The city experience a significant loss of electricity (10%[97]) of the electricity generated due to the old infrastructure. This demand-supply gap has contributed to inadequate power distribution leading to power disruption in the DSCC.

- **Fragility Statement:**

  Illegal settlements and slum populations face a major crisis of energy due to existing policies, leading to unauthorised connections. Weak distribution networks and old infrastructure are responsible for power disruption in the area.

  Climate Impact

  During periods of extreme heat, the demand for energy surges as residential, industrial and commercial air conditioning units are used extensively. Consequently, this leads to frequent power outages, adding to the discomfort experienced by the population. Additionally, cyclonic storms, excessive rainfall, and urban flooding can cause significant damage to infrastructure, resulting in prolonged power interruptions lasting several days.

Situation Analysis of Health System

The health sector of Bangladesh faces significant challenges. The country has made progress in recent years but still falls below the World Health Organisation's minimum standard of 2.28 healthcare professionals per 1000 people, with only 0.5 doctors and 0.2 nurses per 1000 people[98]. Hence, there is a significant lack of health care systems in urban areas of Dhaka. Moreover, urban healthcare services are being operated by multiple stakeholders, including NGOs, local governments and centers government. According to Dhaka South City Corporation, DSCC has 193 hospitals and health care centers and 5 maternity centers. But these are not adequate to cater to the growing population of the city. The shortage of doctors and nurses is a major issue in hospitals. The urban local body does not have sufficient funds to improve the existing infrastructure. The number of private healthcare facilities has increased in the city which improves the health care situation of the city. However, private healthcare facilities do not have easy access and affordability for the urban poor. Air pollution, water pollution, the spread of infectious diseases, and climate change are key challenges faced by the health sector of the city.

- **Fragility Statement:**

  Dhaka South City Corporation (DSCC) faces challenges with inadequate hospitals, a shortage of healthcare professionals, and limited funds for infrastructure. Private healthcare facilities are not easily affordable for the urban poor.

  Climate Impacts

  Public hospitals are not equipped to deal with heat stress and this can severely impact the health of the urban poor who are largely dependent on the public healthcare system because of its affordability.

Excessive rainfall and urban flooding in some cases cuts off access to health care units, and this is particularly troublesome for the urban poor who may not have the means to access other healthcare systems far away from their residence. Moreover, water borne diseases caused by flooding and contaminated water consumption in flooded areas can pose undue pressure on already stressed out public healthcare systems.

Situation Analysis of Wastewater Management

Dhaka South City Corporation faces significant challenges in the management of its wastewater due to its increasing population (especially in the slum population) and inadequate infrastructure. The DSCC has one sewerage treatment plant, named Pagla STP which covers only 7.5% of households of the DSCC. The existing infrastructure of wastewater management is not sufficient to manage the growing demand that arises due to the flourishing population of the city. The inadequate infrastructure for wastewater treatment leads to the discharge of untreated wastewater into stormwater drains, open drains, rivers, etc. Approximately 21% of households[99] in Dhaka city (including both DSCC and DNCC) release wastewater

97 https://www.afd.fr/en/carte-des-projets/strengthening-electricity-distribution-dhaka

98 https://www.banglajol.info/index.php/BMJ/article/view/26356/17685

99 https://www.susana.org/_resources/documents/default/3-2609-7-1470298292.pdf

directly into stormwater drains or open drains. This distressing scenario presents serious environmental and public health challenges that demand immediate attention and comprehensive solutions. Unchecked discharge of untreated wastewater management can have far-reaching and severe consequences on human health as well as on groundwater and surface water.

- **Fragility Statement:** The Dhaka South City Corporation faces significant challenges in wastewater management due to its high population density, insufficient infrastructure, and substantial slum population. As a consequence of these limitations, untreated domestic sewage and industrial effluents are frequently discharged into rivers and canals, resulting in severe pollution and contributing to flooding.

  Climate Impact

  Rise in temperature in DSCC can create favourable conditions for microbial growth on stagnant waste water, resulting in production of noxious gases and foul odour. On the other hand, an increase in rainfall intensity or erratic rainfall in the city poses a threat to existing sewerage systems and associated infrastructure, leading to water accumulation and the spread of water and vector-borne diseases, particularly in lower-income areas and slum pockets.

5.2 Future Climate Impacts and Preparation of Vulnerability Assessment Map

Based on the climate risks identified above of increasing temperatures, cyclone and rainfall and increased sudden, high intensity rainfall events, the different urban systems are analysed to identify possible future climatic risks to these systems. For each urban system analysed above, the climate fragility statements giving potential future risks are outlined in table below:

Table 5: Climate Fragility Statement for critical Urban system of the Dhaka South City

Urban System	Climate Risk - 1: Increase Temperature	Climate Risk - 2: Erratic Rainfall	Climate Risk - 3: Cyclone
Solid Waste Management	Rising temperatures can impact the waste collection efficiency of the city. High temperature and humidity can alter the waste decomposition rate, leachate production rate and chemical composition of the leachate which will facilitate microenvironments that encourage the spread of infectious diseases. It can also increase the risk of fires in landfill sites	Excessive rainfall can lead to waterlogging and urban flooding due to the obstruction of drains and water flow caused by improper disposal of solid waste. This can result in infrastructure damage and contamination of water bodies.	Storm surges from cyclones may cause similar impacts from water logging and urban flooding.
Water Supply System	Due to rising temperatures, water demand may increase in the city, putting stress on existing sources of water, particularly the groundwater. Given that the groundwater table is depleting, this may result in acute water stress on the water resources within the city.	Sudden, intense rainfall may cause urban flooding that can damage the infrastructure of the water supply system and contamination of water due to leakages, thus exacerbating water scarcity.	Storm surges from cyclones may cause similar impacts from urban flooding.

Urban System	Climate Risk - 1: Increase Temperature	Climate Risk - 2: Erratic Rainfall	Climate Risk - 3: Cyclone
Stormwater Drainage System		Increased rainfall when coupled with clogged drains will lead to more incidences of waterlogging and flooding in the city. Since Dhaka South area is low lying, it is more prone to damage due to urban flooding and water logging. Stagnating water may impact the health and well-being of residents and increase the incidence of waterborne diseases.	Storm surges from cyclones may cause similar impacts from water logging and urban flooding.
Transportation	Higher temperatures may lead to greater use of private transport leading to an increase in traffic congestion and higher GHG emissions caused by the increase of private vehicles on the roads. It will also impact the economy and health of rickshaw pullers due to prolonged exposure to extreme heat. High temperatures can also damage the transportation infrastructure such as roads and public buses.	Erratic rainfall will expedite the deterioration of transportation-related infrastructure affecting road and rail transportation. As a result, the overall maintenance cost of roads and other infrastructure will be increased.	
Energy and power system	The increased temperature in the DSCC area will intensify the electricity demand. Need for cooling and air conditioning during heat stress strains the energy infrastructure, resulting in disruption of power supply and leading to inconvenience to local residents and textile and other industries of the city.		Cyclones, with their strong winds and heavy rainfall, often inflict damage on the city's power infrastructure, leading to frequent power outages.
Health	Increasing temperature and waterlogging can provide breeding ground to vector-borne diseases such as dengue and malaria. It will also increase the risk of non-communicable diseases such as asthma and heart attacks.		
Wastewater Management	Rising temperatures can exacerbate the release of noxious gases and foul odors from stagnant sewage, creating unfavourable conditions for the surrounding environment. Moreover, the higher temperatures can also lead to the accelerated growth and proliferation of harmful microorganisms within the sewage.	Erratic rainfall can lead to more frequent waterlogging, which poses a challenge to the integrity of the sewerage management system infrastructure. Additionally, during these periods, there is a higher likelihood of freshwater and rainwater mixing with sewage and sludge, resulting in pollution of rivers and contributing to the potential spread of diseases.	

6. Adaptive Capacity

Erratic rainfall can lead to more frequent waterlogging, which poses a challenge to the integrity of the sewerage management system infrastructure. Additionally, during these periods, there is a higher likelihood of freshwater and rainwater mixing with sewage and sludge, resulting in pollution of rivers and contributing to the potential spread of diseases.

6.1 Adaptive Capacity of Urban Actors

The adaptive capacity of the key stakeholders or urban actors are identified based on their capacity to respond during a climatic hazard event, their ability to access financial and human resources as well as their ability to access relevant information at the correct time to be able to take action. Urban actors with low adaptive capacity are considered as vulnerable actors, who may be adversely impacted by climate change while those with high adaptive capacity are considered as supporting actors for the local government, who may be able to assist the local government in taking action to reduce the impacts of climate change.

The assessment is done on three parameters -

1) Capacity to organize and respond,
2) Availability of resources,
3) Access to information.

Each parameter is given a score between 1 to 3, 1 being the lowest score and 3 the highest. Multiplying these scores gives the adaptive capacity of each actor for the different urban systems. The adaptive capacity score determines which actors have high, medium and low adaptive capacity based on the table below.

Table 6: Levels of Adaptive Capacity of Actors

Adaptive Capacity Score	Level of Adaptive Capacity
1 – 8	High
9 – 17	Medium
18 – 27	Low

Table 7: Adaptive Capacity of Urban Actors

Urban System	Actors	Level of Adaptive Capacity
Solid Waste Management	Private Secondary Waste collection service provider	Low
	Resident	Low
	Sanitary Worker	Low
	Informal Sector	Low
	Migrants	Low
	Low Income Group	Low
	PCSPs	Medium
	DSCC	High
	Ward Councillors	High
Water Supply System	DSCC	Low
	Low Income Group	Low
	Ward Councillors	Low
	Resident	Low
	Women	Low
	Migrants	Low
	DWASA	Medium

Urban System	Actors	Level of Adaptive Capacity
Stormwater Drainage System	DSCC	Low
	Resident	Low
	Ward Councillor	Low
	Low Income Group	Low
	Elderly and Children	Low
	Migrants	Low
	People with disability	Low
	Informal Sector	Low
	DWASA	High
Transportation System	Rickshaw Puller/Informal Sector	Low
	Residents	Low
	Low Income Group	Low
	Elderly and Children	Low
	Migrants	Low
	Rajdhani Unnayan Kartipakkha (RAJUK)	Low
	Informal Sector	Low
	Women	Low
	Bangladesh Road Transport Corporation (BRTC)	Medium
	DSCC	Medium
	Bangladesh Police (Dhaka Range)- DMP	Medium
	Bangladesh Road Transportation Authority (BRTA)	Medium
	Dhaka Transportation Coordination Authority (DTCA)	High
Energy and power	Resident	Low
	Informal Sector	Low
	Low Income Group	Low
	Bangladesh Power Development Board (BPDB)	Medium
	Dhaka Power distribution company(DPDC)	Medium
	Ministry of Power, Energy and Mineral Resource, GoB	High
Health	Informal Sector	Low
	Public and Private Hospitals	HIgh
	Low Income Group	Low
	DSCC	Medium
	Primary Health Centers	Medium
	Elderly and Children	Medium
	Ministry of Health and Public Welfare, GoB	High

Urban System	Actors	Level of Adaptive Capacity
Wastewater Management	DSCC	Low
	Low Income group	Low
	Informal Sector	Low
	Women	Low
	Migrants	Low
	NGOs	Low
	DWASA	Medium
	Elderly and Children	Low

Adaptive Capacity of Fragile Urban Systems

Based on the secondary data and inputs of experts collected during SLD, the adaptive capacity of fragile urban systems was assessed against six parameters given below

1) **Economic:** Financial resources available within the system to respond to stresses or its ability to generate such financial resources through taxes or user charges or grants.
2) **Technological/ Infrastructure:** Technical and infrastructure resources available within the system and the ability to access such resources readily.
3) **GHG Emissions:** Level of emissions from the system or its ability to reduce emissions.
4) **Governance:** Regulations, policies, laws and rules that support resilience building in the system.
5) **Societal:** Support and resources from/for the general public regarding resilience building measures in the system.
6) **Ecosystem:** The level of involvement of ecosystems for the urban system or its impact on natural resources in the city.

Table 8: Adaptive Capacity of Urban Systems

Fragile Urban System	Adaptive capacity of the system		
	Low	Medium	High
Solid Waste Management	Societal	Economic Technological /Infrastructure	Governance Ecosystem
Water Supply	Governance Societal	Economic Technological/ Infrastructure	Ecosystem
Stormwater Drainage	Economic, Technological/ Infrastructure Societal	Governance	Ecosystem
Transportation System	Economic, Technological/ Infrastructure Societal	Governance Technological/ Infrastructure	
Energy and power sector	Ecosystem Societal	Economic Technological/ Infrastructure Governance	

Fragile Urban System	Adaptive capacity of the system		
	Low	**Medium**	**High**
Health Sector	Economic Societal Ecosystem	Technological/ Infrastructure	Governance
Wastewater Management	Economic Societal Technological/ Infrastructure	Governance Ecosystem	

7. Risk Assessment

To enhance resilience, it's essential to comprehend the city's susceptibility and exposure to the impacts of climate change. As stated in the IPCC-AR5 report, risk is the function of Hazard, Exposure, and Vulnerability. This term is primarily employed to address the potential risks associated with the impacts of climate change. Exposure[100] pertains to the presence of individuals, livelihoods, species, ecosystems, environmental functions, services, resources, infrastructure, or economic, social, and cultural assets within areas and contexts that may face negative repercussions. Vulnerability, on the other hand, refers to the inclination or susceptibility to experience adverse effects[101]. Vulnerability encompasses the notions of sensitivity (proneness to potential harm) and adaptive capacity.

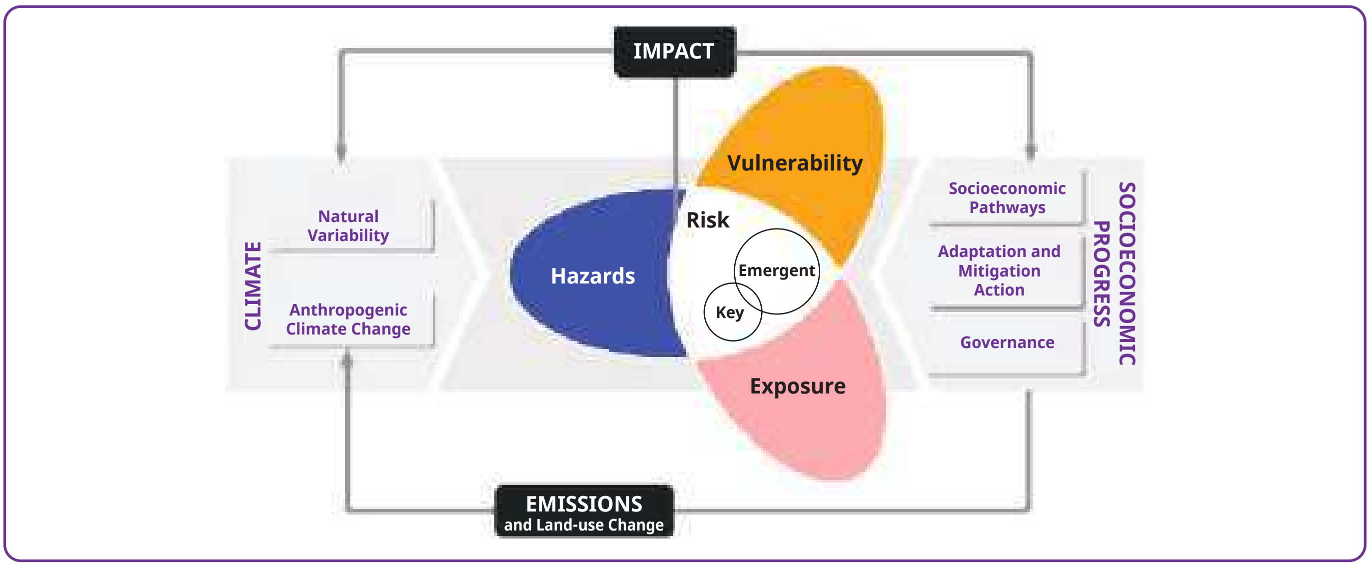


***Figure 12:** Interaction among the physical climate system, exposure and vulnerability producing risk[102]*

By employing the data gathered in earlier sections and collaborating with the core team of the DSCC (mostly from City Corporation) regarding hazards, exposure, and vulnerability, an evaluation of present and future risks to both the DSCC and its infrastructure has been carried out. Furthermore, specific wards or areas that are susceptible to fragile urban systems due to the potential impacts of climate change have been pinpointed. The following section has identified wards/ areas that are currently exposed to risks due to fragile urban systems and are also vulnerable to anticipated climate impacts.

100 https://www.sciencedirect.com/science/article/pii/S2590061720300478
101 https://www.sciencedirect.com/science/article/pii/S2590061720300478
102 https://www.sciencedirect.com/science/article/pii/S2590061720300478

7.1 Current Risk Assessment

Through collaborative dialogues with the climate core team, notably including municipal representatives from DSCC (City Corporation), a thorough assessment of risks and vulnerabilities was carried out. This encompassing exercise involved the identification of specific areas or wards that exhibit heightened susceptibility or likelihood of being impacted by potential climate-related hazards, as delineated in the climate fragility statement for each urban system. These areas, which are most vulnerable, have been clearly marked on the city's ward map. Vulnerable hotspots that need special attention for city resilience building were also identified.

