Funding Proposal

FP315: Bhutan Livable and Resilient Cities Project (LRCP)

Bhutan | International Bank for Reconstruction and Development and International Development Association (WorldBank) | Decision B.46/04

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Note to Accredited Entities on the use of the funding proposal template

- Accredited Entities should provide summary information in the proposal with cross-reference to annexes such as feasibility studies, gender action plan, term sheet, etc.
- Accredited Entities should ensure that annexes provided are consistent with the details provided in the funding proposal. Updates to the funding proposal and/or annexes must be reflected in all relevant documents.
- The total number of pages for the funding proposal (excluding annexes) **should not exceed 60**. Proposals exceeding the prescribed length will not be assessed within the usual service standard time.
- The recommended font is Arial, size 11.
- Under the GCF Information Disclosure Policy, project and programme funding proposals will be disclosed on the GCF website, simultaneous with the submission to the Board, subject to the redaction of any information that may not be disclosed pursuant to the IDP. Accredited Entities are asked to fill out information on disclosure in section G.4.

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Please use the following name convention for the file name:

"FP-[Accredited Entity Short Name]-[Country/Region]-[YYYY/MM/DD]"

ACRONYMS:

ACRONYM	DEFINITION
ACREWAS	ADVANCING CLIMATE RESILIENCE OF THE WATER SECTOR IN BHUTAN
ADB	ASIAN DEVELOPMENT BANK
ADPC	ASIAN DISASTER PREPAREDNESS CENTER
AE	ACCREDITED ENTITY
AMA	ACCREDITATION MASTER AGREEMENT
AML/CFT	ANTI-MONEY LAUNDERING AND COUNTERING THE FINANCING OF TERRORISM
ARA	ADAPTATION RESULTS AREA
ASI	AVOID-SHIFT-IMPROVE
BAU	BUSINESS-AS-USUAL
BCR	BENEFIT-COST RATIO
BPL	BUS PRIORITY LANE
BTN	BHUTANESE NGULTRUM
BUR	BIENNIAL UPDATE REPORT
CBS	CITY BUS SERVICE
CCAP	CITY CORE ACTION PLAN
CCDR	BHUTAN COUNTRY CLIMATE AND DEVELOPMENT REPORT
CN	CONCEPT NOTE
CSO	CIVIL SOCIETY ORGANIZATION
DA	DESIGNATED ACCOUNT
DHS	DEPARTMENT OF HUMAN SETTLEMENT
DMA	DISTRICT METERED AREA
ECRUL	ENHANCING CLIMATE RESILIENCE OF THE URBAN LANDSCAPES AND COMMUNITIES IN THE THIMPHU–PARO REGION
EE	EXECUTING ENTITY
EFA	ECONOMIC AND FINANCIAL ANALYSIS
EIRR	ECONOMIC INTERNAL RATE OF RETURN
ENPV	ECONOMIC NET PRESENT VALUE
ESIA	ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT
ESMF	ENVIRONMENTAL AND SOCIAL MANAGEMENT FRAMEWORK
ESMP	ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN
ESS	ENVIRONMENTAL AND SOCIAL SAFEGUARDS
FAA	FUNDED ACTIVITY AGREEMENT
FM	FINANCIAL MANAGEMENT
FNPV	FINANCIAL NET PRESENT VALUE
FP	FUNDING PROPOSAL
FYP	FIVE-YEAR PLAN
GAP	GENDER ACTION PLAN
GCF	GREEN CLIMATE FUND
GDP	GROSS DOMESTIC PRODUCT
GHG	GREENHOUSE GAS
GLOF	GLACIAL LAKE OUTBURST FLOOD
GRM	GRIEVANCE REDRESS MECHANISM
IDA	INTERNATIONAL DEVELOPMENT ASSOCIATION
IDP	INFORMATION DISCLOSURE POLICY
IMF	INTERNATIONAL MONETARY FUND
IPPU	INDUSTRIAL PROCESSES AND PRODUCT USE
IRMF	INTEGRATED RESULTS MANAGEMENT FRAMEWORK
ITS	INTELLIGENT TRANSPORT SYSTEM
IUFRS	INTERIM UNAUDITED FINANCIAL REPORTS
JICA	JAPAN INTERNATIONAL COOPERATION AGENCY
KYC	KNOW YOUR CUSTOMER
LDC	LEAST DEVELOPED COUNTRY

LETMP	Low Emission Transport Master Plan
LMP	Labor Management Procedures
LRCP	Bhutan Livable and Resilient Cities Project
LTS	Bhutan's Long-Term Low Greenhouse Gas Emission and Climate Resilient Development Strategy
M&E	Monitoring and Evaluation
MIS	Management Information System
ML/TF	Money Laundering / Terrorist Financing
MLD	Million Liters per Day
MoF	Ministry of Finance
MoIT	Ministry of Infrastructure and Transport
MoV	Means of Verification
MRA	Mitigation Results Area
NAP	National Adaptation Plan
NbS	Nature-based Solutions
NDC	Nationally Determined Contribution
NMT	Non-Motorized Transport
NOL	No Objection Letter
NPV	Net Present Value
NRW	Non-Revenue Water
O&M	Operations and Maintenance
OHS	Occupational Health and Safety
PAVA	Property Assessment and Valuation Division
PDO	Project Development Objective
PIU	Project Implementation Unit
PMC	Project Management Consultant
PMU	Project Management Unit
PPF	Project Preparation Facility
PSA	Public Service Agreement
PSC	Project Steering Committee
PWD	Persons with Disabilities
RAG	Red, Amber, Green (risk rating)
RCP	Representative Concentration Pathway
RGoB	Royal Government of Bhutan
RMA	Royal Monetary Authority
SAARC	South Asian Association for Regional Cooperation
SCADA	Supervisory Control and Data Acquisition
SDG	Sustainable Development Goal
SEA/SH	Sexual Exploitation and Abuse / Sexual Harassment
SOE	State-Owned Enterprise
SPEI	Standardized Precipitation Evapotranspiration Index
SSP	Shared Socioeconomic Pathway
SuDS	Sustainable Drainage Systems
SUTI	Sustainable Urban Transport Index
TA	Technical Assistance
tCO2eq	Tonnes of carbon dioxide equivalent
ToC	Theory of Change
TSP	Thimphu Structure Plan
TT	Thimphu Thromde
UNDP	United Nations Development Programme
UNDRR	United Nations Office for Disaster Risk Reduction
UNFCCC	United Nations Framework Convention on Climate Change
WFPSP	Water Flagship Program Support Project
WSD	Water and Wastewater Services Division
WSMP / TWSM	Water Sector Master Plan / Thimphu Water Services Master Plan
WTP	Water Treatment Plant

A.1. Project or programme	Project	**A.2. Public or private sector**	Public	
A.3. Request for Proposals (RFP)	Not applicable			
A.4. Result area(s)			**GCF contribution**	**Co-financers' contribution[1]**
	Mitigation total			
	☐ Energy generation and access			
	☒ Low-emission transport		85%	28%
	☐ Buildings, cities, industries and appliances			
	☐ Forestry and land use			
	Adaptation total			
	☐ Most vulnerable people and communities			
	☒ Health and well-being, and food and water security		0%	44%
	☒ Infrastructure and built environment		15%	28%
	☐ Ecosystems and ecosystem services			
A.5. Expected mitigation outcome *(Core indicator 1: GHG emissions reduced, avoided or removed / sequestered)*	69,519 tCO_2eq *(over 20 years)*	**A.6. Expected adaptation outcome** *(Core indicator 2: direct and indirect beneficiaries reached)*	*Direct: 104,162 (50,519 female)*	*Indirect: 271,871 (134,857 female)*
A.7. Total financing (GCF + co-finance[2])	USD 48 million	**A.9. Project size**	Small	
A.8. Total GCF funding requested	USD 28 million			
A.10. Financial instrument(s) requested for the GCF funding	☒ Grant $22.4m ☒ Loan $5.6m ☐ Guarantee	☐ Equity ☐ Results-based payment		
A.11. Implementation period	*Five years January 2027 – December 2031*	**A.12. Total lifespan**	*20 years for the infrastructure before capital maintenance. Approximately 10 years for implementing complementary strategies from Low Emission Transport Master Plan (LETMP), with rolling programme of bus replacement every 10-12 years. The water sector interventions have an economic lifespan of 20 years.*	
A.13. Expected date of AE internal approval	*10/1/2026*	**A.14. ESS category**	B	
A.15. Has this FP been submitted as a CN before?	Yes ☒ No ☐	**A.16. Has Readiness or PPF support been used to prepare this FP?**	Yes ☒ No ☐	
A.17. Is this FP included in the entity work programme?	Yes ☒ No ☐	**A.18. Is this FP included in the country programme?**	Yes ☒ No ☐	

A.19. Complementarity and coherence	Yes ☒ No ☐
A.20. Executing Entity information	The Government of the Royal Kingdom of Bhutan, represented by its Ministry of Finance (MoF) and acting through its Ministry of Infrastructure and Transport (MoIT)

A.21. Executive summary (max. 750 words, approximately 1.5 pages)

1. The Livable and Resilient Cities Project (LRCP) supports Bhutan's response to two emerging climate challenges in its urban areas: rising greenhouse gas emissions from transport and growing climate risks to water systems and urban transport infrastructure. Focusing on Thimphu, Bhutan's capital and largest city, the project combines low-emission resilient urban mobility investments with measures to strengthen the resilience of critical water infrastructure and services. These interventions will reduce emissions from urban transport while addressing the increasing risks of flooding, landslides, drought, and heat affecting the capital. By piloting integrated mitigation and adaptation solutions, LRCP establishes a scalable model for climate-resilient urban development in Bhutan.