Additionally, an appraisal of urban stakeholders (previously identified in the preceding section) and their respective capacities for adaptation was undertaken. This assessment aimed to comprehend the holistic risk encompassing various urban systems and the associated stakeholders within the city.

Solid Waste Management

Climate-related risks to the solid waste management system in DSCC (City Corporation), vulnerable zones were established by scrutinising wards where residents frequently engage in open dumping practices, lack of infrastructure and the area having slum population. This assessment was conducted with the goal of pinpointing areas that are at risk of experiencing adverse consequences from the identified climate-related risks.

Table 9: Vulnerability Assessment of Solid Waste Management

Fragile Urban Systems	Potential Hazard - (Climate Fragility Statements)	Vulnerability		
		Exposure - (Impacted Areas/ wards and population)	Urban Actors	Adaptive capacity
Solid Waste Management	Rising temperatures can impact the waste collection efficiency of the city. High temperature and humidity can alter the waste decomposition rate, leachate production rate, and chemical composition of the leachate which will facilitate microenvironments that encourage the spread of infectious diseases. It can also increase the risk of fires in landfill sites. Excessive rainfall can lead to waterlogging and urban flooding due to the obstruction of drains and water flow caused by improper disposal of solid waste. This can result in infrastructure damage and contamination of water bodies.	Ward- 3, Ward-4, Ward-6, Ward-14 Ward-18 Ward-22 Ward-23 Ward-26 Ward-29 Ward-30 Ward-58, Ward-59 Ward-63 Ward-61 Ward-60 Ward-53	Migrants	Low
			Informal Sector	Low
			Resident	Low
			Low-Income Group	Low
			PCSPs	Medium
			Ward Councillors	High
			DSCC	High

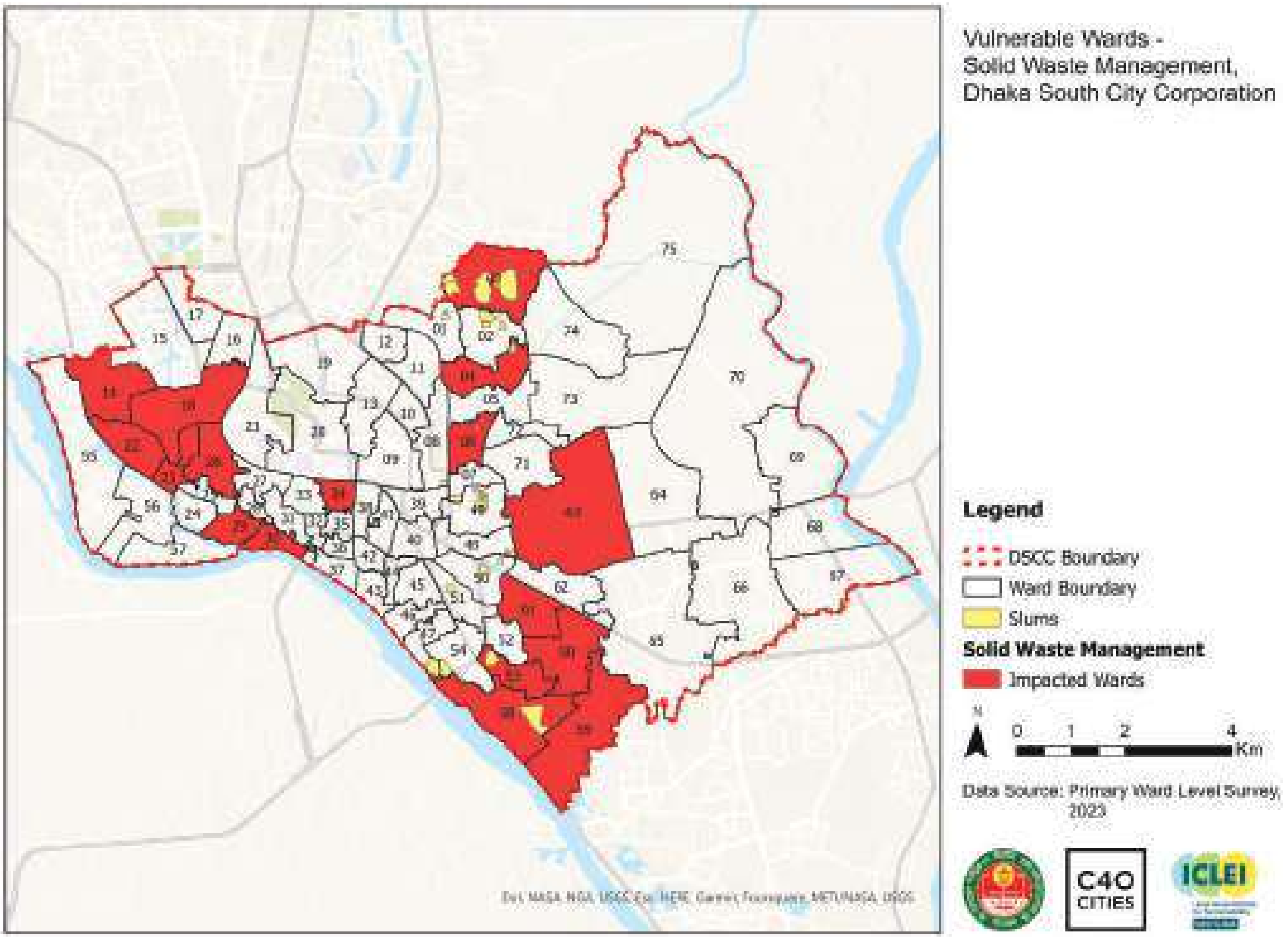


***Figure 13:** Areas most vulnerable to climate risks in the context of Solid Waste Management (DSCC)*

Wards 3, 4, 6, 14, 18, 22, 23, 26, 29, 30, 34, 53, 58, 60, 61, and 63 are identified as vulnerable to the effects of climate change concerning solid waste management. The map indicates that wards 53, 54, 59, 60, and 61 still lack a secondary transfer station, thereby raising the likelihood of illegal and open dumping. These areas face significant issues related to open dumping and inadequate waste collection practices.

Water Supply System

Wards experiencing frequent water crises due to high demand and dry seasons are categorised as vulnerable areas within the water supply system. Significantly, many of these vulnerable wards are characterised by a substantial presence of slum areas. The assessment's primary focus was to pinpoint areas within the city that could be vulnerable to the negative consequences of the identified climate risks, given that the city heavily relies on groundwater extraction.

Table 10: Vulnerability Assessment of Water Supply System

Fragile Urban Systems	Potential Hazard - (Climate Fragility Statements)	Vulnerability		
		Exposure - (Impacted Areas/ wards and population)	Urban Actors	Adaptive capacity
Water Supply System	Due to rising temperatures, water demand may increase in the city, putting stress on existing sources of water, particularly the groundwater. Given that the groundwater table is depleting, this may result in acute water stress on the water resources within the city. Sudden, intense rainfall may cause urban flooding that can damage the infrastructure of the water supply system and contamination of water due to leakages, thus exacerbating water scarcity.	Ward -2 Ward- 3, Ward-4 Ward 14 Ward 22 Ward 26 Ward- 52 (most vulnerable), Ward-53 Ward- 54 Ward -58	DSCC	Low
			Low-Income group	Low
			Resident	Low
			Women	Low
			Ward Councilors	Low
			Migrants	Low
			DWASA	Medium

Due to the growing urbanisation and expanding population in both Dhaka North and South City Corporation areas, there has been a heightened reliance on groundwater for the water supply. The surge in demand for water in this region has led to a significant strain on available water resources. Consequently, due to the increasing demand and existing water scarcity issues, ward numbers 2, 3, 4, 14, 22, 26, 52, 53, 54, and 58 have been pinpointed as wards that are particularly vulnerable in terms of their water supply systems. The map shows that the majority of these wards lack proper water supply infrastructure (such as water pumping stations and water tanks), particularly ward 14 52, 53, 54 and 54 and are poised to encounter significant challenges related to climate change if prompt measures are not implemented. These wards face an elevated risk because of climate-related factors like increasing temperatures and erratic rainfall patterns, which could worsen the already existing water supply problems in these regions.

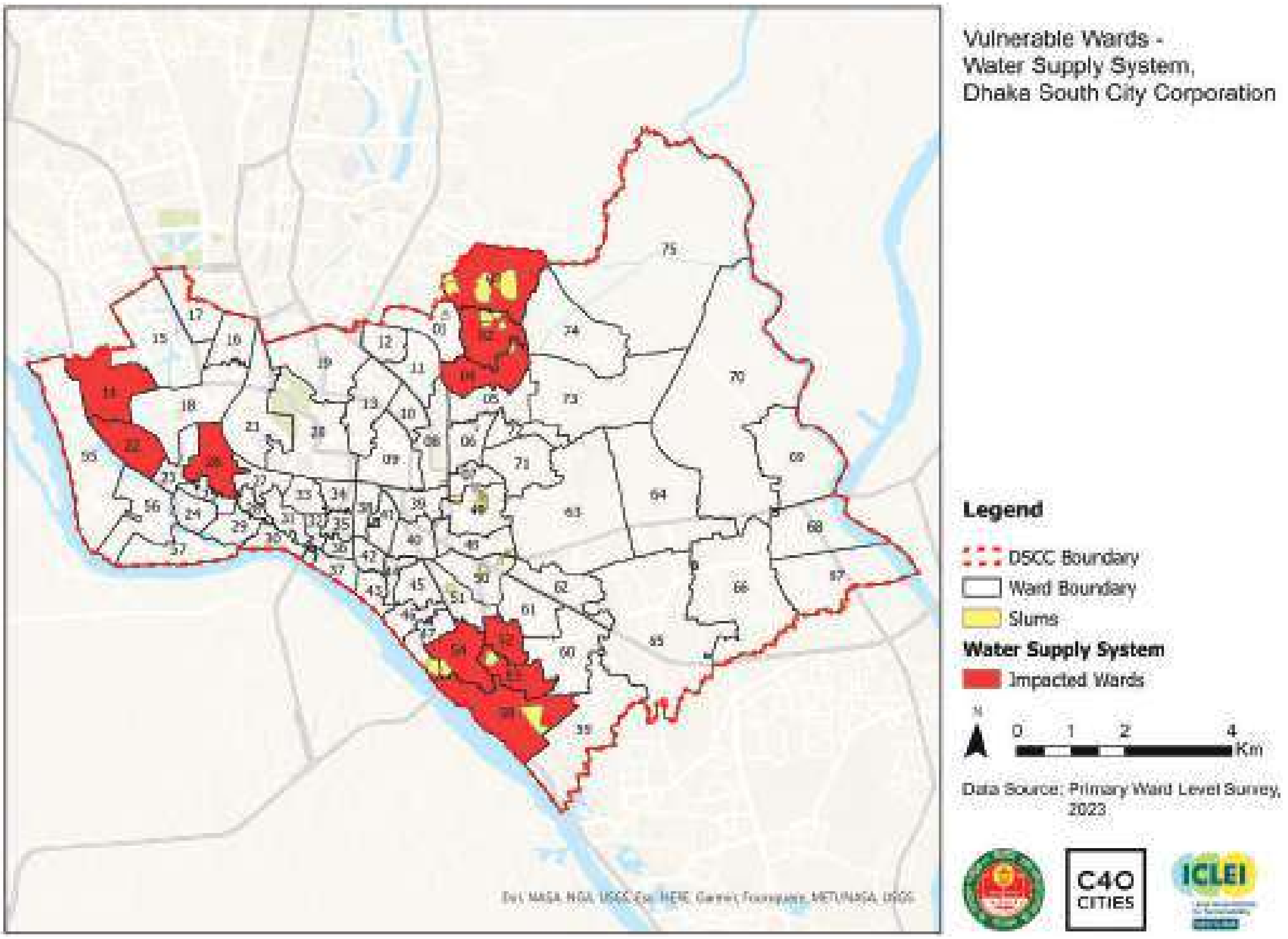


Figure 14: *Areas most vulnerable to climate risks in the context of Solid Waste Management (DSCC)*

Stormwater Drainage System

Wards that are affected by encroachments along water channels (khals) and the undesirable mixing of sewage in canals, leading to an increased susceptibility to urban flooding, have been classified as vulnerable wards in relation to the stormwater drainage system.

The risk assessment seeks to identify the city wards that are already experiencing issues like urban flooding, encroachment, and the mixing of sewage with drainage systems, and are also at risk of being further affected by climate change.

Table 11: Vulnerabiilty Assessment of Storm Water Drainage

Fragile Urban Systems	Potential Hazard - (Climate Fragility Statements)	Vulnerability		
		Exposure - (Impacted Areas/ wards and population)	Sensitivity - Urban Actors	Adaptive capacity
Storm Water Drainage	Increased rainfall when coupled with clogged drains will lead to more incidences of water logging and flooding in the city. Since Dhaka South area is low lying, it is more prone to damage due to urban flooding and water logging. Stagnating water may impact the health and well-being of residents and increase the incidence of waterborne diseases.	Ward-2 Ward 3, Ward-4 Ward-5 Ward -7, Ward-10 Ward-11 Ward-14 Ward-22 Ward-23 Ward-24 Ward-26 Ward-29 Ward-30 Ward-34 Ward-35 ward-38 ward-40 Ward- 75 Ward- 52 Ward53, Ward-60 Ward-62 Ward-65 Ward 68	Low-Income group	Low
			Resident	Low
			People with disability	Low
			Informal Sector	Low
			Elderly and Children	Low
			Migrants	Low
			Ward Councillors	Medium
			DSCC	Medium
			DWASA	High

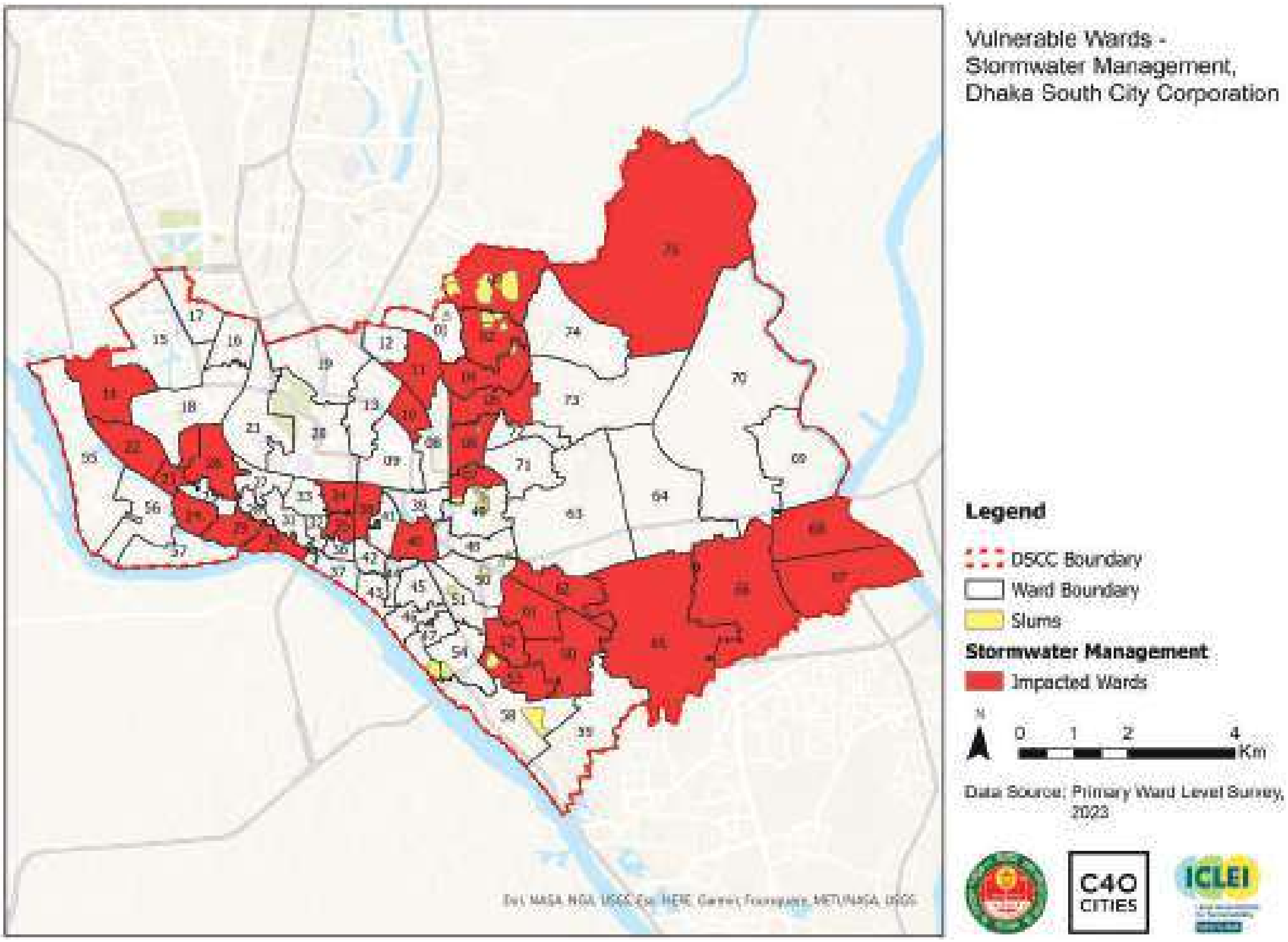


Figure 15: Areas most vulnerable to climate risks in the context of Stormwater Drainage (DSCC)

The map reveals that there is only two stormwater pumping station serving the entire set of wards. This single station is insufficient to effectively address the city's drainage issues, given the scale of the problem.