2. Bhutan remains carbon negative, but gross emissions are rising rapidly with economic growth[3]. National greenhouse gas emissions reached 2,723.28 $GgCO_2e$ in 2020, about 600 percent above 1994 levels, and are projected to rise to 8,217.42 $GgCO_2e$ by 2050 under a business-as-usual pathway[4].Transport represents the main urban mitigation challenge, with road transport accounting for about 20 percent of national energy demand and relying almost entirely on fossil fuels. In Thimphu, increasing car ownership and congestion are contributing to rising fuel consumption and urban emissions, reinforcing the need for a shift toward low-emission public transport.

3. Bhutan also faces acute and growing climate vulnerability driven by climate change. Climate projections for Bhutan indicate increasing rainfall intensity, more frequent extreme precipitation events, higher peak temperatures, and greater seasonal variability in water availability. These trends are already affecting the capital. Around 20 percent of settlements are located in high-risk flood zones; the city's flood-prone built-up area nearly tripled between 1985 and 2015; and modelling suggests that an event currently classified as a 1-in-100-year pluvial flood could recur as often as once every five years by the 2060s[5]. The city also faces rainfall-triggered landslides, surface temperatures exceeding 40°C in summer, and growing dry-season water stress[6]. Climate change and rapid urbanization therefore reinforce one another, increasing the exposure of infrastructure and communities to flooding, landslides, drought, and heat.

4. These climate risks are compounded by institutional and technical barriers that limit the city's capacity to respond effectively. In transport, Thimphu's constrained road network and declining service quality have reinforced a shift toward private vehicles: nearly 50 percent of commuters travel by private car, compared with about 10 percent by city bus and 22 percent by walking or other non-motorized transport. Additionally, Thimphu's road network is highly exposed to flooding, inadequate drainage, and climate-induced disruptions resulting in recurrent transport interruptions, increased congestion, higher vehicle operating costs, and significant economic and business disruption. In the water sector,

[1] Co-financer's contribution means the financial resources required, whether Public Finance or Private Finance, in addition to the GCF contribution (i.e. GCF financial resources requested by the Accredited Entity) to implement the project or programme described in the funding proposal.
[2] Refer to the Policy of Co-financing of the GCF.
[3] Department of Environment and Climate Change, Royal Government of Bhutan. (2023). *Bhutan's long-term low greenhouse gas emission and climate resilient development strategy (LTS)*. Retrieved from https://unfccc.int/sites/default/files/resource/LTS%20Report_final%20print_copy.pdf
[4] United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP). (n.d.). *Sustainable Urban Transport Index (SUTI) report for Thimphu City*. Retrieved from https://www.unescap.org/sites/default/files/Thimphu.pdf
[5] Adhikari, K., et al. (2023). *Assessing flood risk in Thimphu: Analyzing contributing factors through urban flood modeling*. International Journal of Scientific Research in Engineering and Management. Retrieved from https://ijsrem.com/download/assessing-flood-risk-in-thimphu-analyzing-contributing-factors-through-urban-flood-modeling/
[6] Asian Disaster Preparedness Center (ADPC) & United Nations Office for Disaster Risk Reduction (UNDRR). (2020). *Disaster risk reduction in Bhutan: Status report 2020*. Retrieved from https://www.adpc.net/Igo/category/ID1664/doc/2021-dhx3BO-ADPC-Disaster_Risk_Reduction_in_Bhutan_Status_Report_2020.pdf

climate variability is affecting an aging distribution network where non-revenue water exceeds 50 percent and supply in some neighborhoods is limited to 3–9 hours per day. Institutional arrangements for urban service delivery remain fragmented, and utilities lack the digital systems, operational autonomy, and performance management tools needed to manage climate risks proactively.

5. LRCP addresses these barriers through an integrated package of climate-focused investments and institutional reforms. On mitigation, the project will establish the backbone of Bhutan's first low-emission urban bus system through an 18.9 km bus priority corridor with dedicated bus lanes, a fleet of 50 electric buses, two passenger terminals and an upgraded bus depot, 75 bus shelters, signalized pedestrian crossings, and digital systems for fleet management, passenger information, and ticketing. These interventions are designed to improve the speed, reliability, and attractiveness of public transport while reducing dependence on private vehicles. The expected result is a reduction of 69,519 tCO_2eq by 2048 relative to the BAU scenario. This also has significant resilience co-benefits as investments will enhance the robustness of the urban mobility system by reducing disruption from flooding and extreme rainfall, improving network redundancy and continuity of service during climate shocks.

6. On adaptation, the project will climate-proof priority water infrastructure and improve water security in areas exposed to drought, flooding, and landslide disruption. Investments include upgrading raw water intake structures so they can operate under both low-flow and high-flow conditions; stabilizing slopes and pipeline corridors exposed to rainfall-induced landslides; rehabilitating deteriorated distribution mains in core district-metered areas; and installing SCADA systems, bulk meters, flow meters, and pressure valves to enable real-time monitoring and faster leak detection. These measures address the climate risks of drought variability, flood damage, and landslide disruption to water infrastructure while helping reduce non-revenue water and improving the reliability of urban water supply.

7. Institutionally, LRCP will create the conditions for sustained climate action. In transport, the City Bus Service will be strengthened as an autonomous state-owned enterprise able to operate and expand low-carbon public transport under Public Service Agreements. In the water sector, LRCP will support a ring-fenced water services unit within Thimphu Thromde, enabling clearer budgeting, revenue management, staffing, and performance monitoring arrangements. Day-to-day management of the water network will be strengthened through embedded international specialists working alongside Water Services Division staff, building the operational and technical capacity needed to manage the system on a resilient and financially sustainable basis. The project will also enable technology transfer, introducing ITS/MIS, real-time passenger information, and digital ticketing for transport as well as SCADA systems for utility operations. The institutional changes supported by LRCP are designed from the outset to drive a paradigm shift in urban service delivery, building the capacity within implementing institutions to lead future scale-up. They provide transferable governance and operational blueprints, supported by protocols, data systems, and management tools that other Bhutanese cities can adopt as they face similar urbanisation and climate pressures.

8. GCF will provide US$28 million, including US$22.4 million in grant financing and US$5.6 million in concessional loan financing, alongside US$20 million from IDA. Concessional climate finance is critical to support the upfront costs of low-emission transport systems, climate-resilient infrastructure, and institutional reforms that would otherwise be difficult to finance through domestic resources alone. The Royal Government of Bhutan, represented by the Ministry of Finance and acting through the Ministry of Infrastructure and Transport, will implement the project with support from Thimphu Thromde and the City Bus Service under a Project Steering Committee and a dedicated project management unit.

9. LRCP is closely aligned with Bhutan's climate and development strategies, including the National Adaptation Plan (NAP), the Low-Emission Transport Master Plan, the Thimphu Water Services Master Plan, and the priorities of the 13th Five-Year Plan. It also directly contributes to Bhutan's Nationally Determined Contributions (NDCs) under the Paris Agreement. By integrating low-emission mobility, climate-resilient water systems, and institutional reforms, LRCP demonstrates a scalable model for

climate-resilient urban development in Bhutan and supports a long-term paradigm shift toward low-carbon, climate-resilient urban infrastructure. LRCP uses Thimphu as a demonstration cityfor systemic transformation in urban service delivery, with lessons and models designed for replication across Bhutan. . The two primary transferable models are the CBS transition to a State-Owned Enterprise operating under a Public Service Agreement and the ring-fenced Water and Wastewater Services Division, both of which provide replicable institutional and governance blueprints for other Bhutanese cities. Bhutan's 13th Five-Year Plan has already committed to 45 additional electric buses for secondary cities, reflecting national intent to scale the approach. Policy workshops will disseminate operational lessons to other Thromdes, while ITS and SCADA data will inform investment planning and climate adaptation decisions nationally. Together, these institutional reforms and the infrastructure investments that underpin them establish a nationally replicable model for low-carbon, climate-resilient urban service delivery consistent with Bhutan's carbon neutrality commitment.

PROJECT/PROGRAMME INFORMATION

B.1. Climate context (max. 1000 words, approximately 2 pages)

10. Bhutan is a small country on the southern slopes of the Himalayas with ambitious commitments to climate change mitigation and resilience. The country is lower-middle-income, with a population of 0.78 million and a GDP per capita of US$3,700[7]. Urbanization has accelerated in recent decades, with 45 percent of the population now living in urban areas. Thimphu, the capital and largest city, is home to 15 percent of the national population and functions as the country's primary administrative and economic center.

Climate change problem

11. Bhutan remains carbon-negative, primarily due to its extensive forests and reliance on hydropower. However, economic growth is increasing emissions, particularly in the energy and industrial sectors. Simultaneously, Bhutan faces severe climate risks such as shifting rainfall patterns and heatwaves, especially in urban centers like Thimphu. These climate hazards exacerbate infrastructure and water management challenges.

Mitigation needs

12. Bhutan occupies a unique position globally as a carbon-negative country. Total greenhouse gas (GHG) emissions in 2020 amounted to 2,723.28 Gg CO_2e. Carbon sequestration from Bhutan's extensive forest cover was estimated at 9,513.50 Gg CO_2e in the same year[8]. Bhutan has therefore significantly exceeded its net-zero commitments and has pledged since 2009 to maintain carbon neutrality in perpetuity, a commitment reaffirmed in its second Nationally Determined Contribution (NDC) in 2021.