Health System

The DSCC has identified certain wards as vulnerable wards within the scope of its health system, which exhibit a heightened susceptibility to heat stress and vector-borne diseases such as dengue and malaria. Notably, a significant portion of these wards has been identified as being affected by vector-borne and waterborne diseases. Moreover, the vulnerability and risk assessment revealed that a significant number of city wards are currently grappling with challenges related to both heat stress and vector-borne diseases. Moreover, some of these wards have a substantial population of low-income groups, underscoring the importance of addressing these issues with an equity-focused approach. This underscores the importance of addressing these vulnerabilities in order to enhance the overall resilience of the city's health system.

Table 12: Vulnerability Assessment of Health System

Fragile Urban Systems	Potential Hazard - (Climate Fragility Statements)	Vulnerability		
		Exposure - (Impacted Areas/ wards and population)	Urban Actors	Adaptive capacity
Health	Increasing temperature and waterlogging can provide breeding ground to vector-borne diseases such as dengue and malaria. It will also increase the risk of non-communicable diseases such as asthma and heart attacks.	Water/Vector borne diseases affected wards: 2, 7, 10, 12, 14, 15, 22, 23, 24, 25, 26, 27, 29, 35, 36, 38 56, 57, 58, 62, 63, 64, 65, 66, 67, 68, 70, 75 Heat Stress affected Wards: 2,7 10, 11, 12, 13, 14, 15 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38	DSCC	Low
			Informal Sector	Low
			Low Income Group	Low
			Primary Health Centers	Medium
			Elderly and Children	Medium
			Ministry of Health and Public Welfare, GoB	High
			Public and Private Hospitals	High

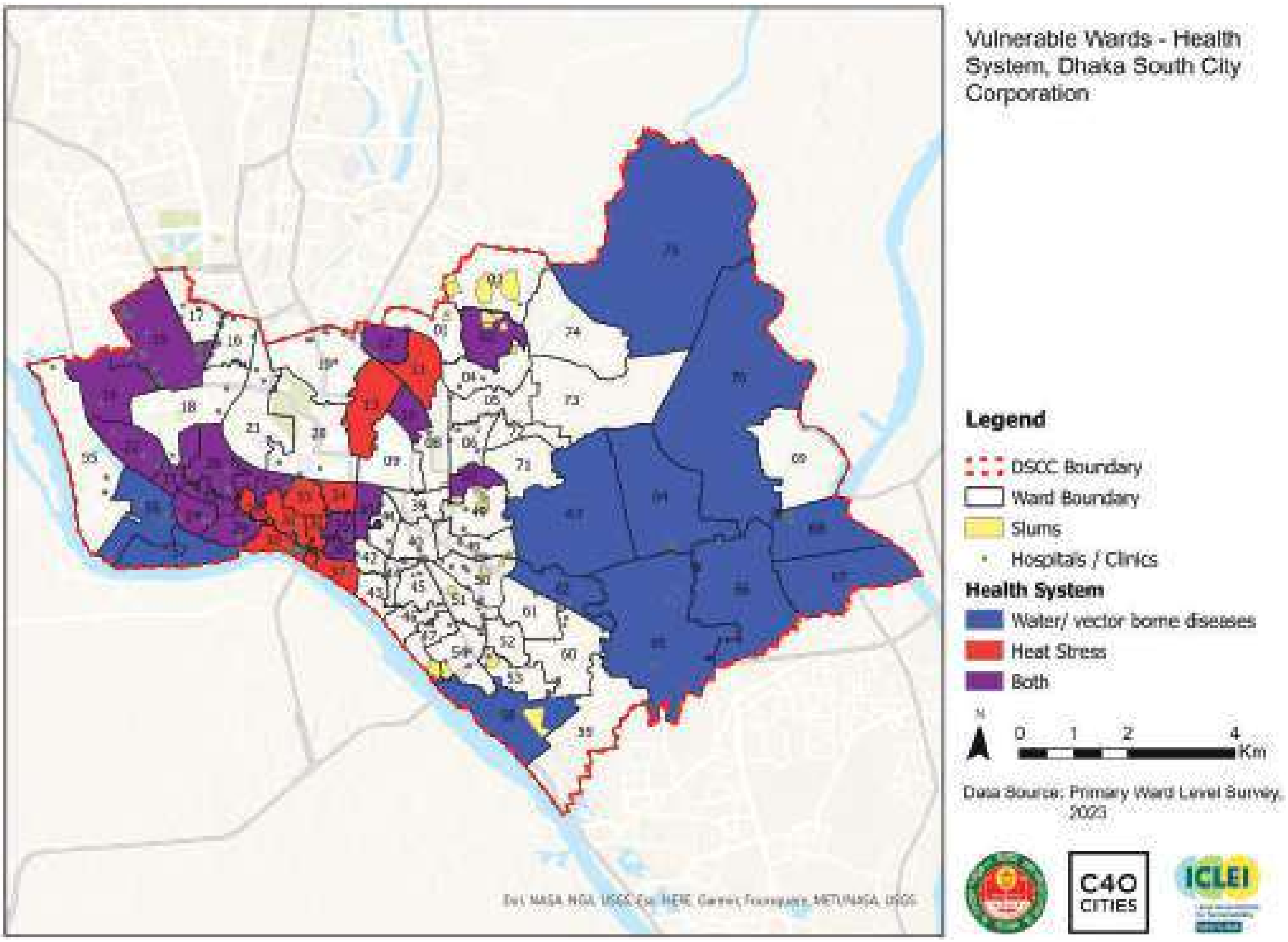


Figure 16: *DSCC that are susceptible to heat stress and waterborne diseases within the framework of the healthcare system.*

Assessment to evaluate the impact of climate change on the health systems and different areas of the DSCC city has considered two key factors.

- **Heat Stress:** The vulnerability of wards has been determined based on the impact of heat stress on the residents. Wards number 2,7 10, 11, 12, 13, 14, 15 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37 and 38 may experience more severe heat stress, which can have adverse effects on the health of the population.

- **Vector-Borne Diseases:** Another aspect taken into account is the impact of vector-borne diseases in various wards. These diseases can be exacerbated by factors such as the cleaning of Khals (canals) and ponds, especially when these water bodies are not properly maintained. Wards 2, 7, 10, 12, 14, 15, 22, 23, 24, 25, 26, 27, 29, 35, 36, 38 56, 57, 58, 62, 63, 64, 65, 66, 67, 68, 70, and 75are likely to be more susceptible to the increased incidence of vector-borne diseases resulting from the effects of climate change.

- **Ward Impacted from both heat stress and vector borne disease:** Wards 2, 7, 10, 12, 14, 15, 22, 23, 24, 25, 26, 27, 35, 36, and 38 are vulnerable to the combined effects of heat stress and vector-borne diseases due to the identified climate risks. This highlights the necessity for the city to implement measures that take into account the healthcare needs of these specific wards.

Transportation

Concerning climate-related risks to the transportation system, the process of identifying vulnerable areas within the Dhaka South City Corporation (DSCC) involved analysing locations or wards that have consistently faced notably heightened traffic congestion (especially major crossings and junctions) when compared to other areas under DSCC's authority.

Table 13: Vulnerability Assessment of Transportation System

Fragile Urban Systems	Potential Hazard - (Climate Fragility Statements)	Vulnerability		
		Exposure - (Impacted Areas /wards and population)	Urban Actors	Adaptive capacity
Transportation	Higher temperatures may lead to greater use of private transport leading to an increase in traffic congestion and higher GHG emissions caused by the increase of private vehicles on the roads. It will also impact the economy and health of rickshaw pullers due to prolonged exposure to extreme heat. High temperatures can also damage the transportation infrastructure such as roads and public buses. Erratic rainfall will expedite the deterioration of transportation-related infrastructure affecting road and rail transportation. As a result, the overall maintenance cost of roads and other infrastructure will be increased	All Wards have fixed congestion point except 15, 24, 25, 28, 36, 38	Rickshaw Puller/Informal Sector	Low
			Elderly and Children	Low
			Low-Income group	Low
			Resident	Low
			RAJUK	Low
			DSCC	Low
			Migrants	Low
			Bangladesh Road Transport Corporation (BRTC)	Medium
			Bangladesh Road Transportation Authority (BRTA)	Medium
			Bangladesh Road Transport Corporation (BRTC)	Medium
			Dhaka Transportation Coordination Authority (DTCA)	High

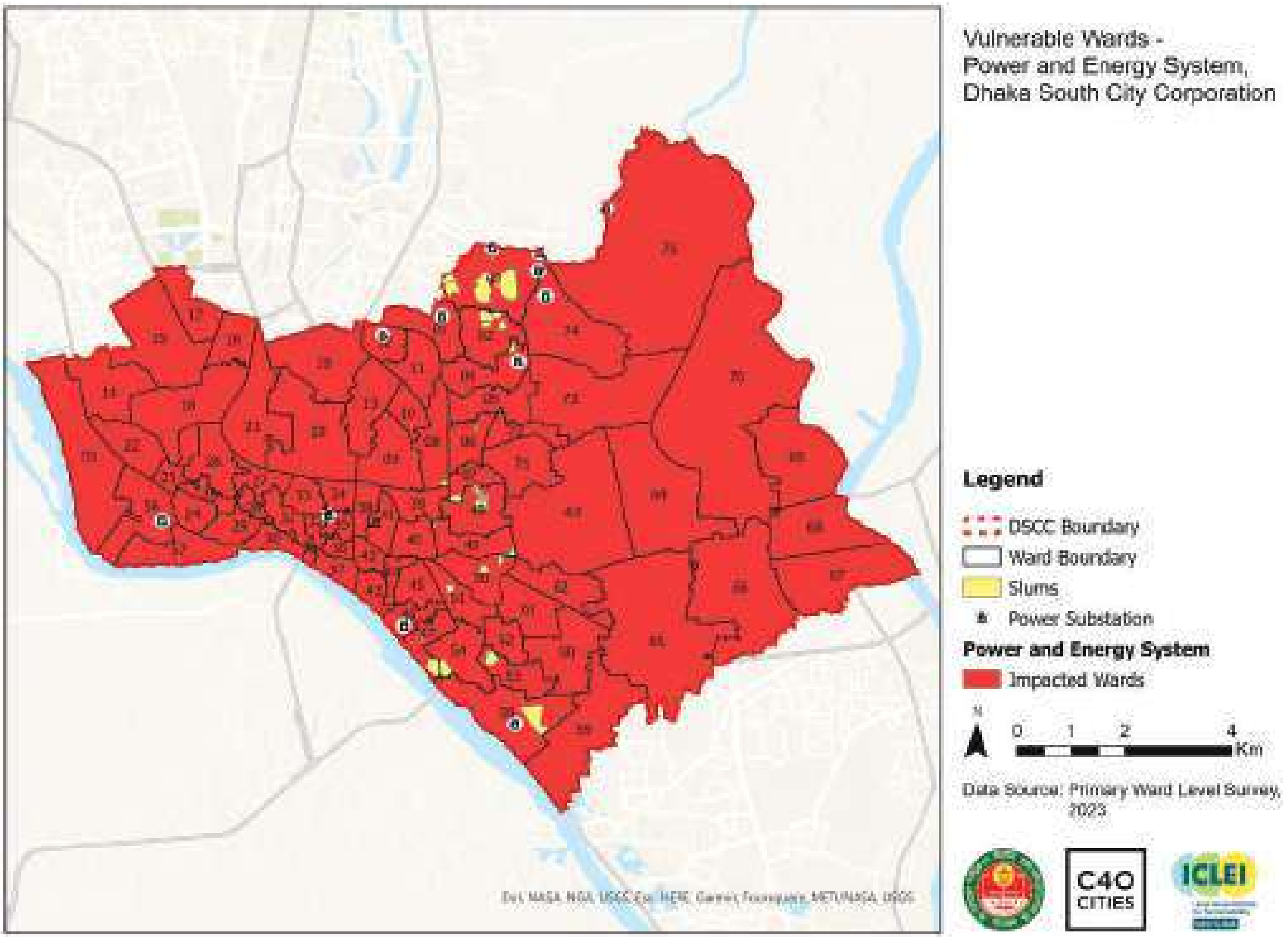


***Figure 17:** DSCC's Wards/Areas most vulnerable to climate risks in the context of Transportation*

With the exception of wards 15, 24, 25, 28, 36, and 38, all other wards, specifically wards 2, 3, 9, 10, 13, 14, 16, 17, 19, 22, 23, 24, 25, 29, and 31, have been recognised as susceptible to the effects of climate change on the transportation system. These wards have already witnessed occurrences of traffic congestion and road infrastructure damage, and these problems are anticipated to worsen due to the impacts of climate change.

Energy and Power System

The entire Dhaka South City Corporation area is identified as susceptible to the effects of climate change, with a particular emphasis on the vulnerability of the power and energy infrastructure. Presently, an important challenge in the region is the availability of consistent power supply. The occurrence of power outages is significantly affecting the water supply of Dhaka city as Water supply system relies on water pumps. Power outages are observed in all parts of the DSCC area, and therefore the entire city has been marked as vulnerable in this case.

Table 14: Vulnerability Assessment of Energy and Power System

Fragile Urban Systems	Potential Hazard - (Climate Fragility Statements)	Vulnerability		
		Exposure - (Impacted Areas / wards and population)	Sensitivity - Urban Actors	Adaptive capacity
Energy and Power System	The increased temperature in the DSCC area will intensify the electricity demand. The need for cooling and air conditioning during heat stress strains the energy infrastructure, resulting in disruption of power supply and leading to inconvenience to local residents and textile and other industries of the city.	Entire DSCC region or area	Resident	Low
			Informal Sector	Low
			Low Income Group	Low
			Bangladesh Power Development Board (BPDB)	Medium
			DPDC	Medium
			Ministry of Power, Energy and Mineral Resource, GoB	High

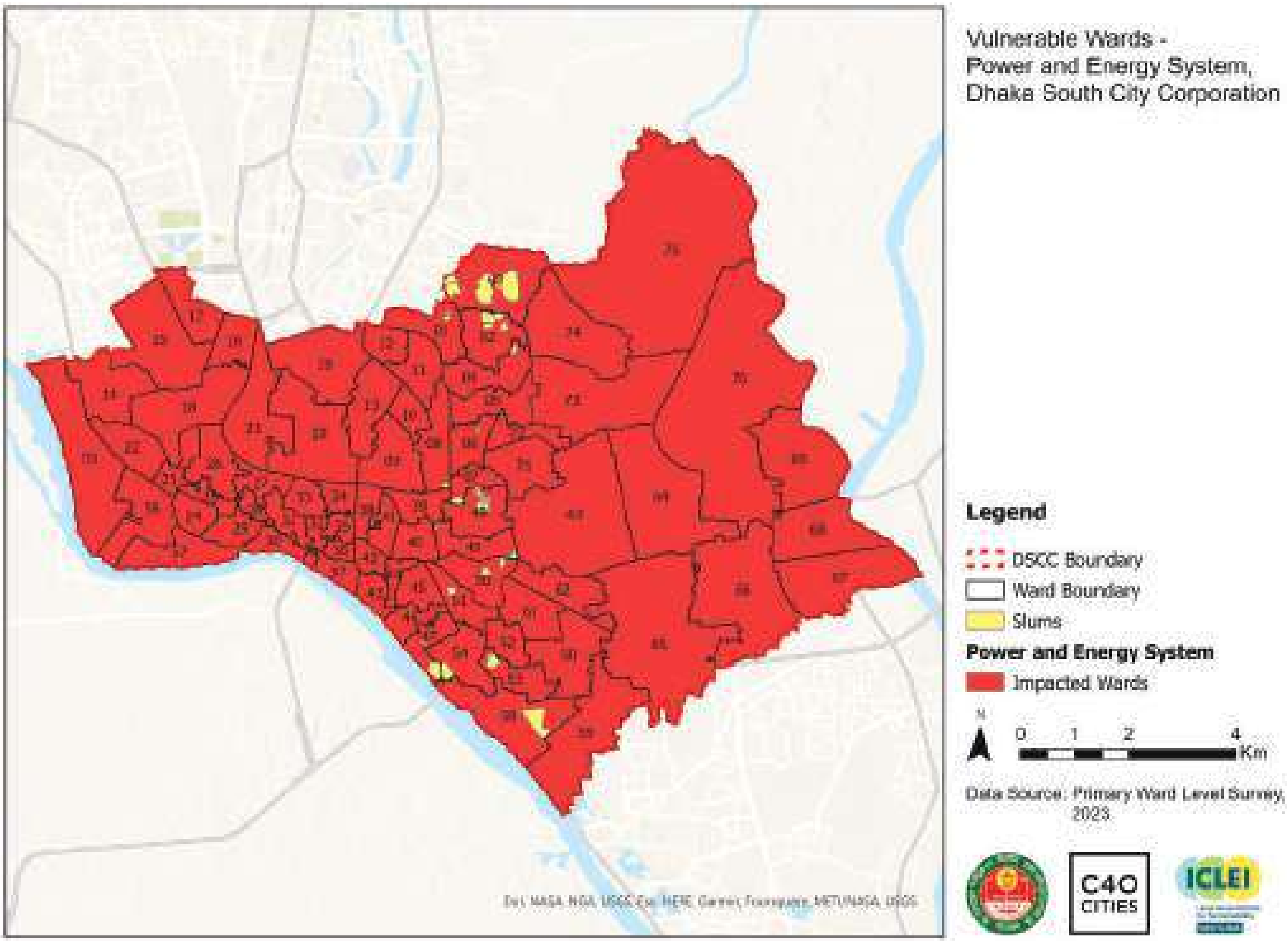


Figure 18: DSCC's Wards/Areas most vulnerable to climate risks in the context of Energy and Power System