13. Emissions arising from economic activity have nevertheless increased steadily over recent decades, registering a 600 percent increase between 1994 and 2020[9]. Bhutan's graduation from Least Developed Country (LDC) status in 2023 marks an important milestone in its development trajectory but continued economic expansion is expected to place additional upward pressure on emissions. National GHG emissions are projected increase to 8,217.42 Gg CO_2e by 2050 under current development trends, primarily driven by increases in the energy sector and Industrial Processes and Product Use (IPPU)[10].

14. Within the energy sector, emissions are dominated by transport. Bhutan's power sector remains largely decarbonized due to its reliance on run-of-the-river hydropower systems. However, road transport, which accounts for approximately 20 percent of total energy demand, depends almost entirely on fossil fuels. Bhutan relies heavily on road-based mobility to sustain economic activity and connectivity as a landlocked country. Demand for passenger transport is projected to double by 2050 under BAU conditions, while freight demand is projected to triple. As a result, the transport sector is expected to account for an increasing share of total emissions over time.

15. These projected increases in transport demand and emissions are closely linked to changing urban mobility patterns. Population growth in Thimphu has been rapid over the past two decades, with the city's population increasing from 79,185 in 2005 to 114,551 in 2017, reflecting sustained rural-urban migration and economic expansion[11]. Travel distances have lengthened as the city has

[7] World Bank, *World Development Indicators – Bhutan*, 2024. Retrieved from https://data.worldbank.org/country/bhutan
[8] Royal Government of Bhutan, *First Biennial Update Report of the Kingdom of Bhutan to the UNFCCC,* 2022. National Environment Commission. Retrieved from https://unfccc.int/sites/default/files/resource/BhutanBURreport.pdf
[9] Ibid
[10] Department of Environment and Climate Change, Royal Government of Bhutan. (2023). *Bhutan's Long-Term Low Greenhouse Gas Emission and Climate Resilient Development Strategy.* Retrieved from https://unfccc.int/documents/631824
[11] Office of the Census Commissioner, Royal Government of Bhutan. (2005). *Population and Housing Census of Bhutan 2005.* Retrieved from https://unstats.un.org/unsd/demographic/sources/census/quest/BTN2005en.pdf; National Statistics Bureau, Royal Government of Bhutan. (2018). *2017 Population and Housing Census of Bhutan: National Report.* Retrieved from https://www.nsb.gov.bt/wp-content/uploads/dlm_uploads/2020/07/PHCB2017_national_report.pdf

expanded along the valley corridor, reducing the feasibility of walking and increasing reliance on motorized transport. Rising household incomes and improvements in road infrastructure have further contributed to steady increases in vehicle ownership, with the number of registered motor vehicles in Bhutan increasing from 3,600 in 1985 to more than 112,000 by 2020[12]. The growth of Thimphu has not been matched by a comparable expansion of public transport services, further reinforcing dependence on private vehicles. As a result, nearly 50 percent of commuters travel by private car, compared to approximately 10 percent using the city bus service and around 20 percent using taxis. Non-Motorized Transport (NMT), primarily walking, still accounts for approximately 22 percent of trips but its share has declined significantly from 48 percent in 2009, reflecting a broader shift towards motorized mobility.

16. Transport-related emissions are also influenced by congestion patterns and declining travel efficiency. Urban growth has occurred within a spatially constrained valley setting, intensifying traffic flows along a limited road network. Traffic volumes along the main corridor are projected to increase as urbanization continues. Modeled travel times for general vehicles increase from about 107 seconds per kilometer in 2023 to roughly 116 seconds per kilometer by 2047 under the BAU scenario, while bus travel times increase from around 179 to 188 seconds per kilometer, indicating worsening congestion conditions along the corridor[13]. Even moderate increases in peak-hour car traffic are expected to intensify congestion, increase vehicle idling time, lengthen travel durations, and raise fuel consumption, further increasing transport-related emissions.

Adaptation needs

Climate impacts

17. Bhutan has experienced significant warming since the 1960s. Minimum temperatures have risen faster than maximum temperatures and average annual temperatures in Thimphu have increased from 5.2°C in 1979 to 7.0°C in 2024. Urban areas are already experiencing high surface temperatures, with land surface temperatures in Thimphu reaching up to 43°C during summer months due to the combined effects of regional warming and urban heat accumulation. Climate models project further warming of 1.0–2.5°C by 2040-2059. Bhutan will experience slightly more global warming than the global average with projections indicating a consistent increase in temperature under both RCP 4.5 (+0.8°C - 2.8°C) and RCP 8.5 (+3.2°C - 5.6°C)[14]. Rising temperatures are also expected to intensify heat extremes, with the probability of heatwaves projected to increase from about 2 percent today to between 20 and 36 percent by 2100[15].

[12] Ministry of Information and Communications, Royal Government of Bhutan, *Low Emission Development Strategy for Surface Transport, 2021*. Retrieved from https://www.moit.gov.bt/wp-content/uploads/2023/10/LEDS_Surface-Transport.pdf
[13] See Annex 22: Assessment of GHG emissions reductions and MRV
14 World Bank Group, *Climate Risk Country Profile: Bhutan,* 2021. Retrieved from https://climateknowledgeportal.worldbank.org/sites/default/files/country-profiles/15874-WB_Bhutan%20Country%20Profile-WEB.pdf
15 Ibid

Table 1: Projected anomaly (changes °C) for maximum, minimum, and average daily temperatures in Bhutan for 2040–2059 and 2080–2099, from the reference period of 1986–2005 for all RCPs.[16]

	Average Daily Maximum Temperature		Average Daily Temperature		Average Daily Minimum Temperature	
Scenario	2040–2059	2080–2099	2040–2059	2080–2099	2040–2059	2080–2099
RCP2.6	1.3 (–0.6, 3.5)	1.3 (–0.6, 3.4)	1.3 (–0.1, 2.8)	1.2 (0.0, 2.9)	1.2 (–0.3, 3.2)	1.3 (–0.4, 3.2)
RCP4.5	1.7 (–0.3, 3.7)	2.5 (0.3, 4.8)	1.6 (0.2, 3.0)	2.4 (0.8, 4.0)	1.7 (0.0, 3.6)	2.3 (0.8, 4.5)
RCP6.0	1.5 (–0.6, 3.6)	2.8 (0.6, 5.2)	1.5 (0.1, 3.0)	2.8 (1.3, 4.5)	1.6 (–0.2, 3.4)	2.9 (1.2, 5.0)
RCP8.5	2.3 (0.2, 4.2)	4.7 (2.4, 7.0)	2.2 (0.8, 3.6)	4.5 (2.8, 6.5)	2.2 0.7, 4.0)	4.6 (2.8, 7.1)

18. Bhutan's precipitation patterns are also changing. The country receives more than 70 percent of its annual rainfall during the Southwest Monsoon between June and September, but monsoon patterns have become increasingly irregular and are characterized by heavier rainfall events and greater variability. Extreme precipitation events are projected to become 1.3 to 1.5 times more frequent by mid-century. Thimphu is projected to experience more frequent and intense rainfall events under both SSP2-4.5 and SSP3-7.0 scenarios, with the number of days receiving more than 20mm of precipitation expected to increase by approximately 40–100% by mid-century as compared to the 1995–2014 baseline. These shifts are expected to intensify both pluvial and fluvial flooding across the country: intense monsoon rainfall can rapidly increase surface runoff and river discharge, while glacial melt and glacial lake dynamics further amplify riverine flood risks. A 100-year flood could occur every five years by the 2060s[17].

19. Bhutan is simultaneously increasingly exposed to drought conditions due to rising temperatures and increasing rainfall variability. Observed hydrological trends indicate increasing water stress. World Bank analysis of Total Water Storage Anomaly (TWSA) data since 2011 shows a declining trend across Bhutan's major cities, suggesting growing pressure on water resources. Longer dry spells are projected, with consecutive dry days in Thimphu expected to reach between 140 and 160 days per year[18].

Exposure

20. Bhutan's cities are highly exposed to these climate hazards due to their geographic location and patterns of urban development. Rapid urbanization has increased exposure to climate hazards like pluvial and fluvial flooding, landslides, droughts, and heat. About a fifth of all settlements are in zones with high flood risks. Infrastructure is mostly located along drainage basins, which are vulnerable to heavy monsoon rains and glacial lake outburst floods[19].

21. Thimphu illustrates these exposure dynamics particularly clearly. The city has the largest built-up areas exposed to pluvial flooding of all urban areas in Bhutan. Its exposed built-up areas increased from approximately 0.6 sq km to 1.7 sq km over the 31-year period between 1985 and 2015, outstripping all other major towns. The high rate of growth of exposed areas is combined with disjointed pluvial flood zones: flood zones are distributed across built-up areas in both older and newer settlements. Figure 1 shows rainwater flood probability across neighborhoods[20].

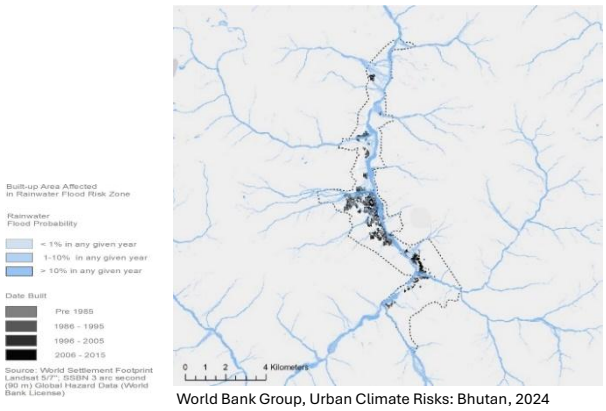
[16] Ibid. Note that the table is showing the median of the CCKP model ensemble and the 10–90th percentiles in brackets
[17] World Bank Group, *Climate Risk Country Profile: Bhutan,* 2021. Retrieved from https://climateknowledgeportal.worldbank.org/sites/default/files/country-profiles/15874-WB_Bhutan%20Country%20Profile-WEB.pdf
[18] World Bank Group, *Bhutan Country Climate and Development Report (CCDR)*, 2025
[19] World Bank Group, *Bhutan Urban Climate Risk Analysis*, 2024
[20] Ibid

22. Similarly, Thimphu is highly exposed to riverine flooding caused by heavy monsoon rains and glacial melt. The Wang Chhu River flows through the city center, joined by seven tributaries which amplify flood risk. Urban expansion has increased the number of residential areas, commercial zones, and infrastructure assets located within river floodplains, heightening exposure to riverine flooding during extreme rainfall events. The city has experienced at least five major flood events over the last quarter century, resulting in 74 deaths and millions of dollars in damages[21].

23. Rainfall-triggered landslide hazards are a significant corresponding threat. Thimphu is vulnerable to landslides due to its location and heavy seasonal rainfall. Urban expansion into surrounding hillsides and the clearing of vegetation for roads and housing have increased exposure by destabilizing slopes and placing new development in areas susceptible to rainfall-triggered landslides. Figure 2 shows how rainfall-triggered landslide risk is spread across the city[22].

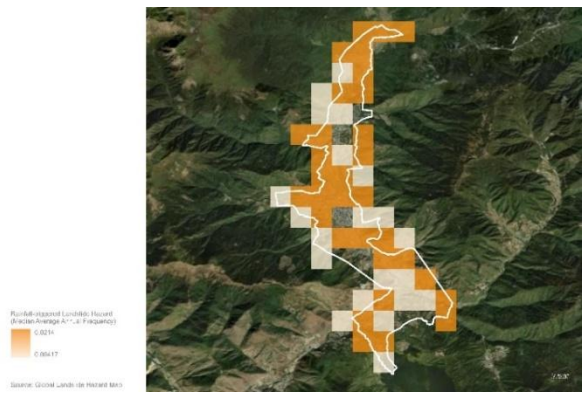
24. Thimphu also stands out as one of the warmest urban areas in Bhutan. Figure 3 shows average summer surface temperatures from 2013 to 2022. Rapid growth in dense built-up areas, paved surfaces, and reduced vegetation cover has intensified urban heat island effects, increasing the exposure of residents and infrastructure to extreme urban temperatures. Extreme exacerbates water scarcity and evaporation and contributes to the drying up of natural water sources[23].

Figure 1: Built-up area in rainwater flood risk zone



World Bank Group, Urban Climate Risks: Bhutan, 2024

Figure 2: Rainfall-triggered landslide hazard



World Bank Group, Urban Climate Risks: Bhutan, 2024

25. Finally, Thimphu is increasingly at risk of drought. Predominantly dry conditions prevailed from 2011 to 2020, as measured through precipitation and groundwater storage. The Standardized Precipitation Evapotranspiration Index (SPEI) for June 2019, for instance, provides an example of a broader trend where Thimphu experienced drier than normal years. Figure 4 indicates increasingly dry conditions, as measured by the TWSA. Population growth and rising urban water demand increase the city's exposure to these drought conditions[24].

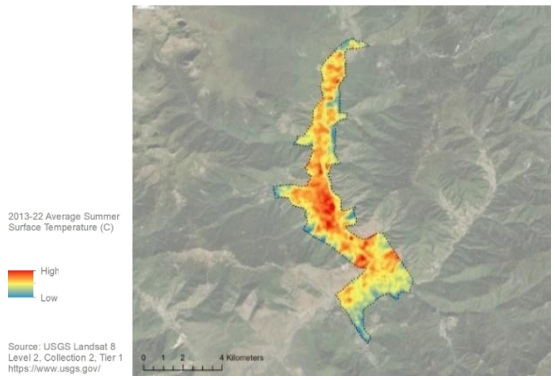
[21] World Bank Group, *Climate Risk Country Profile: Bhutan,* 2021. Retrieved from https://climateknowledgeportal.worldbank.org/sites/default/files/country-profiles/15874-WB_Bhutan%20Country%20Profile-WEB.pdf; Department of Disaster Management, Royal Government of Bhutan, *National Disaster Risk Management Strategy*, 2019. Retrieved from https://www.preventionweb.net/files/74873_finalndrmsndmabhutan.pdf; National Environment Commission Secretariat, Royal Government of Bhutan, *National Adaptation Plan of the Kingdom of Bhutan*, 2023. Retrieved from https://unfccc.int/sites/default/files/resource/NAP-Bhutan-2023.pdf

[22] World Bank Group, *Bhutan Country Climate and Development Report (CCDR)*, 2025

[23] Ibid

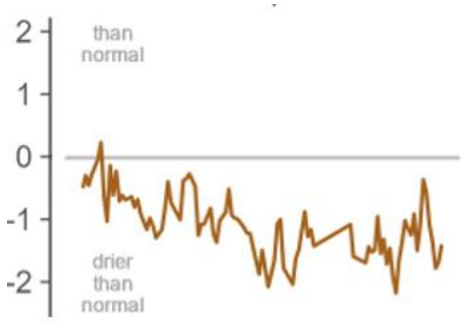
[24] World Bank Group, *Bhutan Urban Climate Risk Analysis*, 2024

Figure 3: Average summer surface temperature



World Bank Group, Urban Climate Risks: Bhutan, 2024

Figure 4: Thimphu TWS anomaly, 2011 - 2020



World Bank Group, Urban Climate Risks: Bhutan, 2024

Vulnerability

26. Bhutan's urban systems face additional vulnerabilities that amplify the impacts of climate change. Rapid urban growth has often outpaced infrastructure development and planning capacity, resulting in uneven service provision and increasing pressure on critical urban systems. Among the most critical are urban transport and water supply systems, which are essential for economic activity, service delivery, and public health but are increasingly exposed to climate hazards.

27. Urban transport in Bhutan is largely road-based, with cities relying on a limited network of arterial corridors to connect residential areas, commercial centers, and public services. In Thimphu, much of this network follows the narrow valley floor and adjacent hillsides, making it particularly sensitive to climate hazards. Intense monsoon rainfall can trigger landslides, debris flows, and localized flooding that block roads, damage drainage systems, and disrupt mobility across the city. Fathom-Global 3.0 data indicates that flood depths in the core urban areas typically range from approximately 0.2 to 1.2 meters under low to high emissions scenarios respectively. Damage to road linkages extends beyond infrastructure costs — projected flood depths observed in exposed areas are sufficient to impair vehicle movement, reduce road passability, and in some cases render key corridors temporarily unusable, leading to increased congestion, travel delays, and higher vehicle operating costs for users.

28. Thimphu's water supply system relies primarily on surface water sources conveyed through gravity-fed transmission networks to treatment plants and distribution systems serving the city's growing population. These sources are sensitive to seasonal rainfall variability and changing hydrological conditions, leading to periodic supply shortages during the dry season when river flows and groundwater recharge decline. Operational assessments indicate that these seasonal shortages periodically require emergency water rationing and temporary supply measures to maintain minimum service levels. The city has experienced recurrent water supply disruptions in recent years, with households in some areas receiving piped water only intermittently during dry periods (see Annex 2, Sections 4.3–4.4).

29. At the same time, Thimphu's water transmission infrastructure is highly exposed to climate hazards. Transmission pipelines are located along steep hillsides where heavy rainfall can trigger landslides and slope failures. During intense monsoon events, pipelines can become dislodged or damaged as unstable slopes shift or debris impacts buried infrastructure. Repairs are often delayed due to difficult terrain and adverse weather conditions, resulting in prolonged service interruptions in affected neighborhoods.

30. These climate risks are compounded by structural weaknesses within the water supply system. While the core city's treatment plants and boreholes have a combined maximum production capacity of approximately 28 MLD, operational output is closer to 19 MLD due to source variability and operational constraints. System efficiency also remains low: non-revenue water losses exceed

50 percent, reflecting leaks, unauthorized connections, and limited monitoring of flows and pressure within the distribution network (Annex 2, Sections 4.3–4.4).

31. In addition, pedestrian pathways are also exposed to the climate risks outlined above. Landslides and flooding risk damage pedestrian infrastructure, making parts of the city inaccessible on foot. High temperatures also create disincentives to travel on foot unless pedestrian infrastructure is both climate resilient and convenient. Sidewalk coverage at 55.2 percent of routes and the near-complete absence of dedicated cycling facilities mean that non-motorized transport remains unsafe and impractical for most residents, particularly during heavy rainfall and extreme weather conditions. These risks in turn can push the population to use fossil fuel-based transportation or to cut them off from mobility entirely. Similarly, roads that bus lines depend on are at risk of flooding. Bus shelter coverage stands at just 6.3 percent of stops and bus bay coverage at 8.3 percent, leaving passengers without weather protection. Thimphu's bridges, including the Kamji, Pamtsho, and Dechencholing bridges, are largely built to 20- or 25-year design standards that are already being exceeded with increasing frequency as extreme weather intensifies. These crossings are exposed to scour, flood damage, and landslide-driven embankment failure, and their loss severs the connectivity that public transport depends on. Road drainage infrastructure is inadequate, with intense rainfall regularly overwhelming drainage capacity along key corridors, flooding road surfaces, and causing sewer overflow onto major routes, which further constrains pedestrian movement and access to public transport during extreme events. The urban heat island effect, intensified by Thimphu's valley topography and growing built-up surface area, accelerates the deterioration of asphalt and structural materials, increasing maintenance burdens and shortening infrastructure lifespans. These physical vulnerabilities are compounded by the fragility of the bus fleet and maintenance system; when roads are damaged or flooded, an aging fleet with no protected priority corridors has no means of maintaining service continuity.