Wastewater Management System

Fragile Urban Systems	Potential Hazard - (Climate Fragility Statements)	Vulnerability		
		Exposure - (Impacted Areas/ wards and population)	Sensitivity - Urban Actors	Adaptive capacity
Wastewater System	Rising temperatures can exacerbate the release of noxious gases and foul odors from stagnant sewage, creating unfavourable conditions for the surrounding environment. Moreover, the higher temperatures can also lead to the accelerated growth and proliferation of harmful microorganisms within the sewage. Erratic rainfall can lead to more frequent waterlogging, which poses a challenge to the integrity of the sewerage management system infrastructure. Additionally, during these periods, there is a higher likelihood of freshwater and rainwater mixing with sewage and sludge, resulting in pollution of rivers and contributing to the potential spread of diseases.	Ward-1, Ward-2 Ward- 3 Ward- 4, Ward- 5, Ward-6, Ward-7, Ward-16, Ward-18, Ward-23, Ward-30, Ward-34, Ward-35, Ward-39, Ward-50, Ward-51, Ward-52, Ward-53, Ward-54, Ward-58	DNCC	Low
			Low-Income Group	Low
			Informal Sector	Low
			Women	Low
			Migrants	Low
			NGOs	Medium
			Elderly and Children	Medium

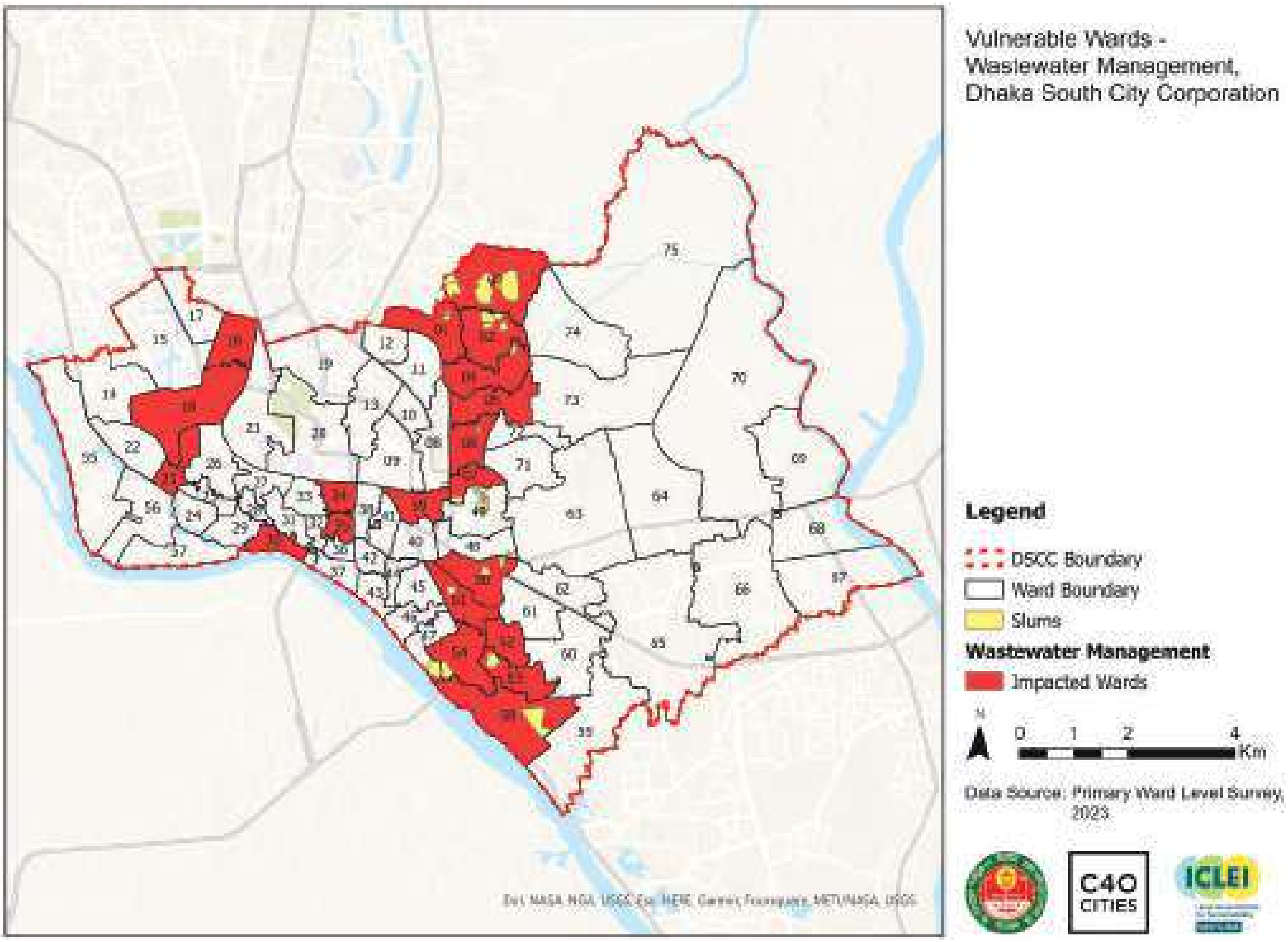


Figure 19: DSCC's Wards/Areas most vulnerable to climate risks in the context of Energy and Wastewater

Wards 1, 2, 3, 4, 5, 6, 7, 16, 18, 23, 30, 34, 35, 39, 50, 51, 52, 53, 54, and 58 have been designated as vulnerable in the context of wastewater management. It is crucial to highlight that a significant number of these wards have slum areas. In these areas, the majority of toilets lack septic tanks or other proper scientific disposal facilities for sewage management.

Vulnerable Hotspots

Numerous areas in the city are affected by multiple fragile urban systems, warranting increased attention and designation as vulnerability hotspots. The risk assessment indicates that approximately 11 wards in DSCC, specifically wards 2, 3, 4, 14, 22, 23, 26, 30, 34, 53, and 58, are vulnerable or at risk across all six urban systems. Similarly, wards 6, 7, 29, 35, 53, and 58 are susceptible to five urban systems. Importantly, no single ward is identified as a vulnerability hotspot for all seven urban systems. The remaining majority of the wards within the DSCC (Dhaka South City Corporation) exhibit vulnerability to either four or three urban systems. This underscores the need for heightened attention to these areas, as they present a significant concern due to their exposure to multiple fragile urban systems. These regions are identified as vulnerability hotspots, demanding focused mitigation efforts.

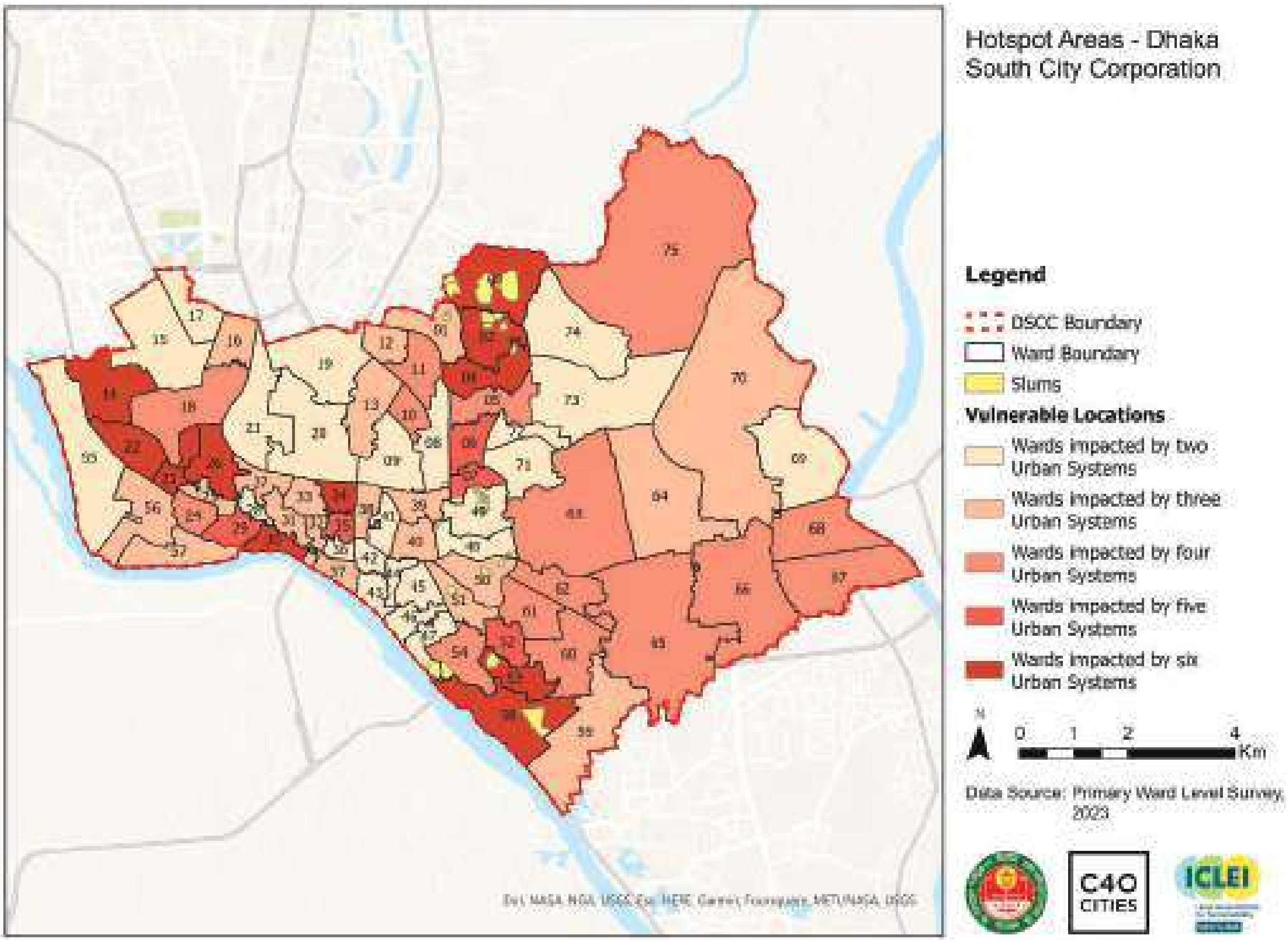


***Figure 20:** Vulnerable Hot spot map of DSCC*

7.2 Future Risk Assessment

A comprehensive evaluation of potential future risks stemming from climate change was conducted for DSCC's urban systems and population. This risk assessment exercise engaged DSCC's Core team, primarily consisting of DSCC municipal officials. The risk assessment exercise is explained in detail in Annexure 2. The extent of climate vulnerability, indicating potential impacts on each fragile urban system, was determined through consultations with the core team.

The assessment of risk for each climate fragility statement is a result of merging two pivotal factors: likelihood - the probability of an event occurring, and consequences - the magnitude of the repercussions in case the event does unfold. The likelihood depends on the possibility of occurrence of a hazard event in future while the consequence depends on the vulnerability of the urban systems or population groups.

While the risk score, thus assigned, is somewhat dependent on the opinions and personal experiences of the participants present during the discussion, it is compared to the projection of climate risks as seen in secondary sources to corroborate the information. Climate risks on most urban systems are rated high to extreme. The assigned risk score for DSCC's urban systems is as follows.

Table 15: Risk Assessment of Climate Fragility Statements

Urban System	Impacts of Climate Change	Risk Status
Water Supply	Due to rising temperatures, water demand may increase in the city, putting stress on existing sources of water, particularly groundwater. Given that the groundwater table is depleting, this may result in acute water stress within the city.	Extremely High
	Sudden, more intense rainfall may cause urban flooding that can damage the infrastructure of the water supply system and exacerbate water scarcity.	Medium
Solid Waste Management	Rising temperatures can impact the waste collection efficiency of the city. High temperature and humidity can alter the waste decomposition rate, leachate production rate and chemical composition of the leachate which will facilitate micro environments that encourage the spread of infectious diseases. It can also increase the risk of fires in landfill sites.	High
	Excessive rainfall can lead to waterlogging and urban flooding due to the obstruction of drains and water flow caused by improper disposal of solid waste. This can result in infrastructure damage and contamination of water bodies.	High
Wastewater Management	Rising temperatures can exacerbate the release of noxious gases and foul odors from stagnant sewage, creating unfavorable conditions for the surrounding environment. Moreover, the higher temperatures can also lead to the accelerated growth and proliferation of harmful microorganisms within the sewage.	Medium
	Erratic rainfall can lead to more frequent waterlogging, which poses a challenge to the integrity of the sewerage management system infrastructure. Additionally, during these periods, there is a higher likelihood of freshwater and rainwater mixing with sewerage and sludge, resulting in pollution in rivers and contributing to the potential spread of diseases.	High
Storm Drainage	Increased rainfall when coupled with clogged drains will lead to more incidences of water logging and flooding in the city. Since Dhaka South area is low lying, it is more prone to damage due to urban flooding and water logging. Stagnating water may impact the health and well-being of residents and increase the incidence of waterborne diseases.	Extremely High
Transportation	Higher temperatures may lead to greater use of private transport, leading to increased traffic congestion and higher GHG emissions caused by the increase of private vehicles on the roads. It will also impact the economy and health of rickshaw pullers due to prolonged exposure to extreme heat. High temperatures can also damage the transportation infrastructure such as roads and public buses.	High
	Erratic rainfall will expedite the deterioration of transportation-related infrastructure affecting road and rail transportation. As a result, the overall maintenance cost of roads and other infrastructure will be increased.	High
Health System	Increasing temperature and waterlogging can provide breading ground to vector-borne diseases such as dengue and malaria. It will also increase the risk of non-communicable diseases such as asthma and heart attacks.	High
Energy and Power System	The increased temperature in the DSCC area will intensify the electricity demand. The need for cooling and air conditioning during heat stress strains the energy infrastructure, resulting in disruption of power supply and leading to inconvenience to local residents and textile and other industries of the city.	Extremely High

Section C: Summary and Conclusion

8. Key Findings and Outcomes Conclusion

Given below are the key finding and outcome of the CCRA of Dhaka South:

- Detailed climate trends and projections specifically tailored to Dhaka City are not easily accessible for reference. As a result, projections at the national level are used to evaluate the climate-related risks for the Dhaka South City Corporation. Likewise, the city lacks research that outlines the present and future consequences of climate-induced hazards such as urban flooding and heat stress on the DNCC area/wards and its population, and how these will influence the local economy.

- Increased temperatures leading to **heat stress**, unpredictable rainfall patterns and storm surges from cyclonic events causing urban **flooding**, and the occurrence of **cyclones** are the primary climate-related risks underscored in the study as significantly affecting the city, its infrastructure, residents, and economy. Nonetheless, there is no immediate observable impact of **sea level rise** within the city itself. However, a notable migration trend is underway in both the DNCC and DSCC areas due to sea level rise occurring in other regions of the country. As a result, the rise in sea levels indirectly influences the DSCC, its associated infrastructure and economy.

- The report highlights that crucial urban systems, including **solid waste management, water supply, wastewater infrastructure, energy and power facilities, transportation networks, healthcare services, and drainage systems**, are currently under strain as a result of the rapid urbanisation, uncontrolled development and migration occurring in Dhaka City. The additional factor of climate change and its accompanying risks have exacerbated the challenges faced by these urban systems, intensifying the pressure they are experiencing.