32. These trends are summarized in table 2.

Table 2: Climate Risk Assessment summary

Impacts	Exposure	Vulnerability
Rising temperatures and heatwaves Average annual temperatures in Thimphu increased from 5.2°C in 1979 to 7.0°C in 2024, with land surface temperatures reaching up to 43°C in summer. The probability of heatwaves is projected to increase from about 2% today to 20–36% by 2100.	Dense built-up areas, paved surfaces, and reduced vegetation cover intensify urban heat island effects, increasing exposure of residents and infrastructure to extreme temperatures.	Extreme heat exacerbates water scarcity and contributes to the drying up of natural water sources. The urban heat island effect accelerates deterioration of roads and structural materials, and deters walking
Intense rainfall and flooding Extreme precipitation events are projected to be 1.3–1.5 times more frequent by mid-century. A 100-year flood event could occur every five years by the 2060s.	Thimphu's exposed built-up area grew from 0.6 to 1.7 sq km between 1985 and 2015. The Wang Chhu River and seven tributaries run through the city centre, with urban expansion placing residential and commercial areas within floodplains.	Roads, drainage systems, and bus infrastructure are at risk. Bus shelter coverage stands at just 6.3% of stops, leaving passengers unprotected. The city has experienced five major floods in 25 years, resulting in 74 deaths.
Landslides Heavy seasonal rainfall combined with hillside urban expansion and vegetation clearance destabilizes slopes across the city.	Water transmission pipelines are located along steep hillsides. Roads, bridges, and pedestrian paths sit on or adjacent to unstable slopes.	Pipeline damage causes prolonged service interruptions, with repairs delayed by difficult terrain. Key bridges, including Kamji, Pamtsho, and Dechencholing, face scour and embankment failure risk, severing public transport connectivity
Drought and water stress Total Water Storage Anomaly data show a declining trend across Bhutan's major cities since 2011. Consecutive dry days in Thimphu	Water supply relies on surface sources that are sensitive to seasonal variability and changing hydrological conditions. Rising urban population and demand compound this exposure.	Core city treatment plant output (19 MLD) falls below combined capacity (28 MLD). Non-revenue water losses exceed 50%. Some households receive water only intermittently during dry periods,

are projected to reach 140–160 per year.		and seasonal shortages periodically require emergency rationing.

LRCP and complementary projects

33. LRCP addresses these two emerging climate challenges in Bhutan's urban areas, tackling transport emissions and growing climate risks to water systems and urban infrastructure. The project combines low-emission urban mobility investments with measures to strengthen the resilience and efficiency of critical water infrastructure in Thimphu.

34. Several complementary initiatives are underway in Bhutan's urban resilience and water sectors (see Feasibility Study, Chapter 9, Section 9.9, Table 9-1.) The UNDP *Enhancing Climate Resilience of the Urban Landscapes and Communities in the Thimphu–Paro Region (ECRUL)* project supports climate-informed urban planning and nature-based solutions to reduce flood and landslide risks across the wider metropolitan region. The ADB's *Water Flagship Program Support Project (WFPSP)* is expanding climate-resilient drinking water and irrigation services in Thimphu Valley and several other districts, with investments located primarily in upstream areas of the valley. The UNDP *Advancing Climate Resilience of the Water Sector in Bhutan (ACREWAS)* project complements these efforts by strengthening basin-level water management and watershed restoration to improve long-term water availability. The Livable and Resilient Cities Project (LRCP) complements these initiatives by focusing on climate-resilient urban infrastructure and service delivery within the core of Thimphu. LRCP complements these initiatives in two distinct ways. First, it fills a geographic gap by focusing on the city core while partner projects operate at the basin level, on the urban periphery, or in upstream valley areas. Second, where partner projects build capacity primarily through workshops and training, LRCP goes further by embedding international specialists directly within the Water Services Division and City Bus Service, providing sustained, hands-on technical support that drives institutional change.

B.2 (a). Theory of change narrative and diagram (max. 1500 words, approximately 3 pages plus diagram)

35. LRCP's Project Development Objective (PDO) is to enhance livability and climate resilience in the project area by improving targeted urban infrastructure and service delivery. The Theory of Change is anchored in the goal: IF climate resilient water management, urban pedestrian, and low-emission transportation systems are implemented and client capacity is improved, THEN the local population will have greater resilience capacity against climate shocks, access to safe and reliable water, and more resilient and sustainable urban mobility, BECAUSE water, urban pedestrian, and transport infrastructure will be less vulnerable to riverine floods, landslides, drought, and urban heat island effects AND a modal shift toward non-motorized and public transport will reduce GHG emissions from the city's transport system. To achieve this overarching goal, the project will generate several core outcomes. First, urban water services in the project area will become more reliable and more resilient to climate hazards, especially drought, flooding, and rainfall-triggered landslides[25]. Second, climate-resilient urban mobility infrastructure in the project area will encourage a modal shift from private vehicle use toward walking and non-motorized transport. Third, climate-resilient and low-emission urban passenger transport in Thimphu encourages a shift from private car use toward electric public transport, maintains reliable mobility under climate stress, and reduces GHG emissions from the transport sector. Fourth, the institutions responsible for water and public transport will have enhanced capacity to operate, maintain, finance, and replicate climate-resilient and low-emission urban systems. In addition, there will be co-benefits addressing improved access to jobs and income; improved household hygiene and health; and improved air quality and reduced pollution[26].

[25] The project is addressing climate risks outlined in section B.1III for all relevant sectors.
[26] More information on the improvements to the enabling environment and policy frameworks are found in section D.2.

36. The project's outputs are organized across six major corresponding areas:

1.1.a) Climate-resilient water supply infrastructure and distribution networks will be established and operational. This will be achieved through project activities such as improving raw water intake structures, stabilizing landslide-prone slopes, NRW reduction, reorganizing Water Treatment Plants (WTPs) and treated water transmission lines, and enhancing the water distribution network with smart meters. Together, these activities will reduce system losses, improve the reliability and coverage of water supply, and harden the network against climate-related disruptions, collectively contributing to a climate-resilient water supply and distribution network. These improvements will yield climate resilience benefits for household end users who will have access to a more reliable water supply system that is better able to adjust to climate shocks, as these upstream improvements are required for the water system to operate properly and reliably within a climate-vulnerable environment to deliver water to household connections. Such improvements will help increase the number of hours per day household have reliable water access.

1.1.b) Climate-informed decision-making systems and operational control mechanisms will be established and functioning. Water supply operations will be informed through the project's installation of Supervisory Control and Data Acquisition (SCADA) systems, which will be integrated into improved decision-making and management processes (see area 2.1). By enabling real-time monitoring of network performance and early detection of faults and stress events, the SCADA system will allow operators to respond proactively to climate-related disruptions, improving the resilience and reliability of day-to-day water service delivery. By improving real-time data collection, the utility will be able to more efficiently and coordinate between the water treatment plants, storage systems, and distribution networks, improving water service access and reliability which will ultimately benefit the end users. Such systems will better allow the utility to match water supply and local household/neighborhood demand in real time, including during climate shocks, to better serve local residents, while also improving the ability of the utility to make forward-looking, data-driven decisions that will benefit household users. Combined with the physical infrastructure improvements mentioned above, the SCADA system will help increase the number of hours households have reliable water access.

1.2) Climate-resilient pedestrian access and public realm infrastructure will be established. The project will carry out urban pedestrian interventions, improving the safety and convenience of sidewalks, footpaths, and passageways to facilitate pedestrian movement along the bus priority corridor and in the downtown core, that is, Norzin Lam. It will remove high kerbs and hazards on footpaths, upgrade sidewalks and connecting paths, install communication cable ducts under sidewalks, implement a comprehensive traffic circulation and management plan, and improve roadside drainage. Taken together, these interventions create a safer, more accessible, and more climate-resilient pedestrian environment, reducing the attractiveness of private vehicle use and supporting the broader modal shift toward walking, non-motorized transport, and public transit.

1.3) A climate-resilient and low-emission public transport system will be established and operational. The project will develop an 18.9 km bus priority corridor (BPC) with dedicated bus lanes, bus bays, and 75 bus shelters, deploy a fleet of 50 electric buses, construct two new bus terminals and upgrade the existing city bus depot, all equipped with fast charging infrastructure for e-bus operations, roll out Intelligent Transport Systems (ITS) and Management Information Systems (MIS) to provide live service information and improve operational flexibility, and install 23 signalized pedestrian crossings to enhance safety and first- and last-mile connectivity. Together, these investments create the physical and operational conditions for a competitive, zero-emission public transport system. The BPC improves journey times and service reliability, the expanded e-bus fleet eliminates direct emissions from public transport operations while enabling the frequency and quality of service necessary to realize the BPC's benefits, the charging infrastructure enables the sustained operation and future expansion of the electric fleet, and the ITS/MIS and pedestrian crossings make public transport a more attractive and accessible alternative to private vehicle use. By integrating infrastructure, vehicles, technology, and first- and last-mile access, these

investments drive the modal shift that underpins the project's mitigation outcomes while ensuring that mobility is maintained under climate stress.

2.1) Water and urban sector institutional systems, tools, and capacities will be strengthened to independently and sustainably deliver climate-resilient water services and plan future investments. The institutional setup, level of technical capacity, and financial profile of the sector in Thimphu is inadequate to ensure forward-looking climate resilience capacity and an ability to be proactive in addressing and financing climate needs. The project aims to shift this dynamic through a series of targeted institutional, technical, and financial interventions that together contribute to a broader paradigm shift toward more climate-resilient water service provision. The project will establish a ring-fenced municipal water and wastewater division, strengthen day-to-day management through digital monitoring, improve billing and tariff systems, develop disaster and emergency response processes, and deliver institutional strengthening and policy support, underpinned by a targeted communications strategy[27]. Such improvements to utility performance will improve the utility's capacity to specifically address poorer resident's water needs with regard to future planning, tariff-setting, and billing. The project will also support the development and implementation of the Bhutan Land Information System (BLIS), a unified platform integrating land registration, cadastre, public land management, and valuation data that will improve disaster risk identification, strengthen natural resource management, and enable more informed government decision-making on the economic risks of climate shocks to infrastructure and land assets.

2.2) The City Bus Service will be capacitated to transition to an independent SOE with a national mandate to sustainably operate low-carbon public transport and support its expansion to other cities, facilitating the replication of the model elsewhere in the country. CBS currently operates as a service without the institutional structure, operational expertise, or financial sustainability needed to lead Bhutan's transition to low-emission public transport. The project addresses this by delivering a series of targeted governance, operational, and capacity-building interventions that together contribute to a broader paradigm shift toward a self-sustaining, low-carbon public transport provider. The project will strengthen CBS's day-to-day operations through embedded bus operations consultants, support its transition to delivering services under Public Service Agreements (PSAs) with other Thromdes, help diversify non-fare revenue sources such as retail franchises, advertising, and bus leasing, build the capacity of the broader transport network, and analyze the potential for operators to provide dedicated services such as school buses to reduce peak-hour demand. It will develop national standards for ITS and smartcard payments, and provide policy and institutional support to implement national frameworks including the Low Emission Transport Master Plan and National Adaptation Plan, underpinned by a targeted communications and awareness campaign to drive behavioral change among Thimphu commuters.

37. The project recognizes several barriers and risks. As documented in the Feasibility Study, the barriers in the water and transport sector in Bhutan are categorized by type to support diagnostic clarity. For the purpose of project design, these barriers are synthesized into a set of integrated, sector-level constraints (e.g., fragmented service delivery, infrastructure vulnerability, and weak public transport competitiveness) that directly inform the project's Theory of Change. The current major barriers are summarized in Table 3 below:

Table 3: Identified barriers and project response

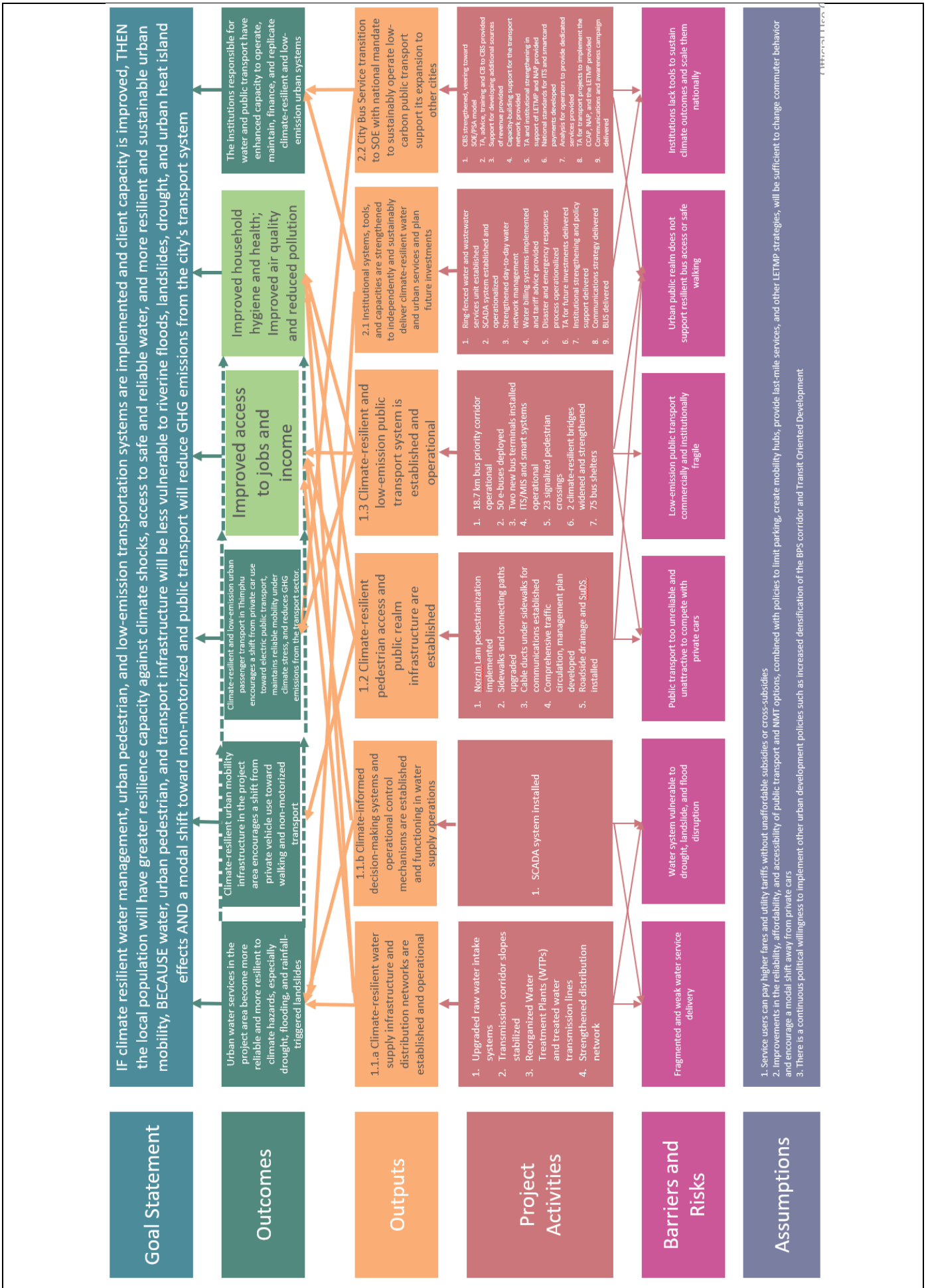
Barrier type and name	Description	Project response
Fragmented and weak water service delivery	High non-revenue water losses, aging and undersized distribution	Ring-fenced utility-style water service management; SCADA installation and

[27] By project closing, the client will regularly prepare and apply maintenance strategies, emergency protocols, business plans, and budgets to guide climate-resilient water service management. All relevant municipal staff will be trained in SCADA use, climate-resilient planning, and emergency response. These improvements aim to increase supply hours from 3-9 hours/day in the baseline up to 15 hours/day at closing. Households receiving at least 12 hours/day of water is expected to rise from zero percent up to 50 percent at closing.

	networks, and limited storage capacity undermine reliable service delivery	operationalization; water supply network rehabilitation and NRW reduction
Water system vulnerable to drought, landslide, and flood disruption	Vulnerable intake and transmission infrastructure, combined with increasing climate-driven variability in water availability, expose the system to frequent disruption	Climate-proofed raw water intakes; stabilization of landslide-prone transmission corridors; improved distribution monitoring and control
Public transport too unreliable and unattractive to compete with private cars	Buses compete with private vehicles for congested road space; bus shelter coverage is 6.3% and bus bay coverage 8.3%; much of the CBS fleet is beyond its operational lifespan; service frequency is low outside peak periods; the Olakha maintenance facility lacks equipment to support a modernizing fleet	Bus priority corridor (18.9 km); procurement of 50 e-buses; two new bus terminals; ITS/MIS for real-time service information; 75 bus shelters; 23 signalized pedestrian crossings
Low-emission public transport commercially and institutionally fragile	CBS lacks the institutional structure, financial sustainability, and operational expertise to lead Bhutan's transition to low-emission public transport	CBS capacitated to become independent SOE under Public Service Agreements with other Thromdes; embedded bus operations support; business planning; revenue diversification through non-fare sources such as advertising, retail franchises
Urban public realm does not support resilient bus access or safe walking	Inadequate sidewalks, footpaths, and drainage infrastructure reduce the safety and attractiveness of walking and non-motorized transport along the corridor	Upgraded sidewalks and connecting paths; Norzin Lam pedestrianization; roadside drainage improvements; NbS/SuDS installation; traffic circulation and management plan
Institutions lack tools to sustain climate outcomes and scale them nationally	Fragmented mandates, limited coordination, and constrained technical capacity across water and transport agencies weaken integrated, climate-resilient urban service delivery	Technical assistance across water and transport sectors; climate-resilient infrastructure design standards; planning tools and maintenance systems; policy support including parking restrictions and freight policies; M&E framework to track outcomes and support replication

38. Finally, the Theory of Change rests on several key assumptions regarding external factors:
    - Service users can pay higher fares and utility tariffs without unaffordable subsidies or cross-subsidies;
    - Improvements in the reliability, affordability, and accessibility of public transport and NMT options, combined with policies to limit parking, create mobility hubs, provide last-mile services, and other LETMP strategies, will be sufficient to change commuter behavior and encourage a modal shift away from private cars; and
    - There is continued political willingness to implement other urban development policies such as increased densification of the BPS corridor and Transit Oriented Development.
    - During implementation, care will be taken to work with the client in a timely and flexible manner to address any of these external factors if they become relevant. In addition, relevant internal risks to the project include whether the project will have sufficient capacity to effectively procure civil works, equipment, and technical systems and that relevant

	agencies and development partners will coordinate effectively with each other and local stakeholders. The project activities to improve client capacity will work with the client to directly address these institutional capacity concerns through training and providing technical support.