- The study indicates that crucial urban actors, including **women, the informal sector, low-income groups, the elderly, children, people with disabilities, and migrants,** possess a low level of adaptive capacity. This implies that these groups are most vulnerable and will experience significant impacts during climate-induced hazards or events. Conversely, various government departments and private sectors have been rated as having a moderate to high adaptive capacity. This suggests that these urban actors possess adequate resources and capabilities to mobilize effectively when climate-induced hazards occur.

- The risk assessment highlights that 11 wards of the city are exposed to risk across all six urban systems While 5 wards are at risk from five urban systems. None of the wards have been identified as vulnerable to all seven urban systemsFurthermore, a significant portion of the wards within the Dhaka South City Corporation (DSCC) are prone to vulnerability in either four or three urban systems. This accentuates the necessity for increased focus on these areas, given their substantial susceptibility to multiple delicate urban systems.

- The assessment of the adaptive capacity of vulnerable urban systems within the DSCC has highlighted that the majority of these urban systems are rated low in social parameters. This signifies a restricted or even absent involvement of citizens in resilience-building actions. Simultaneously, the evaluation of technology and infrastructure falls within the range of low to medium, indicating that either the technological and infrastructural aspects of the city are outdated, or they require immediate enhancement to establish resilience within the urban systems. Additionally, the allocation of financial resources or economic backing is also confined, underscoring the need for an increase in order to foster resilience-building actions or initiatives.

Conclusion

The Climate Change Risk Assessment (CCRA) for the Dhaka South City Corporation underscores the city's vulnerability to climate change, primarily characterised by rising temperatures and unpredictable rainfall patterns. Furthermore, the swift growth of the urban population, increasing slum population, urbanisation and inadequate service delivery amplify the city's exposure to climate change impacts. It's crucial to highlight that while the city is not situated in a coastal region of the country, there has not been any significant impact of cyclones and sea level rise on the city. Nevertheless, it's essential to acknowledge that sea-level rise has played a role in the migration of people from other regions of the country to this particular area, increasing demand on urban services.

The consequences of climate change are clearly evident in crucial urban infrastructure systems within the city, encompassing solid waste management, water supply, transportation, the power sector, healthcare, wastewater management, and drainage systems. These impacts are expected to become more pronounced in the near future. While the city has already initiated measures to enhance the adaptive capacity of women, the elderly, and children, there is a pressing need for more concerted actions and interventions to bolster the adaptive capacity of other urban actors, including marginalised groups like the low-income population, the informal sector, and all residents of the city. Additionally, efforts should be directed towards enhancing the adaptive capacity of critical urban systems. These comprehensive actions are vital to fortify the overall resilience of both the city and its urban infrastructure and systems in the face of climate change challenges.

The CCRA report has not only assessed vulnerable wards but has also highlighted vulnerable hotspots for urban systems. It is imperative for the city to pay special attention to these identified wards and take action to improve the situation. The Dhaka South City Corporation (DSCC) should proactively implement comprehensive intervention measures to mitigate the climate risks and vulnerabilities that have been identified.

To ensure effective implementation, these interventions should be prioritised based on their short-term, medium-term, and long-term impacts, and their feasibility. Moreover, it is advisable to integrate these measures seamlessly into existing departmental programs or projects, rather than treating them as independent, standalone initiatives. This integrated approach can enhance the efficiency and effectiveness of efforts to build resilience and adapt to the challenges posed by climate change in the city.

Annexures

Annex 1: Stakeholder Committee

Sl. No.	Name of the Organisation	Name of the Official/Department
Government (National, Local/City/Trustee/Autonomous)		
1	Ministry of Environment, Forest and Climate Change (MoEFCC)	Office of the Secretary
2	Department of Environment (DoE)	1. Mirza Shawkat Ali, Director (Climate Change & International Convention). 2. Md. Ziaul Haque, Director
3	Bangladesh Planning Commission (BPC), Ministry of Planning	General Economic Division
4	Power Division, Ministry of Power, Energy and Mineral Resources	Programming Division
5	Sustainable and Renewable Development Authority (SREDA)	Office of the Director General (DG), Power Cell
6	Dhaka South City Corporation (DSCC)	Farzana Mamtaz, Member (Additional Secretary), Energy Efficiency & Conservation
7	Rajdhani Unnayan Kartripakkha (RAJUK)	Climate Core Team
8	Dhaka Water Supply and Sewerage Authority (Dhaka WASA)	Planning Wing of RAJUK Head OfficeAnd appropriate Zonal Offices fall in DSCC area.
9	Local Government Engineering Department (LGED)	1. Gopal Krishna Debnath, Additional Chief Engineer & Director (Additional Chief Engineer) (Deputation), Climate Resilient Local Infrastructure Center (CReLIC). 2. S.M. Nazrul Islam, Project Director, Climate Resilient Inclusive Smart Cities (CRISC)
10	Palli Karma-Sahayak Foundation (PKSF)	Dr. Fazle Rabbi Sadeque Ahmed, Deputy Managing Director
11	National Housing Authority (NHA)	Md. Shahjahan Ali, Chairman (In Charge)
12	Bangladesh Road Transport Authority (BRTA)	Nur Mohammad Mazumder, Chairman
13	Dhaka Transport Coordination Authority (DTCA)	Shabiha Pervin, Executive Director
14	Department of Public Health Engineering (DPHE)	Md. Sarwar Hossain, Chief Engineer
15	Department/Ministry of Disaster Management and Relief	Md. Mijanur Rahman, Director General (DG)
16	Urban Development Directorate (UDD)	Dr. Khurshid Zabin Hossain Taufique, Director
17	Department Fire Service and Civil Defense	Brigadier General Md Main Uddin, BSP (Bar), ndc, psc, G, M phil. Director General (DG)

Sl. No.	Name of the Organisation	Name of the Official/Department
18	Infrastructure Development Company Limited (IDCOL)	1. Alamgir Morshed, Executive Director & CEO 2. Mafruda Rahman, Assistant Vice President, Green Climate Fund
19	Institute of Water Modelling (IWM)	Md. Tarikul Islam, Head of Climate Change Cell
20	Centre for Environmental and Geographic Information Services (CEGIS)	Malik Fida A Khan, Executive Director
Local NGOs/CBOs/Donors/Development Partners		
21	BRAC International	Dr Md. Liakath Ali, Director of Climate Change Programme
22	UNDP	A. K. M. Mamunur Rashid, Climate Change Specialist
23	Center for Participatory Research and Development (CPRD)	Md Shamsuddoha, Executive Director
24	Asian Disaster Preparedness Centre (ADPC)	Mr. Rouf Mohammad Abdur, Country Project Lead
25	Care Bangladesh	Palash Mondal, Advisor – Climate Change Adaptation
26	GIZ Bangladesh	Mohammad Hamidul Islam Chowdhury, Officer Responsible for Commission, CRISC Project
27	Global Centre on Adaptation (GCA)	Shaikh Muhammed Mehedi Ahsan, Country Manager
28	International Centre for Climate Change and Development (ICCCAD)	Prof. Dr Saleemul Huq, Director
29	International Union for Conservation of Nature (IUCN)	Raquibul Amin, Country Representative
30	Bangladesh Centre for Advanced Studies (BCAS)	Dr. Atiq Rahman
31	Center for Natural Resource Studies (CNRS)	M Mokhlesur Rahman PhD, Executive Director
32	Christian Commission for Development in Bangladesh (CCDB)	Md. Ashrafuzzaman Khan, Acting Coordinator, Climate Technology Park
33	Practical Action	Uttam Kumar Saha, Strategic Lead- Urban & Energy
34	Nature Conservation Management (NACOM)	S.M Munjurul Hannan Khan, Executive Director
Associations		
35	Municipal Association of Bangladesh	Dewan Kamal Ahmed, President
36	Bangladesh Institute of Planners (BIP)	Mohammad Fazle Reza Sumon, President
Academic Institutions		
37	Bangladesh University of Engineering and Technology (BUET)	Dr. Mohammad Shakil Akther, Professor, Department of Urban and Regional Planning
38	University of Dhaka	Dr. Md. Humayun Kabir, Professor, Department of Geography and Environment

Sl. No.	Name of the Organisation	Name of the Official/Department
39	Centre for Climate Change and Environmental Resaerch (C3ER), BRAC University	Ainun Nishat, PhD, Professor Emeritus
40	Jahangirnagar University	M. Shafiq Ur Rahman, Professor, Department of Urban and Regional Planning
41	University of Liberal Arts Bangladesh	Rumana Sultana, PhD, Assistant Professor, Center for Sustainable Development
Community Representatives		
42	Ward Councilors	Selected (Maximum 3, will be nominated by DSCC)
43	CDC[1]/WLCC[2]/TLCC[3] Members	Selected (Maximum 3, will be nominated by DSCC)
Individual Experts		
44	Dr. Haseeb Irfanullah	Visiting Resrach Fellow, CSD, ULAB, Independent Consultant
45	Dr Asaduzzaman	Former Director, Bangladesh Institue of Development Sutides (BIDS)

Annex 2: Risk Assessment[103]

Once the Climate Fragility Statements for the fragile infrastructure and socio-ecological systems are identified, it is important to prioritise the risks using a risk assessment methodology in consultation with the stakeholder group in the local government. This exercise can be quite subjective as it depends on the opinions and personal experiences of participants/ stakeholders. Therefore, it is recommended to conduct the risk assessment with a broad group of city/ village representatives and preferably with the stakeholder group to validate the priorities. This will help generate discussions and build consensus on the final risk prioritisation.

To assess the climate risks, local governments can assess the likelihood and consequence of each climate fragility statement of each of the systems. The likelihood depends on the level of exposure to the hazard while the consequence depends on the vulnerability of the system or population group.

The likelihood of each risk can be assigned a score from 1 to 5 as per the table below. It is recommended that you refer back to the 'Level of Confidence' that has been assigned to each of the identified climate change conditions in the climate scenario table referred before, which indicates whether the likelihood of occurrence is higher or lower.

Likelihood Rating and Scoring

Likelihood rating	Description	Score
Almost certain	Is highly likely to occur, could occur several times per year. Likelihood: probably greater than 50%	5
Likely	Reasonable likelihood, may arise once per year. Likelihood: 50/50 chance	4
Possible	May occur, perhaps once in 10 years Likelihood: less than 50% but still quite high	3
Unlikely	Unlikely but should still be considered, may arise once in 10 to 25 years. Likelihood: probability significantly greater than zero	2
Rare	Unlikely in foreseeable future – negligible probability	1

[103] ICLEI ACCCRN Process and Climate Resilience Planning in Municipality of Nepal (a tool kit)

Next, for each climate risk, assess the consequence or impact, if the risk does occur. The consequences can range from Catastrophic to Moderate to Insignificant. Assign a score from 1 to 5 for each risk, where 5 is Catastrophic and 1 is Insignificant. Table 5 shows one way of assessing the different consequence rating, using "Impact on the System" and "Impact on the local Government" as measures.

Consequence Rating and Scoring

Consequence rating	Impact on system	Impact on poor and other vulnerable groups such as women	Score
Catastrophic	System fails completely and is unable to deliver critical services, may lead to failure of other connected systems	Severe impacts on poor and vulnerable groups (including women) in the city/ village, leading to extreme destitution	5
Major	Serious impact on the system's ability to deliver critical services; however, not a complete system failure	Loss of confidence and criticism in local government; ability to achieve city/ village vision and mission seriously affected; Significant impacts on poor and vulnerable groups in the city/ village that seriously affect their lives and livelihoods	4
Moderate	System experiences significant problems, but is still able to deliver some degree of service	Moderate impacts on the lives and livelihoods of the poor and vulnerable groups (including women) in the city /village	3
Minor	Some minor problems experienced, reducing effective service delivery, possibly affecting certain other systems or groups	Minor impacts on the lives and livelihoods of the poor and vulnerable groups (Including women) in the city/ village	2
Minor	Minimal impact on system – may require some review or repair, but still able to function	Minimal impacts on the lives and livelihoods of the poor and vulnerable (Including women) groups in the city/ village	1

Having assigned a 'Likelihood' and 'Consequence' score to each of the identified climate risks, now multiply these values to arrive at the 'Risk Score' for each fragile system (see Table 10).

Prioritisation of Climate Risks

Climate Fragility Statements	Likelihood	Consequence	Risk Score (Likelihood x Consequence)	Risk Status
Increased precipitation disrupts/ damages water supply infrastructure	4	4	16	High
Increased precipitation can cause water to freeze in the pipelines	4	4	16	High
Increased temperatures will lead to increased demand for water, thereby putting additional stress on the supply system	3	3	9	Medium
Increase temperature will lead to increase water demand, thereby put extra pressure on local women to collect free drinking water	4	4	16	High

Finally, for each of the climate fragility statements, assess their Risk Status based on their respective Risk Scores. Please refer to the 'Summary of Risk Matrix' in Table 111 for assessing the risk status.

Summary of a Risk Matrix

Likelihood	Consequences				
	Insignificant	**Minor**	**Moderate**	**Major**	**Catastrophic**
Almost certain	Medium (RS* = 5)	Medium (RS = 10)	High (RS = 15)	Extreme (RS = 20)	Extreme (RS = 25)
Likely	Low (RS = 4)	Medium (RS = 8)	High (RS = 12)	High (RS = 16)	Extreme (RS = 20)
Possible	Low (RS = 3)	Medium (RS = 6)	Medium (RS = 9)	High (RS = 12)	High (RS = 15)
Unlikely	Low (RS = 2)	Low (RS = 4)	Medium (RS = 6)	Medium (RS = 8)	Medium (RS = 10)
Rare	Low (RS = 1)	Low (RS = 2)	Low (RS = 3)	Low (RS = 4)	Medium (RS = 5)

*RS: Risk Score

Annex 3: Adaptive Capacity of Urban System

	Economic	Technology/ Infrastructure	GHG Emissions	Governance	Social	Ecosystem Services/ Natural Environment
Low	Limited inherent economic ability to adapt to impacts (e.g. required finance is very high as compared to benefits, no legal authority to raise funds; no strong tax base to call upon)	Limited inherent technology/ infrastructure to adapt to impacts (e.g. use of out dated materials in building codes; no system for integrating new knowledge into changes, very low potential for improvement of urban services, low/no possibility for replication, very low energy saving and GHG emission reduction potential)	Contribution of the sector to GHG emissions is less than 5% and mitigation interventions are limited	Limited governance structure in place to adapt to impacts (e.g. no interagency collaboration; no support from higher levels) i.e. inadequate rules and practices	Limited societal structure in place to adapt to impacts (e.g. disenfranchised or uninvolved citizenry; lack of community and aid,	Limited ecosystem services/natural environmental ability to adapt to impacts (e.g. no marsh or dune system to provide storm protection; all habitat is isolated and disconnected from other natural areas)
Medium	Economic ability to adapt to impacts can be developed (e.g. required finance is comparable to benefits, mechanism for raising funds exist; tax base avaliable to call upon)	Technology/infrastructure to adapt to impacts can be accessed (e.g. structures can be renovated and retrofitted; new knowledge can be regularly integrated into purchasing agreements, potential to improve urban services)	Contribution of the sector to overall City GHG Emissions is less than 10% and mitigation interventions are possible	Governance structure in place to adapt to impacts (e.g. possibility of interagency collaborative processes; work closely with higher levels) i.e. some rules and practices are in place.	Societal structure in place to adapt to impacts (e.g. citizens are heavily involved in their communities; active and effective community and aid,	Ecosystem services/ natural environmental ability to adapt to impacts (eg city takes into account ecosystem services while planning for developmental projects)

	Economic	Technology/ Infrastructure	GHG Emissions	Governance	Social	Ecosystem Services/ Natural Environment
High	Robust inherent economic ability to adapt to impacts (e.g. required finance is less as compared to benefits, mechanism for raising funds exist; very strong tax base to call upon)	Robust inherent technology/ infrastructure to adapt to impacts (e.g. most structures are new and have used the latest materials & building codes; new knowledge is regularly integrated into purchasing agreements, very high potential to improvement of urban services, replication at larger scale possible) very high energy saving and GHG emission reduction potential)	Contribution of the sector to overall City GHG Emissions is more than 15% and significant reduction of GHG emissions is possible through mitigation interventions	Robust governance structure in place to adapt to impacts (e.g. good interagency collaborative processes; work closely with higher levels) i.e. good rules and practices	Robust societal structure in place to adapt to impacts (e.g. citizens are heavily involved in their communities; active and effective community and aid,	Robust ecosystem services/natural environmental ability to adapt to impacts (e.g. highly functioning dune or marsh system provides storm protection; habitat systems are connected allowing for species and sediment movement)

Annexure 6

Adaptive Capacity of Urban Actors

Actors (i.e., individuals, households and public/private sector organisations), play a critical role towards building urban resilience. Their ability to contribute to resilience and adaptation is broadly dependent on the following three key capacities:

- **Capacity to organise and respond** - the capacity to organize and re-organise in response to threat or disruption.

  Example: slum communities residing in a flood-prone area have received training on how to purify water for drinking and maintaining hygienic conditions to prevent the outbreak of post-flood diseases. Or, trained Search and Rescue Teams exist within the community that can respond effectively during floods

- **Resources** – access to the resources necessary to respond (manpower, technology, funds)

  Example: slum communities residing in flood-prone areas have been provided with water filters that will ensure that they have safe drinking water even during flood situations. Or, the Search and Rescue Teams have the necessary equipment and medicines

- **Access to information** – availability of data and information necessary to develop effective plans and actions and to improve responses to disruptions

  Example: slum communities residing in a flood-prone area have access to improved information that can be locally managed e.g. Early Warning Systems, which would enable them to respond more effectively. Or, regular refresher and updating training courses for the members of the Search and Rescue Teams

The combination of these three characteristics would help determine the adaptive capacity of each of the urban actors.

The Actors analysis can be used to identify:

1. How different categories of actors relate to different systems (who, what, where, why)
2. What categories of actors may be missing?
3. Groups of actors that may be disempowered lacking in capacities or otherwise marginalised

Please follow the steps below:

Step 1:

Select the Climate Risk Hotspots from the maps

Step 2:

For each Hotspot and Climate Risk, list the key actors involved – those affected by, and those who have control over, the system.

For example, Ward XY is vulnerable to flooding, so the specific actors affected could be

- the residents, specifically the poor households in the area
- a hospital
- a NGO working on education in this ward
- street vendors

And the specific actors who may have control may be the Department of Water Resources or the Department of Sewerage and Drainage.

When defining the actors, you are encouraged to be as specific as possible. Therefore, rather than mentioning 'residents of Ward XY' you should try and specify 'women, children and elderly in Slum 22'. The more precise you are in determining the actors, the simpler it would be to target and organise an effective response.

Step 3:

We now need to double-check that we have not overlooked any groups of poor or vulnerable people who may not be located in the Hotspots. This is very important as there may be groups which could be affected by a particular climate risk which has not been identified. Look particularly for poor communities or groups that may already be struggling and for whom a small change in temperature, rainfall, or flooding could be a tipping point that causes high vulnerability. Any groups identified in this step should be added to *Table 1* below.

Step 4:

Using Table 1 below, rate the actors against the three criteria - Capacity to Organize and Respond, Resources, and Access to Information. For each of the criteria you need to determine whether the capacity of a particular actor is Low, Medium or high, and accordingly assign the corresponding score as indicated in the table.

Table 1: Actors' Capacities Rating and Scoring

Key Capacities of Actors	Score
Capacity to Organise and Respond	
Low capacity to organise and re-organise in response to threat or disruption	1
Medium capacity to organise and re-organise in response to threat or disruption	2
High capacity to organise and re-organise in response to threat or disruption	3
Resources	
Low access to the resources necessary to respond (manpower, technology, funds)	1
Medium access to the resources necessary to respond (manpower, technology, funds)	2
High access to the resources necessary to respond (manpower, technology, funds)	3
Access to Information	
Low availability of data and information necessary to develop effective plans and actions and to improve responses to disruptions	1
Medium availability of data and information necessary to develop effective plans and actions and to improve responses to disruptions	2
High availability of data and information necessary to develop effective plans and actions and to improve responses to disruptions	3

Step 5:

Finally, for each actor calculate their 'Adaptive Capacity Score' by multiplying the scores allocated to each of the 3 characteristics.

Step 6:

Based on the Adaptive Capacity Scores of each of the actors, for a particular fragile system, you can determine which actors have a High, Medium and Low adaptive capacity. Refer to Table 2 to help you assess the level of adaptive capacity of each of the actors.

Table 2: Levels of Adaptive Capacity of Urban Actors

Adaptive Capacity Score	Level of Adaptive Capacity
1 – 8	Low
9 – 17	Medium
18 – 27	High

Actors having a **'Low'** level of adaptive capacity would be those that would need to be **specifically targeted** in the actions (or resilience strategies) that are undertaken to reduce the fragility of the identified urban system.

Actors with a **'High'** level of adaptive capacity can be engaged in the proposed actions as they have the capacity to effectively respond to the impacts of fragile systems. Similarly, those falling in the **'Medium'** category might also need to be specifically targeted or can also be engaged in the proposed actions, depending on which end of the range they are on i.e. closer to the 'low' category or closer to the 'high' category.

Table 3: Adaptive Capacity of Urban Actors for DNCC

Urban Actor	Capacity to organise	Resource (Ability to access public services (health, education, transport, water and sanitation, housing, electricity) in the city?	Access to Information	Score	Adaptive Capacity
Water Supply					
DWASA	3	2	2	12	Medium
DSCC	1	1	1	1	Low
Low Income Group	1	1	1	1	Low
Ward Councillors	1	1	2	2	Low
Resident	2	2	1	4	Low
Women	2	2	2	8	Low
Migrants	1	1	1	1	Low
Storm Water Drainage					
DWASA	3	2	3	18	High
DSCC	2	2	3	12	Low
Resident	2	2	1	4	Low
Ward Councillor	1	1	2	2	Low
Low Income Group	1	1	1	1	Low
Elderly and Children	1	1	1	1	Low
Migrants	1	1	1	1	Low
People with disability	1	1	3	3	Low
Informal Sector	1	1	1	1	Low
Wastewater Management					
DWASA	3	2	2	12	Medium
DSCC	2	1	1	2	Low
Low Income group	1	1	1	1	Low
Informal Sector	1	2	1	2	Low
Women	1	1	1	1	Low
NGOs	1	1	1	1	Low
Migrants				0	Low
Elderly and Children	1	1	1	1	Low
Solid Waste Management					
DSCC	3	2	3	18	High
Ward Councillors	3	3	2	18	High
PCSPs	3	2	2	12	Medium

Urban Actor	Capacity to organise	Resource (Ability to access public services (health, education, transport, water and sanitation, housing, electricity) in the city?	Access to Information	Score	Adaptive Capacity
Private waste collection service provider	2	2	2	8	Low
Resident	2	2	1	4	Low
Sanitry Worker	1	2	2	4	Low
Informal Sector	1	1	1	1	Low
Migrants	2	2	2	8	Low
Low Income Group	1	1	1	1	Low
Transportation					
Rickshaw Puller/Informal Sector	1	1	1	1	Low
Residents	2	2	1	4	Low
Low Income Group	1	1	1	1	Low
Elderly and Children	1	1	1	1	Low
Migrants	1	1	1	1	Low
Dhaka Transportation Coordination Authority (DTCA)	3	3	2	18	High
DSCC	2	3	2	12	Medium
Bangladesh Road Transportation Authority (BRTA)	3	2	2	12	Medium
Bangladesh Road Transport Corporation (BRTC)	3	2	2	12	Medium
Rajdhani Unnayan Kartipakkha (RAJUK)	2	1	2	4	Low
Bangladesh Police (Dhaka Range)- DMP	2	2	3	12	Medium
Informal Sector	1	1	1	1	Low
Women	2	2	2	8	Low
Energy and Power Sector					
Dhaka Power distribution company(DPDC)	3	2	2	12	Medium
Bangladesh Power Development Board (BPDB)	2	2	3	12	Medium
Resident	2	2	1	4	Low

Urban Actor	Capacity to organise	Resource (Ability to access public services (health, education, transport, water and sanitation, housing, electricity) in the city?	Access to Information	Score	Adaptive Capacity
Ministry of Power, Energy and Mineral Resource, GoB	3	2	3	18	High
Low Income Group	1	1	1	1	Low
Informal Sector	1	1	1	1	Low
Health System					
Public and Private Hospitals	2	3	3	18	High
Primary Health Centers	2	2	3	12	Medium
Ministry of Health and Public Welfare, GoB	3	2	3	18	High
DSCC	3	2	2	12	Medium
Informal Sector	1	1	1	1	Low
Low Income Group	1	1	1	1	Low
Elderly and Children Citizens	2	3	2	12	Medium

Annexure 7

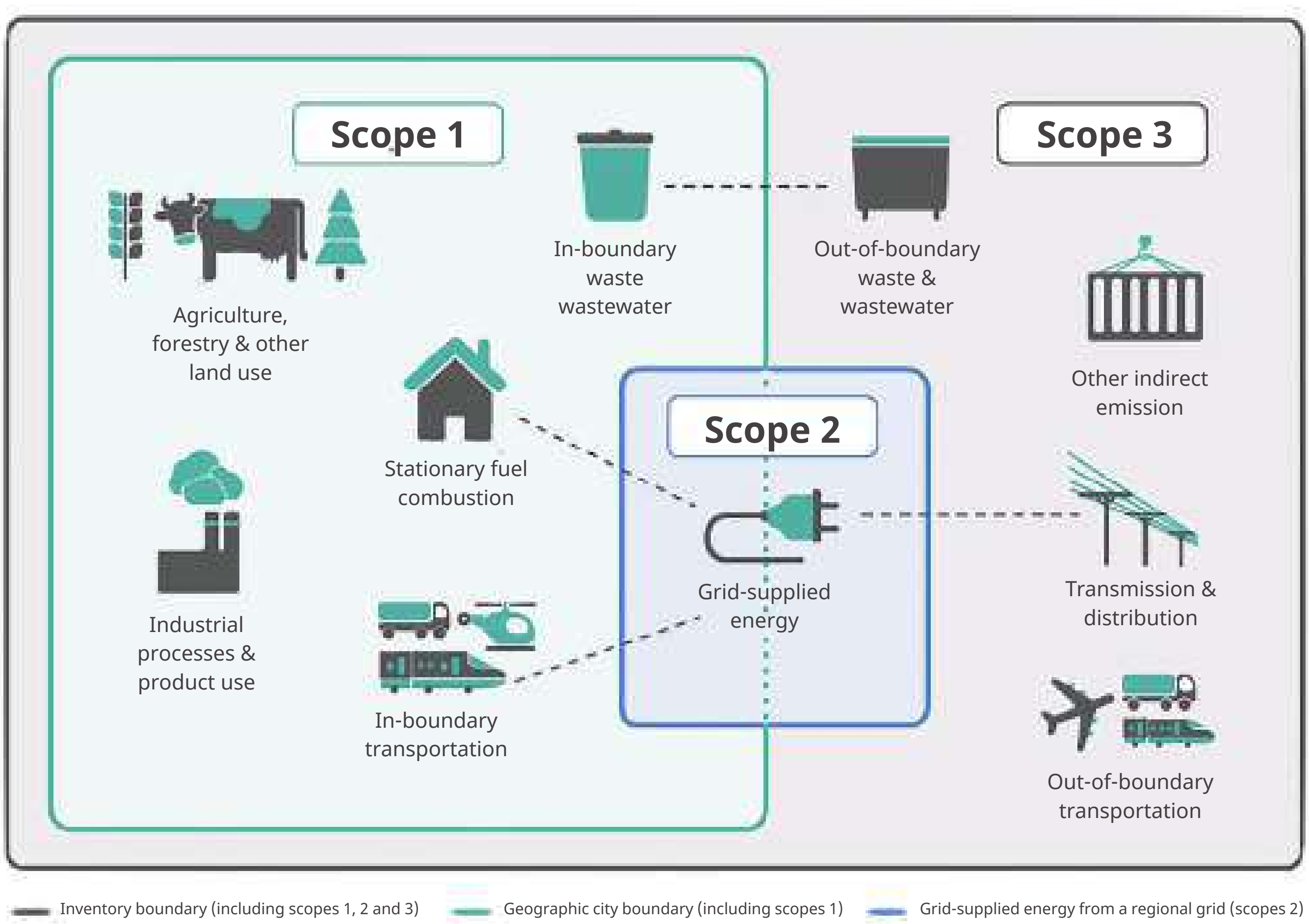
GPC Scopes and Emission Sources

Activities taking place within a city can generate GHG emissions that occur inside as well as outside the city boundary. To distinguish among them, the GPC groups emissions into three categories based on where they occur: scope 1, scope 2 or scope 3 emissions.

Scope definition for city inventories

Scope	Definition
Scope 1	GHG emissions from sources located within the city boundary
Scope 2	GHG emissions occurring as a consequence of the use of grid-supplied electricity, heat, steam and/or cooling within the city boundary
Scope 3	All other GHG emissions that occur outside the city boundary as a result of activities taking places within the city boundary

Scope-wise sources and boundaries of GHG emissions in GPC inventories[1]



[1] Image source: Report of Global Protocol for Community-Scale Greenhouse Gas Inventory

The figure above illustrates which emission sources occur solely within the geographic boundary established for the inventory, which occur outside the geographic boundary, and which may occur across the geographic boundary.

Global warming potentials (GWP) used in calculations, adapted from IPCC 2006 Fourth Assessment Report

Industrial designation or common name	Chemical formula	Lifetime (years)	Global warming potential for given time horizon (100 years)
Carbon dioxide	CO_2		1
Methane	CH_4	12	25
Nitrous oxide	N_2O	114	298

Annexure 8

Data Sources

Data	Source	Latest year	Period	Scale	Nature of data source
Residential PNG	Titas Gas Transmission & Distribution Company Limited	2022	Financial Year	Metro	Primary data
Residential grid electricity	Dhaka Power Distribution Company (DPDC)	2022	Financial Year	Metro	Primary data
Residential kerosene consumption	Bangladesh Petroleum Corporation	2022	Financial Year	Metro	Primary data
Residential LPG consumption	Energy and Mineral Resources Division, Annual Report 2021-22	2022	Financial Year	National	Secondary data[1]
Residential biomass	Sustainable Renewable Energy Development Authority	2015	Calendar year	National	Secondary data[2]
Commercial electricity consumption	Dhaka Power Distribution Company (DPDC)	2022	Financial Year	Metro	Primary data
Commercial PNG	Titas Gas Transmission & Distribution Company Limited	2022	Financial Year	Metro	Primary data
Commercial biomass	Sustainable Renewable Energy Development Authority (SREDA)	2015	Calendar year	National	Secondary data[3]
Industrial diesel consumption	Bangladesh Petroleum Corporation (BPC)	2022	Financial Year	Metro	Primary data
Industrial electricity	Dhaka Power Distribution Company (DPDC)	2022	Financial Year	Metro	Primary data
Industrial PNG	Titas Gas Transmission & Distribution Company Limited	2022	Financial Year	Metro	Primary data
Solid waste	Dhaka South City Corporation(DSCC)	2022	Financial Year	Local	Primary data
Transport CNG consumption	Titas Gas Transmission & Distribution Company Limited	2022	Financial Year	Metro	Primary data
On road diesel consumption	Bangladesh Petroleum Corporation (BPC)	2022	Financial Year	Local	Primary data

[1] Energy and Mineral Resource Division. 2023. Annual Reports. Government of the People's Republic of Bangladesh. Url: https://emrd.gov.bd/site/view/annual_reports. Date accessed: 31.07.2023

[2] UNDP, Bangladesh. 2019. A Comprehensive Assessment of the Availability and Use of Biomass Fuels for Various End-Uses with Special Attention to Power Generation. Prepared by Nature Conservation Management (NACOM). Url: https://sreda.portal.gov.bd/sites/default/files/files/sreda.portal.gov.bd/page/049ce602_4203_49ac_8237_59e6776e255f/2021-06-22-04-52-31df1f5baf3ce33a4d5737629a391869.pdf. Date accessed: 31.07.2023
National Biomass Resource Assessment - 2020 projections apportioned for Dhaka North - used for cooking.

[3] Sustainable Renewable Energy Development Authority. 2015.