Goal Statement
IF climate resilient water management, urban pedestrian, and low-emission transportation systems are implemented and client capacity is improved, THEN the local population will have greater resilience capacity against climate shocks, access to safe and reliable water, and more resilient and sustainable urban mobility, BECAUSE water, urban pedestrian, and transport infrastructure will be less vulnerable to riverine floods, landslides, drought, and urban heat island effects AND a modal shift toward non-motorized and public transport will reduce GHG emissions from the city's transport system
Outcomes
Urban water services in the project area become more reliable and more resilient to climate hazards, especially drought, flooding, and rainfall-triggered landslides
Climate-resilient urban mobility infrastructure in the project area encourages a shift from private vehicle use toward walking and non-motorized transport
Climate-resilient and low-emission urban passenger transport in Thimphu encourages a shift from private car use toward electric public transport, maintains reliable mobility under climate stress, and reduces GHG emissions from the transport sector.
Improved access to jobs and income
Improved household hygiene and health; Improved air quality and reduced pollution
The institutions responsible for water and public transport have enhanced capacity to operate, maintain, finance, and replicate climate-resilient and low-emission urban systems
Outputs
1.1.a Climate-resilient water supply infrastructure and distribution networks are established and operational
1.1.b Climate-informed decision-making systems and operational control mechanisms are established and functioning in water supply operations
1.2 Climate-resilient pedestrian access and public realm infrastructure are established
1.3 Climate-resilient and low-emission public transport system is established and operational
2.1 Institutional systems, tools, and capacities are strengthened to independently and sustainably deliver climate-resilient water and urban services and plan future investments
2.2 City Bus Service transition to SOE with national mandate to sustainably operate low-carbon public transport support its expansion to other cities
Project Activities
1. Upgraded raw water intake systems
2. Transmission corridor slopes stabilized
3. Reorganized Water Treatment Plants (WTPs) and treated water transmission lines
4. Strengthened distribution network
1. SCADA system installed
1. Norzin Lam pedestrianization implemented
2. Sidewalks and connecting paths upgraded
3. Cable ducts under sidewalks for communications established
4. Comprehensive traffic circulation, management plan developed
5. Roadside drainage and SuDS installed
1. 18.7 km bus priority corridor operational
2. 50 e-buses deployed
3. Two new bus terminals installed
4. ITS/MIS and smart systems operational
5. 23 signalized pedestrian crossings
6. 2 climate-resilient bridges widened and strengthened
7. 75 bus shelters
1. Ring-fenced water and wastewater services unit established
2. SCADA system established and operationalized
3. Strengthened day-to-day water network management
4. Water billing systems implemented and tariff advice provided
5. Disaster and emergency responses process operationalized
6. TA for future investments delivered
7. Institutional strengthening and policy support delivered
8. Communications strategy delivered
9. BUS delivered
1. CBS strengthened, veering toward SOE/PSA model
2. TA, advice, training and CB to CBS provided
3. Support for developing additional sources of revenue provided
4. Capacity-building support for the transport network provided
5. TA and institutional strengthening in support of LETMP and NMP provided
6. Blueprint design for ITS and smartcard payments developed
7. Analysis for operators to provide dedicated services provided
8. TA for transport projects to implement the CDAP, NAP, and the LETMP provided
9. Communications and awareness campaign delivered
Barriers and Risks
Fragmented and weak water service delivery
Water system vulnerable to drought, landslide, and flood disruption
Public transport too unreliable and unattractive to compete with private cars
Low-emission public transport commercially and institutionally fragile
Urban public realm does not support resilient bus access or safe walking
Institutions lack tools to sustain climate outcomes and scale them nationally
Assumptions
1. Service users can pay higher fares and utility tariffs without unaffordable subsidies or cross-subsidies
2. Improvements in the reliability, affordability, and accessibility of public transport and NMT options, combined with policies to limit parking, create mobility hubs, provide last-mile services, and other LETMP strategies, will be sufficient to change commuter behavior and encourage a modal shift away from private cars
3. There is a continuous political willingness to implement other urban development policies such as increased densification of the BPS corridor and Transit Oriented Development

Direct Beneficiaries

39. Approximately 104,162 direct beneficiaries (of whom 50,519 female) are expected by project close. An estimated 52,046 core city residents will benefit from improved water supply reliability and resilience. Access to treated water will increase from 3-9 hours per day to at least 15 hours per day (12 hours/day in the dry season). Non-revenue water will be reduced from over 50% to 25% in the city core, and 100% of the distribution network will be covered by real-time SCADA monitoring (E.5, Outcome 1). The city residents will directly benefit from improved household-level services, which include a more reliable and continuous supply of clean water. Connections will be rationalized to reduce network interruptions and leakages, and support will be provided to ensure that household connections are accessible and affordable. This will result in an increased number of households having access to better quality and affordable water services, while improved utility operational and financial performance will increase the utility's capacity to directly address the water needs of the poorest users. The World Bank Group is committed to improving water security for 400 million people by 2030 under the Water Forward program and the associated Water Strategy Implementation Plan, which requires taking a people-centric approach to ensuring that household end users receive improved water sector services, including through LCRP. These improvements will reduce exposure to drought-related water stress and climate-related service interruptions. A further 72,448 residents will benefit from climate-resilient urban mobility and transport infrastructure. Improved drainage, flood-resilient bridges and bus shelters, and safer pedestrian crossings along the Bus Priority corridor are expected to support a substantial modal shift from private vehicles to public and non-motorized transport, increasing the share of trips taken by bus from roughly 8% to 25% (E.5, Outcomes 2 and 3 and Core Indicator 2 in E.3). Detailed calculations are provided in the Adaptation Beneficiaries Analysis.

Indirect Beneficiaries

40. Approximately 271,871 indirect beneficiaries (of whom 134,857 female) are expected by project close. For water, 123,988 users outside the core area will benefit from city-wide NRW reductions and improved resilience of the water supply system to drought- and landslide-related disruptions. For urban mobility and transport, 112,802 residents who do not primarily use public transport or NMT will indirectly benefit from enhanced pedestrian access, urban greening, and reduced transport-related air pollution associated with the transition to electric buses. Approximately 200,000 annual tourists are expected to benefit from both sets of improvements. Detailed calculations are provided in the Adaptation Beneficiaries Analysis.

Avoiding Double-Counting

41. Water supply and transport beneficiaries are tracked separately and mapped to different ARAs. For ex-ante estimation, core city residents benefiting from water supply improvements are assumed to use public transport and NMT at the same rate as the city as a whole. The overlapping share (beneficiaries of both water and transport activities) is counted only once, in the total figure, and excluded from "unique" beneficiary estimates for each.[28] Baseline surveys will confirm this approach during implementation. Detailed calculations are provided in the Adaptation Beneficiaries Analysis.

B.2 (b). Outcome mapping to GCF results areas and co-benefit categorization

[28] This means that *unique* water and *unique* transport beneficiary figures do not sum to "total beneficiaries", with the difference representing beneficiaries of *both* improvement types (counted only once in total).

Outcome number	GCF Mitigation Results Area (MRA 1-4)				GCF Adaptation Results Area (ARA 1-4)			
	MRA 1 Energy generation and access	**MRA 2** Low-emission transport	**MRA 3** Building, cities, industries, appliances	**MRA 4** Forestry and land use	**ARA 1** Most vulnerable people and communities	**ARA 2** Health, well-being, food and water security	**ARA 3** Infrastructure and built environment	**ARA 4** Ecosystems and ecosystem services
Outcome 1 Urban water services in the project area become more reliable and more resilient to climate hazards, especially drought, flooding, and rainfall-triggered landslides	☐	☐	☐	☐	☐	☒	☒	☐
Outcome 2 Climate-resilient urban mobility infrastructure in the project area encourages a shift from private vehicle use toward walking and non-motorized transport	☐	☒	☐	☐	☐	☐	☒	☐
Outcome 3 Climate-resilient and low-emission urban passenger transport in Thimphu encourages a shift from private car use toward electric public transport, maintains reliable mobility under climate stress, and reduces GHG emissions from the transport sector	☐	☒	☐	☐	☐	☐	☒	☐
Outcome 4 The institutions responsible for water and public transport have enhanced capacity to operate, maintain, finance, and replicate climate-resilient and low-emissions urban systems	☐	☒	☐	☐	☐	☒	☒	☐

Co-benefit number	Co-benefit					
	Environmental	**Social**	**Economic**	**Gender**	**Adaptation**	**Mitigation**
Co-benefit 1 Improved access to jobs and income	☐	☒	☒	☒	☐	☐
Co-benefit 2 Improved household hygiene and health; Improved air quality and reduced pollution	☒	☒	☒	☒	☐	☐

B.3. Project/programme description (max. 2500 words, approximately 5 pages)

COMPONENT 1: RESILIENT AND LOW-CARBON SERVICE DELIVERY

42. Component 1 finances the core physical investments that will improve the resilience and sustainability of urban services in Thimphu. The city is facing the combined pressures of rapid urbanization, rising vehicle ownership, and increasing climate stress. More intense rainfall is increasing the risk of erosion, landslides, pluvial flooding, and river scour, while longer and more variable dry seasons are worsening seasonal water shortages. These pressures threaten the reliability of two systems that are critical to urban productivity and livability: the water supply network and the transport network. They also impose growing costs through service disruption, emergency repairs, congestion, and deteriorating public space.