Data	Source	Latest year	Period	Scale	Nature of data source
On road petrol consumption	Bangladesh Petroleum Corporation (BPC)	2022	Financial Year	Local	Primary data
Wastewater (Inlet BOD per capita)	Dhaka Water Supply and Sewerage Authority (DWASA)	2012	Calendar year	Metro	Secondary data[4]
Wastewater (Sanitation conditions)	Dhaka Water Supply and Sewerage Authority (DWASA)	2022	Financial year	Metro	Secondary data[5]
Wastewater (per capita protein consumption)	The Journal of Nutrition. Volume 152, Issue 11, November 2022, Pages 2591-2603	2022	Calendar year	National	Secondary data[6]
Wastewater (treatment categories)	World Bank WSP	2016	Calendar year	Metro	Secondary data[7]

4 Dhaka Water Supply and Sewerage Authority (DWASA). 2012. Sewerage Master Plan Report. Prepared by Grontmij. Url: https://dwasa.portal.gov.bd/sites/default/files/files/dwasa.portal.gov.bd/page/a7539482_676a_483a_b3d0_06c4a950e016/2021-01-17-16-54-efc40b4e53a82bae3513972a0dbc5c69.pdf. Date accessed: 31.07.2023

5 Dhaka Water Supply and Sewerage Authority (DWASA). 2020 -21. Dhaka WASA Annual Report 2020-21. Url: https://dwasa.portal.gov.bd/sites/default/files/files/dwasa.portal.gov.bd/page/b5e42944_f9c0_430e_add7_b0888ba9e0d2/2022-08-11-09-09-60b874cbb0a32c32b0a65d7f60894703.pdf. Date accessed:31.07.2023

6 Ahmed, A. U., Bakhtiar, M. M., Ali, M., Ghostlaw, J., & Nguyen, P. H. (2022). Trends and Inequities in food, energy, protein, fat, and carbohydrate intakes in rural Bangladesh. The Journal of nutrition, 152(11), 2591-2603. Url: https://www.sciencedirect.com/science/article/pii/S0022316623086406?via%3Dihub. Date accessed: 31.07.2023

7 SFD Promotion Initiative. 2016. SFD Report Dhaka, Bangladesh. Prepared by WEDC and World Bank WSP. Url: https://www.susana.org/_resources/documents/default/3-2609-7-1470298292.pdf. Date accessed: 31.07.2023

Annexure 9

GHG Emissions Inventory Summary Reporting Output

GPC ref No.	GHG Emissions Source (By Sector and Sub-sector)	Total GHGs (metric tonnes CO_2e)			
		Scope 1	Scope 2	Scope 3	Scope 4
I	**STATIONARY ENERGY**				
I.1	Residential buildings	843,066	995,292	60,315	1,898,673
I.2	Commercial and institutional buildings and facilities	31,744	450,870	27,323	509,937
I.3	Manufacturing industries and construction	170,364	430,056	26,061	626,482
I.4.1/2/3	Energy industries	NO	IE	IE	
I.4.4	Energy generation supplied to the grid	NO			
I.5	Agriculture, forestry, and fishing activities	NO	43	3	46
I.6	Non-specified sources	NO	97,959	5,936	103,896
I.7	Fugitive emissions from mining, processing, storage, and transportation of coal	NO			
I.8	Fugitive emissions from oil and natural gas systems	1			1
SUB-TOTAL	**(City induced framework only)**	**1,045,175**	**174,221**	**119,638**	**3,139,034**
II	**TRANSPORTATION**				
II.1	On-road transportation	686,173	IE	NE	686,173
II.2	Railways	IE	NO	NE	
II.3	Waterborne navigation	IE	NO	NE	
II.4	Aviation	NE	NO	NE	
II.5	Off-road transportation	IE	NO	NE	
SUB-TOTAL	**(city induced framework only)**	**686,173**			**686,173**
III	**WASTE**				
III.1.1/2	Solid waste generated in the city	1,260,044		NO	1,260,044
III.2.1/2	Biological waste generated in the city	NO		NO	
III.3.1/2	Incinerated and burned waste generated in the city	NO		NO	
III.4.1/2	Wastewater generated in the city	575,439		NO	575,439
III.1.3	Solid waste generated outside the city	NO			
III.2.3	Biological waste generated outside the city	NO			

GPC ref No.	GHG Emissions Source (By Sector and Sub-sector)	Total GHGs (metric tonnes CO_2e)			
		Scope 1	Scope 2	Scope 3	Scope 4
III.3.3	Incinerated and burned waste generated outside city	NO			
III.4.3	Wastewater generated outside the city	NO			
SUB-TOTAL	**(city induced framework only)**	**1,835,482**			**1,835,482**
IV	**INDUSTRIAL PROCESSES and PRODUCT USES**				
IV.1	Emissions from industrial processes occurring in the city boundary	NE			
IV.2	Emissions from product use occurring within the city boundary	NE			
SUB-TOTAL	**(city induced framework only)**				
V	**AGRICULTURE, FORESTRY and OTHER LAND USE**				
V.1	Emissions from livestock	NE			
V.2	Emissions from land	NE			
V.3	Emissions from aggregate sources and non-CO2 emission sources on land	NE			
SUB-TOTAL	**(city induced framework only)**				
VI	**OTHER SCOPE 3**				
VI.1	Other Scope 3			NE	
TOTAL	**(city induced framework only)**	**3,566,831**	**1,974,221**	**119,638**	**5,660,690**

Annexure 10

Sector-Wise Composite Growth Factors

Weights on the base parameters of population growth rate and GDP growth rate have been assigned at the sector level to arrive at composite growth factors for each sector. Growth in energy consumption and consequent emissions from domestic, transport and non-specified sources have been assumed to be primarily driven by growth of population rather than economic growth. Thus, 80% weight has been assigned to the base parameter of population growth rate and 20% weight has been assigned to the base parameter of GDP growth rate to arrive at the composite growth factor of these sectors. Conversely, emissions from commercial, institutional, public utilities and facilities, and industrial sources have been assumed to be primarily driven by growth of economy rather than population. Thus, 20% weight has been assigned to population growth rate and 80% weight has been assigned to GDP growth rate to arrive at the composite growth factor of these sectors. Emissions from the waste sector have been assumed to be driven solely by population growth rate.

Sector-wise GDP and Population Growth Weightages and Composite growth factors for GHG Emission Forecast in BAU Scenario

Sector	Parameter	2021-22 to 2030	2030 to 2040	2040 to 2050
Base Population and GDP growth rates	(a) Population Growth Rate	3.3%	1.1%	1.1%
	(b) GDP Growth Rate	7.6%	5.8%	4.7%
Residential	Composite growth factor = [80% × (a)] + [20% ×(b)]	4.2%	2.1%	1.9%
Commercial, and institutional / facilities	Composite growth factor = [20% × (a)] + [80% ×(b)]	6.8%	4.9%	4.0%
Industrial	Composite growth factor = [20% × (a)] + [80% × (b)]	6.8%	4.9%	4.0%
Solid waste	Composite growth factor = [100% × (a)]	3.3%	1.1%	1.1%
Wastewater	Composite growth factor = [100% × (a)]	3.3%	1.1%	1.1%
Transport	Composite growth factor = [80% × (a)] + [20% × (b)]	4.2%	2.1%	1.9%
Non-specified sources	Composite growth factor = [80% × (a)] + [20% × (b)]	4.2%	2.1%	1.9%

Annexure 11

Resilience Potential, Feasibility and Impact Assessment of Resilience Strategies and Actions

Overall Resilience is scored as follows:

5/5 – Very high

4/5 – High

3/5 – Medium

2/5 – Average

1/5 – Low

Overall feasibility is scored as follows (based on the number of 'yes' in political, financial, and technical feasibility assessment)

3/3 – high

2/3 – med

1/3 – low

Impact is assessed in terms of the time required to see change in resilience of a system or the time needed to bring about change in the city

Short term (impact within 2 years)

Medium term (impact within 5-7 years)

Long term (impact beyond 7 years)

Water Supply:

Actions	Resilience Potential					Overall Resilience	Resilience Potential			Overall feasibility	Impact
	Redundancy	Flexibility	Access to information	Responsiveness	GHG emission reduction potential		Political	Technical	Financial		
Action Area: Reduction of Non-Revenue Water											
Use of smart water metering, Introducing water metering systems in every household.	No	No	Yes	No	No	Low	Yes	Yes	Yes	High	Medium
Water audits	No	No	Yes	Yes	No	Low	yes	Yes	Yes	High	Medium
Leak detection,	Yes	No	Yes	Yes	No	Low	Yes	Yes	No	Low	Short
Upgradation of pipeline network - to improve access to water	No	Yes	Yes	Yes	No	Medium	Yes	Yes	Yes	High	Medium
Action Area: Promotion of Rainwater Harvesting											
Promotion of rainwater harvesting (RWH) for artificial aquifer recharge in residential, public/ institutional, and industrial properties using recharge borewells to reverse the declining groundwater.	Yes	Yes	Yes	Yes	No	High	Yes	Yes	No	Medium	Medium
Establish robust monitoring mechanism to evaluate existing and upcoming RWH systems	Yes	Yes	Yes	Yes	No	High	Yes	Yes	Yes	High	Medium
Action Area: Promotion of Climate proof infrastructure											
Ensure all WTPs and Deep Tube-wells (DTWs) are provided with renewable power sources	Yes	Yes	Yes	Yes	Yes	Very High	Yes	Yes	Yes	High	Long
Undertake energy audits at annual intervals and shift to renewable sources.	Yes	Yes	Yes	No	Yes	High	Yes	Yes	No	Medium	Long
Regular maintenance of DTWs.	Yes	Yes	Yes	Yes	No	High	Yes	Yes	No	Medium	Medium

Actions	Resilience Potential					Overall Resilience	Resilience Potential			Overall feasibility	Impact
	Redundancy	Flexibility	Access to information	Responsiveness	GHG emission reduction potential		Political	Technical	Financial		
Action Area: Increase the Use of Surface Water											
Increase the capacity and number of Surface water treatment plants	Yes	Yes	Yes	Yes	No	High	Yes	Yes	No	Medium	Long
Action: Ensure access to safe and clean water for all citizens											
Regular quality monitoring of water supply to ensure clean and safe water distribution.	No	No	Yes	Yes	No	Average	No	Yes	No	Low	Short
Promote dual plumbing in new construction and encourage reuse of grey water - provide technical support, incentives.	Yes	Yes	No	Yes	No	Medium	Yes	No	No	Low	Medium
Other Soft Measures											
Develop a policy to help regulate and control surface water and groundwater use and pollution, reduce water wastage, and support the introduction of water meters.	No	No	Yes	No	No	Low	Yes	Yes	Yes	High	short
IEC promotes the conservation of water at the household level, and incentives of water conservation through using different tariff slabs for water consumption.	No	No	Yes	Yes	No	Average	Yes	Yes	No	Medium	Short

Wastewater:

Actions	Resilience Potential					Overall Resilience	Resilience Potential			Overall feasibility	Impact
	Redundancy	Flexibility	Access to information	Responsiveness	GHG emission reduction potential		Political	Technical	Financial		
Action: Improve the collection, scientific disposal, and treatment of the Sewage											
Existing septic tanks need to be renovated for scientific onsite treatment by 2030, and progressively reduced by 2050 to 20% of the total treatment options.	Yes	Yes	Yes	Yes	Yes	Very High	No	Yes	No	Low	Long
Develop and implement a strategy for faecal sludge management in the city for managing septic tank sludge.	Yes	Yes	Yes	Yes	No	High	Yes	Yes	Yes	High	Long
Expansion of centralised sewer network, to cover at least 80% of the city by 2050.	Yes	Yes	Yes	Yes	No	High	Yes	Yes	No	Medium	Long
Progressively increase centralised collection and treatment and reduce septic tank use, as infrastructure for waste water is developed in the city.	Yes	Yes	Yes	Yes	Yes	Very High	Yes	Yes	No	Medium	Long
Action- Enhance the Capacity of Scientific treatment and disposal of Waste											
Strengthen and ensure operation and maintenance of aerobic technology based STPs, with trained staff, for instance the facultative lagoons.	Yes	Yes	Yes	Yes	No	High	No	Yes	No	Low	Medium
Enhance sewage treatment capacity to be able to process generated wastewater while focusing on anaerobic technology-based secondary treatment with the option of methane recovery.	Yes	Yes	Yes	Yes	yes	Very High	Yes	Yes	No	Medium	Long

Actions	Resilience Potential					Overall Resilience	Resilience Potential			Overall feasibility	Impact
	Redundancy	Flexibility	Access to information	Responsiveness	GHG emission reduction potential		Political	Technical	Financial		
Integrate faecal sludge cotreatment facility with both aerobic and anaerobic sewage treatment plants.	Yes	Yes	Yes	Yes	Yes	Very High	Yes	Yes	No	Medium	Long
Recommend establishment of faecal sludge treatment plants (FSTPs) at strategic locations.	Yes	Yes	Yes	Yes	No	High	Yes	Yes	No	Medium	Medium
Undertake feasibility study for installing decentralised wastewater treatment solutions for cluster of households or residential complexes as well as in upcoming large residential townships and commercial areas	Yes	Yes	Yes	Yes	No	High	No	Yes	No	Low	Medium
Encourage adoption of anaerobic technology-based DeWATS in large hospitals and public/institutions	Yes	Yes	Yes	Yes	Yes	Very High	No	Yes	No	Medium	Long
Deploy and integrate renewable energy (such as solar) to meet some part of energy demand of treatment plants.	Yes	Yes	Yes	Yes	Yes	Very High	Yes	Yes	No	Medium	Medium
Gas Recovery from Anaerobic Treatment	Yes	Yes	Yes	Yes	Yes	Very High	Yes	Yes	No	Medium	Long
Ensure uptake of treated waste water in industries, municipal parks or in the construction sector through policy changes and incentives.	Yes	Yes	Yes	Yes	No	High	Yes	Yes	No	Medium	Short
Action: Access to Toilet for all											
Dhaka has a very low rate of open defecation. This status should be maintained in the future as well.	Yes	Yes	Yes	Yes	No	High	Yes	Yes	Yes	High	Short

Actions	Resilience Potential					Overall Resilience	Resilience Potential			Overall feasibility	Impact
	Redundancy	Flexibility	Access to information	Responsiveness	GHG emission reduction potential		Political	Technical	Financial		
Other Soft Measures											
Mass awareness activities - Create awareness and capacitate relevant stakeholders regarding proper septic tank construction or connection to sewer lines.	Yes	Yes	No	Yes	No	Medium	Yes	Yes	Yes	High	Short
Training and capacity building programs for staff of DWASA regarding DEWATS, low carbon technologies for wastewater treatment.	Yes	Yes	No	Yes	No	Medium	Yes	Yes	No	Medium	Medium
Establish a plan for regular desludging of septic tanks and safe collection and disposal in treatment facilities.	No	No	No	Yes	No	Low	Yes	Yes	No	Medium	Short
Develop a policy for the reuse of wastewater in industries, City Corporation gardens, avenue plantation, etc.	Yes	Yes	No	Yes	No	Medium	Yes	Yes	No	Medium	Medium
Improved performance management of wastewater treatment facilities	Yes	Yes	Yes	Yes	Yes	Very High	Yes	Yes	No	Medium	Long

Drainage System:

Actions	Resilience Potential					Overall Resilience	Resilience Potential			Overall feasibility	Impact
	Redundancy	Flexibility	Access to information	Responsiveness	GHG emission reduction potential		Political	Technical	Financial		
Action Area: Conservation and restoration of Natural Drains of the City (Khals)											
Existing Drainage Master Plan with DWASA should be followed.	Yes	Yes	Yes	Yes	No	High	Yes	Yes	No	High	Long
Prevent encroachment on khals by removing current obstructions, relocating and rehabilitating current encroaching populations or constructions.	Yes	Yes	Yes	Yes	No	High	Yes	Yes	Yes	High	Long
Cleaning and revitalising khals that have been encroached upon or have deteriorated to improve flow capacity.	Yes	Yes	Yes	Yes	No	High	Yes	Yes	Yes	High	Long
Action-Establishment of an Early Warning System											
Ensure that the Drainage Master Plan is followed. Enhance stormwater drainage network's capacity by aligning it with anticipated future rainfall intensities and surface runoff coefficients.	Yes	Yes	Yes	Yes	No	High	Yes	Yes	Yes	High	Long
Establish a structured maintenance framework for stormwater drainage systems to ensure regular cleaning and obstruction removal in order to proactively prevent waterlogging, particularly in the lead-up to the monsoon season.	Yes	Yes	Yes	Yes	No	High	Yes	Yes	Yes	High	Medium

Actions	Resilience Potential					Overall Resilience	Resilience Potential			Overall feasibility	Impact
	Redundancy	Flexibility	Access to information	Responsiveness	GHG emission reduction potential		Political	Technical	Financial		
Implement flood level early warning and monitoring for water bodies within the city; possible flood response plans for the city with institutional structure in place at the local level.	Yes	Yes	Yes	Yes	No	High	Yes	Yes	No	Medium	Long
Action Area: Enhancement of footpath and permeable surface											
Improve the permeable surfaces in open areas, such as the internal walkways of residential or commercial properties, parks, sidewalks, etc., to reduce runoff and encourage groundwater recharge.	Yes	Yes	Yes	Yes	No	High	Yes	Yes	Yes	High	Medium
Action Area: Enhancement of footpath and permeable surface											
Formulate a policy to prevent the disposal of solid and liquid waste into water channels (khals) with penal provisions.	Yes	Yes	Yes	Yes	No	High	Yes	Yes	Yes	High	Medium
9. Launch a public awareness campaign to discourage the disposal of solid and liquid waste into drainage systems	Yes	Yes	Yes	Yes	No	High	Yes	Yes	Yes	High	Short
10. Establish bylaws to promote the use of permeable surfaces for water recharge particularly for paved footpaths.	No	No	Yes	Yes	No	Average	Yes	No	Yes	Medium	Short

Solid Waste Management:

Actions	Resilience Potential					Overall Resilience	Resilience Potential			Overall feasibility	Impact
	Redundancy	Flexibility	Access to information	Responsiveness	GHG emission reduction potential		Political	Technical	Financial		
Action Area: Reduction of Non-Revenue Water											
1) IEC to popularize circular economy and 3Rs principles, source segregation, recycling, and reduction of waste.	No	Yes	Yes	Yes	No	Medium	Yes	Yes	Yes	High	Short term
2) Promotion of waste Reduction strategies: lifestyle & behaviour changes, IEC for the residential sector and textile industries	No	Yes	Yes	Yes	No	High	Yes	Yes	Yes	High	Short term
3) Segregated at source and segregated collection - through separate vehicles or separate collection days.	Yes	Yes	No	Yes	No	Medium	Yes	Yes	Yes	High	Medium
4) Prevention of littering - provision of sufficient infrastructure at public places and commercial markets.	Yes	Yes	Yes	No	No	Medium	Yes	Yes	Yes	High	Medium
Action Area: Segregated Waste collected and transported											
5) Ensure a comprehensive service for door-to-door collection of waste from every household through primary collection service providers (PCSPs), commercial establishments, institutions, and hotels - Assessment and identification of gaps in primary and secondary collection services; route planning for waste collection, deployment of personnel/private collectors for collection and transportation.	Yes	Yes	Yes	Yes	No	High	No	Yes	No	Low	Medium

Actions	Resilience Potential					Overall Resilience	Resilience Potential			Overall feasibility	Impact
	Redundancy	Flexibility	Access to information	Responsiveness	GHG emission reduction potential		Political	Technical	Financial		
6) Ensure adequate infrastructure - collection vehicles for primary and secondary collection of solid waste; Establishments of adequate numbers of secondary collection points in all wards/zones.	Yes	Yes	Yes	Yes	No	High	Yes	Yes	No	Medium	Medium
Enhance secondary storage, collection, and transport of solid waste. Upgrade transfer stations with pre-sorting facilities GPS enabled route rationalisation of solid waste vehicles to optimize fuel use.	Yes	Yes	Yes	Yes	No	High	Yes	Yes	No	Medium	Medium
Enforce measures and regulation to minimize unscientific handling and processing of plastic, electronic waste and C&D waste and establish mechanisms for their processing	No	Yes	Yes	Yes	No	Medium	Yes	Yes	No	Medium	Short
7) Conduct capacity enhancement for waste collectors through regular training for proper collection of waste at primary and secondary levels; proper handing over of waste to collectors.	Yes	Yes	Yes	Yes	No	High	Yes	Yes	Yes	High	Short

Actions	Resilience Potential					Overall Resilience	Resilience Potential			Overall feasibility	Impact
	Redundancy	Flexibility	Access to information	Responsiveness	GHG emission reduction potential		Political	Technical	Financial		
Action Area: Promotion of Decentralised waste processing facilities in the city											
8) Explore the opportunity to establish decentralised waste processing facilities in different zones through feasibility assessment, particularly catering to bulk waste generators such as hotels, malls, restaurants, wet markets, and residential complexes to remove organic waste going to landfill.	Yes	Yes	Yes	Yes	Yes	Very High	No	Yes	No	Low	Medium
9) Establishment of decentralised processing facilities such as composting and bio methanation facilities for wet waste.	Yes	Yes	Yes	Yes	Yes	Very High	No	Yes	No	Low	Long
10) Encouraging the practice of home composting through providing incentives for reducing waste and sorting waste materials at the source in households.	Yes	Yes	No	Yes	Yes	High	No	Yes	Yes	Medium	Long
Action Area: Promotion of a Centralised Waste Management Facility											
11) Ensure processing of waste through centralised waste management processing facilities such as bio methanation/Material recovery facilities	Yes	Yes	Yes	Yes	Yes	Very High	Yes	Yes	Yes	High	Long

Actions	Resilience Potential					Overall Resilience	Resilience Potential			Overall feasibility	Impact
	Redundancy	Flexibility	Access to information	Responsiveness	GHG emission reduction potential		Political	Technical	Financial		
Action Area: Promotion of a Centralised Waste Management Facility											
12 Ensure maximum recovery of recyclables and non-recyclables (having high calorific value) waste at the processing facility.	Yes	Yes	No	Yes	Yes	High	No	Yes	No	Low	Long
13) Ensure only inert and rejects from processing facilities are reaching the landfill site.	Yes	Yes	Yes	Yes	No	High	Yes	Yes	No	Medium	Long
Other Soft Measures											
Penalty for littering and open disposal	No	No	Yes	Yes	No	Low	No	Yes	No	Low	Short
User charges/ Incentives for household waste composting/ incentives for BWGs for onsite waste processing	No	No	Yes	Yes	No	Low	Yes	Yes	Yes	High	Short
Minimize solid waste generation and maximize reuse and recycling	Yes	Yes	No	Yes	Yes	High	No	No	Yes	Low	Medium
Strengthen waste transfer and processing infrastructure	Yes	Yes	No	Yes	Yes	High	No	Yes	Yes	Medium	Long
Augment waste disposal infrastructure	Yes	Yes	Yes	No	Yes	High	Yes	Yes	Yes	High	Long

Energy and buildings

Actions	Resilience Potential					Overall Resilience	Resilience Potential			Overall feasibility	Impact
	Redundancy	Flexibility	Access to information	Responsiveness	GHG emission reduction potential		Political	Technical	Financial		
Advocate to power sector decision-makers and electricity suppliers for more ambitious and faster integration of renewables in Dhaka's power supply to achieve net-zero goals	Yes	Yes	Yes	No	Yes	High	Yes	No	Yes	Medium	Long-term
Expand the capacity and adoption of renewable power in the electricity grid	Yes	Yes	Yes	Yes	Yes	Very High	Yes	Yes	No	Medium	Long-term
Offer assistance and streamline procedures for private sector and RE developers	Yes	No	No	No	Yes	Average	Yes	Yes	Yes	High	Medium-term
Establish partnerships for research and to implement pilots	Yes	No	Yes	No	Yes	Medium	Yes	Yes	Yes	High	Short-term
Adopt integrated spatial and energy planning at the city-scale and promote renewables through urban development regulations	No	Yes	Yes	No	Yes	Medium	Yes	Yes	Yes	High	Medium-term
Develop a local plan for financing and enabling private investment in large-scale RE projects. Financing options such as public funds, low-interest or concessional loans, climate finance should also be assessed.	Yes	No	No	Yes	Yes	Medium	No	Yes	No	Low	Medium-term
Identify and implement rooftop solar PV projects in prominent large-size public, institutional, educational and hospital buildings. Implementation and business models (CAPEX, lease, OPEX/RESCo) can be tested in such projects for further scale-up.	Yes	Yes	Yes	Yes	Yes	Very High	Yes	Yes	Yes	High	Long-term

Actions	Resilience Potential					Overall Resilience	Resilience Potential			Overall feasibility	Impact
	Redundancy	Flexibility	Access to information	Responsiveness	GHG emission reduction potential		Political	Technical	Financial		
Establish mandates for rooftop solar PV in large buildings and promote solar-ready rooftops	Yes	Yes	No	Yes	Yes	High	Yes	Yes	Yes	High	Long-term
Revisit distributed solar PV guidelines and norms to allow consumers to install higher capacity of solar PV systems (i.e., allow solar PV capacity of up to 70% of the sanctioned electricity load)	Yes	Yes	No	No	Yes	Medium	Yes	No	No	Low	Long-term
Identify a list of rooftops and spaces with solar PV potential and facilitate aggregated deployment	Yes	No	No	No	Yes	Average	Yes	No	No	Low	Long-term
Facilitate technical support and access to financing for rooftop solar deployment	No	Yes	Yes	Yes	Yes	High	Yes	Yes	Yes	High	Medium-term
Conduct energy consumption audits and benchmarking	No	Yes	No	Yes	Yes	Medium	Yes	Yes	No	Medium	Medium-term
Promote energy efficiency through building regulations and mandates	Yes	Yes	Yes	No	Yes	High	Yes	No	No	Low	Medium-term
Enable access to affordable financing and provide financial incentives to ensure greater energy efficiency adoption	Yes	Yes	No	No	Yes	Medium	Yes	Yes	Yes	High	Short-term
Setup a Sustainable Energy Cell in DNCC to promote and coordinate energy efficiency actions in City Corporation buildings and with different stakeholders at the city-scale.	Yes	Yes	Yes	No	Yes	High	Yes	Yes	Yes	High	Short-term
Undertake a public IEC campaign to increase awareness on building and appliance energy efficiency	No	Yes	No	Yes	Yes	Medium	No	Yes	Yes	Medium	Short-term

Actions	Resilience Potential					Overall Resilience	Resilience Potential			Overall feasibility	Impact
	Redundancy	Flexibility	Access to information	Responsiveness	GHG emission reduction potential		Political	Technical	Financial		
Develop easy to use guidebooks and implement pilots on energy efficient and low-carbon building design and construction	Yes	No	Yes	Yes	Yes	High	Yes	Yes	Yes	High	Medium-term
Develop a localised Green Building policy and establish requirements for energy efficient new buildings and those undergoing major renovation in the building regulations that get more ambitious over time	No	Yes	Yes	Yes	Yes	High	Yes	Yes	Yes	High	Medium-term
Build local capacity and facilitate access to local solution providers for green building actions	No	Yes	No	No	Yes	Average	No	Yes	No	Low	Long-term
Implement a city-wide Cool Roof program	No	Yes	Yes	No	Yes	Medium	Yes	Yes	Yes	High	Long-term
Introduce a building renovation program for energy efficiency upgrades for existing buildings	No	Yes	Yes	No	Yes	Medium	Yes	Yes	No	Medium	Long-term
Adoption of sustainable, low-carbon and circular building materials	Yes	Yes	Yes	Yes	Yes	Very High	Yes	Yes	No	Medium	Medium-term
Promote climate-responsive measures in affordable and informal housing	No	Yes	Yes	Yes	Yes	High	Yes	Yes	Yes	High	Short-term
Design and implement monetary and non-monetary measures to promote energy efficient buildings	Yes	Yes	Yes	No	Yes	High	Yes	Yes	No	Medium	Medium-term
Adoption of certified green and net-zero public buildings	Yes	Yes	Yes	Yes	Yes	Very High	Yes	Yes	No	Medium	Long-term
Develop policies promoting energy efficiency in public buildings and infrastructure	Yes	Yes	Yes	Yes	Yes	Very High	Yes	Yes	Yes	High	Medium-term

Actions	Resilience Potential					Overall Resilience	Resilience Potential			Overall feasibility	Impact
	Redundancy	Flexibility	Access to information	Responsiveness	GHG emission reduction potential		Political	Technical	Financial		
Promote green public and institutional buildings	Yes	Yes	Yes	Yes	Yes	Very High	Yes	Yes	No	Medium	Long-term
Track energy performance and implement targeted energy efficiency improvement actions in public buildings and facilities	Yes	Yes	No	No	Yes	Medium	No	Yes	Yes	Medium	Medium-term
Conduct capacity building and technical studies	No	Yes	Yes	No	Yes	Medium	Yes	Yes	Yes	High	Short-term
Promotion of energy efficient public lighting	Yes	Yes	Yes	Yes	Yes	Very High	Yes	Yes	Yes	High	Medium-term
Promotion of clean fuel supply	No	Yes	Yes	Yes	Yes	High	Yes	Yes	No	Medium	Long-term
Adopt demand side interventions to transition to low-emission fuels	Yes	No	No	Yes	Yes	Medium	No	Yes	No	Low	Long-term
Scale-up deployment of rooftop and distributed solar energy and high-energy efficiency solutions in industrial units	No	Yes	No	No	Yes	Average	Yes	Yes	No	Medium	Long-term
Promote fuel switch and transition to renewables	No	No	No	No	Yes	Low	Yes	Yes	No	Medium	Long-term

Transport

Actions	Resilience Potential					Overall Resilience	Resilience Potential			Overall feasibility	Impact
	Redundancy	Flexibility	Access to information	Responsiveness	GHG emission reduction potential		Political	Technical	Financial		
Develop plans and policies to promote faster adoption of EV	No	Yes	Yes	Yes	Yes	High	Yes	Yes	Yes	High	Short-term
Incentivise EV adoption	Yes	Yes	Yes	Yes	Yes	Very High	Yes	Yes	Yes	High	Short-term
Develop and install EV charging infrastructure	Yes	No	Yes	Yes	Yes	High	Yes	Yes	Yes	High	Short-term
Develop plans and policies for increased adoption of NMT and public transport	No	Yes	No	Yes	Yes	Medium	No	Yes	Yes	Medium	Medium-term
Incentivise NMT and public transport	Yes	Yes	Yes	No	Yes	High	Yes	No	No	Medium	Medium-term
Implement demonstrable pilot projects for further scale up/ replication	Yes	No	Yes	No	Yes	High	Yes	Yes	Yes	High	Short-term
Implement IoT and smart measures to promote public transport	No	No	Yes	Yes	Yes	Medium	Yes	No	Yes	Medium	Medium-term
IEC measures to promote NMT and public transport	Yes	No	No	Yes	Yes	Medium	No	Yes	Yes	Medium	Short-term
Implement traffic management system to reduce congestion	Yes	Yes	Yes	No	Yes	High	Yes	Yes	Yes	High	Long-term
Improve transportation related infrastructure from smoother flow of traffic	No	Yes	No	Yes	Yes	Medium	Yes	Yes	Yes	High	Long-term
Prepare policies to eliminate encroachments along Right of Way	No	Yes	No	No	Yes	Average	No	Yes	No	Low	Long-term
Promote adoption of better engines for vehicles	Yes	Yes	Yes	Yes	Yes	Very High	Yes	Yes	Yes	High	Medium-term

Health Sector

Actions	Resilience Potential					Overall Resilience	Resilience Potential			Overall feasibility	Impact
	Redundancy	Flexibility	Access to information	Responsiveness	GHG emission reduction potential		Political	Technical	Financial		
Health Sector:											
Prepare a heat action plan for the city with early warning and early action systems in place.	Yes	No	Yes	Yes	No	Medium	Yes	Yes	Yes	Medium	Medium
Promote cool roofs for new buildings.	Yes	Yes	Yes	Yes	Yes	Very High	Yes	Yes	Yes	Medium	Long
Promote green roofs in all buildings.	Yes	Yes	Yes	Yes	Yes	Very High	No	Yes	Yes	Medium	Long
Promote urban green area development, through avenue plantation or shelters for pedestrians.	Yes	Yes	Yes	Yes	No	High	Yes	Yes	Yes	High	Short
Provide drinking water facilities in public areas and at regular intervals on the roadsides/ rickshaw stands.	Yes	Yes	Yes	Yes	No	High	Yes	Yes	yes	High	Medium
Ensure fogging and spraying of insecticides for vectors"	No	No	Yes	Yes	No	Average	Yes	Yes	Yes	High	Short
Provide cooling centres for pedestrians and people who work outside like street vendors, rickshaw pullers, construction labourers.	Yes	Yes	Yes	Yes	No	High	Yes	Yes	No	Medium	Medium
Ensure no water logging due to solid waste disposal as mentioned in previous section on solid waste.	Yes	Yes	No	Yes	No	Medium	Yes	Yes	YEs	High	Medium

Actions	Resilience Potential					Overall Resilience	Resilience Potential			Overall feasibility	Impact
	Redundancy	Flexibility	Access to information	Responsiveness	GHG emission reduction potential		Political	Technical	Financial		
Action: Capacity building of health workers and establishment of an Early Warning System and linked it with the health sector											
Conduct public awareness campaigns to educate people about the health risks such as heat stress, water borne or vector borne diseases after urban floods.	Yes	Yes	Yes	Yes	No	High	Yes	Yes	Yes	Medium	Medium
Train healthcare professionals, including doctors, nurses, and public health workers, to recognize and address climate-related health risks in their practice, particularly heat stress and heat strokes and report on them.	Yes	Yes	Yes	Yes	No	High	Yes	Yes	Yes	High	Short
Conduct regular drills and simulations to ensure healthcare facilities are well-prepared for climate-related emergencies.	Yes	Yes	No	Yes	No	Medium	Yes	Yes	YEs	High	Short
Early warning and early action systems put in place for local bodies to take action on time to prevent climate related health impacts.	Yes	Yes	Yes	Yes	No	High	Yes	Yes	No	Medium	Short

Actions	Resilience Potential					Overall Resilience	Resilience Potential			Overall feasibility	Impact
	Redundancy	Flexibility	Access to information	Responsiveness	GHG emission reduction potential		Political	Technical	Financial		
Action Area: Access to health care facilities to all citizen											
Establishing regulations and guidelines to ensure the development of healthcare facilities that are well-prepared to withstand and effectively respond to the impacts of climate change on public health.	Yes	Yes	Yes	Yes	No	High	Yes	Yes	YEs	High	Medium
Health care facilities should have back up power systems with renewable sources, such as solar power systems.	Yes	Yes	Yes	Yes	Yes	Very High	Yes	Yes	No	Medium	Medium
Healthcare facilities should be set up in areas that are easily accessible by the urban poor, that is, within the range of public transport facilities and should not be inaccessible due to flooding or other hazards.	Yes	Yes	Yes	Yes	No	High	Yes	Yes	No	Medium	Medium

C40 CITIES

ICLEI
Local Governments for Sustainability
SOUTH ASIA