43. The purpose of this component is therefore to improve climate-resilient service delivery while also shifting the city toward lower-carbon mobility. The component combines investments in resilient water infrastructure, pedestrian-oriented public realm improvements, and the first phase of a low-emission public transport system built around bus priority infrastructure and electric buses. These investments strengthen adaptation by reducing climate-related service interruptions and support mitigation by enabling a modal shift away from private vehicles and toward non-motorized and electric public transport. Over the longer term, Component 1 contributes to a paradigm shift by demonstrating how climate-resilient water infrastructure, street design, and low-emission mobility can be planned and delivered as one integrated urban system.

Sub-component 1.1: Strengthening water supply systems to support resilient water services

44. Sub-component 1.1 addresses the physical and operational weaknesses that currently limit the resilience of Thimphu's water supply system. Water abstraction points are vulnerable to extreme hydrological conditions; transmission lines are exposed to landslides and erosion; and non-revenue water losses in the city core exceeding 50% constrain the efficient use of scarce resources. The sub-component combines infrastructure rehabilitation, digital monitoring, and operational improvements to support more reliable and equitable water service delivery, targeting an increase in average daily supply hours from 3–9 hours to 15 hours (12 hours during the dry season) by project close. Implementation responsibility rests with Thimphu Thromde through the PIU, with technical coordination and oversight from the MoIT PMU. The activities under sub-component 1.1 will directly benefit households by improving water access during climate shocks, increasing hours of water supply availability, improving pressure management, and increasing access for currently unconnected households. Improvements to data collection and monitoring will enable the utility to more efficiently link and manage the infrastructure as an integrated system.It also supports risk management and helps the utility to prepare ahead of time for a range of potential climate risks; and to identify local areas in need of new and improved local connections, including identifying local needs for managing hours without water service. These improvements will yield climate resilience benefits for household end users who will have access to a more reliable water supply system that is better able to adjust to climate shocks, as these upstream improvements are required for the water system to operate properly and reliably within a climate-vulnerable environment to deliver water to household connections. Both installing the SCADA system under activity (1.1.a) and the physical infrastructure improvements under activities (1.1.b-e) are necessary to work together to increase the number of hours households have access to reliable water supply.

45. Under activity (1.1.a), the project will install a Supervisory Control and Data Acquisition (SCADA) system to monitor the performance of water and wastewater treatment plants and key components of the distribution network. The system will be integrated into the District Metered Areas (DMAs) across the city core, including zones around Norzin Lam and the transport corridor, and will include bulk water meters, flow meters, and pressure control equipment. This will allow real-time monitoring of flows, pressure conditions, and actual demand, while also enabling hydraulic analysis and demand forecasting under extreme climate conditions. The deliverable will be an operational SCADA system across the core city's DMAs enabling real-time performance monitoring, leak detection, and data-driven network planning. By improving real-time data collection, the utility will be able to more efficiently and coordinate between the water treatment plants, storage systems, and distribution networks, improving water service access and reliability which will ultimately benefit the performance for end users. Such systems will better allow the utility to match water supply and local household/neighborhood demand in real time, including during climate shocks, to better serve local residents, while also improving the ability of the utility to make forward-looking, data-driven decisions that will benefit household users.

46. Under activity (1.1.b), the project will upgrade 2 raw water intake systems so that they can function more reliably during both flood and drought conditions, with structural improvements to

sediment handling and flow control. The deliverable will be climate-resilient intake infrastructure at key stream sources supplying the city, reducing the risk of service failure during extreme hydrological events.

47. Under activity (1.1.c), the project will protect vulnerable raw and clear water transmission corridors through slope stabilization and related erosion-control measures, reducing the risk that high-rainfall events trigger landslides that damage transmission lines and interrupt service. The deliverable will be stabilized transmission corridors protecting key water supply routes. This work will focus on 1 length of the raw water transmission corridor and 3 lengths of the treated water transmission corridors, with improvements occurring at 37 points along these lengths. Along these four lengths, this work will include improvements to 12 retaining walls sites, 8 slope stabilization sites, 15 pipe anchoring sites, 1 drainage work site, along with pipe replacement at 1 site. These 37 sites are located along 297 m of raw water transmission lines and 3.6 km of treated water transmission lines.

48. Under activity (1.1.d), the project will reorganize water treatment plant operations and transmission routing using SCADA data to optimize storage and distribution across the city's DMAs, improving the equity and continuity of supply including during prolonged droughts. The deliverable will be improved distribution management supporting more consistent and equitable service delivery.

49. Under activity (1.1.e), the project will upgrade the distribution network along Norzin Lam and the transport corridor to reduce non-revenue water losses through replacement of deteriorated water mains and active leakage control, coordinated with the street and sidewalk works under Sub-component 1.2. The deliverable will be an upgraded distribution network in the project area, contributing to the project's target of reducing NRW from 50% to 25%.

Sub-component 1.2: Improving the resilience and convenience of sidewalks, footpaths, and passageways to encourage non-motorized transport

50. Sub-component 1.2 focuses on the public realm improvements needed to make walking and public transport access safer, more convenient, and more resilient to climate impacts. Norzin Lam is the city's main commercial spine, yet it currently experiences congestion, limited pedestrian space, poor accessibility, and localized drainage problems. Sidewalks along the proposed bus priority corridor do not yet provide a high-quality walking environment or strong first- and last-mile links to public transport. This sub-component improves the street environment in ways that directly support the transport investments under Sub-component 1.3 while also reducing flood risk and improving the quality of public space. Implementation responsibility rests with Thimphu Thromde through the PIU, with technical coordination and oversight from the MoIT PMU.

51. Under activity (1.2.a), the project will make public realm improvements to Norzin Lam, with works including removal of high kerbs and obstructions, improved surfacing, and installation of street furniture, amenities, and accessible features. The deliverable will be a completed 1.3 kilometer scheme for Norzin Lam supporting walking, urban placemaking, and climate-resilient city-centre mobility.

52. Under activity (1.2.b), sidewalks and connecting paths along the bus priority corridor will be upgraded to universal access standards, with improvements to surface quality, continuity, and pedestrian amenity, coordinated with pedestrian crossing and bus stop installation under Sub-component 1.3. The deliverable will be upgraded, climate-resilient sidewalks and connecting paths along the corridor.

53. Under activity (1.2.c), continuous cable ducts will be installed under sidewalks and power connections provided to bus stops to support passenger information systems and corridor

lighting, integrated into sidewalk construction to avoid repeated trenching. The deliverable will be continuous ducting along corridor sidewalks with power connections at all bus stops.

54. Under activity (1.2.d), a traffic circulation and management plan will be developed and implemented for central Thimphu to allow emergency and service vehicle access while prioritizing pedestrians and supporting bus priority operations. The deliverable will be an implemented Traffic Circulation and Management Plan for central Thimphu.

55. Under activity (1.2.e), roadside drainage will be upgraded and linked to Sustainable Drainage Systems (SuDS) to improve runoff management and reduce pluvial flood risk, delivered as part of the Norzin Lam and sidewalk works, and will include sewer improvements to address pluvial flood risk in the city core. The deliverable will be improved roadside drainage and functioning SuDS installations along the corridor and Norzin Lam.

Sub-component 1.3: Investments toward a modal shift to resilient low-emission public transport

56. Sub-component 1.3 supports the physical transition toward a cleaner and more reliable public transport system in Thimphu that is more resilient to floods. Rising car use has contributed to congestion, longer travel times, and increasing emissions, while the existing bus system lacks the speed, reliability, and passenger amenities needed to attract a larger share of trips. This sub-component finances the core transport assets required for a step change in service quality: bus priority infrastructure, fleet expansion with electric buses, charging and depot facilities, and digital systems for operations and passenger information. These investments are central to the mitigation ambition of the project and, through road and bridge resilience improvements and pedestrian access works, also contribute to adaptation. The MoIT PMU leads procurement and implementation. CBS assumes operational responsibility once assets are commissioned.

57. Under activity (1.3.a), the project will construct an 18.9-kilometre bus priority corridor along the main road corridor, with dedicated bus priority lanes in both directions, bus bays, 75 bus shelters, road and bridge widening, and bridge protection works including scour measures to improve climate resilience. The deliverable will be a continuous bus priority corridor with shelters and resilient corridor infrastructure improving service speed, reliability, and climate robustness[29].

58. Under activity (1.3.b), a tranche of 50 electric buses will be procured to support higher-frequency trunk and feeder services and replace diesel buses in the fleet. The deliverable will be a fleet of 50 electric buses ready for service on the corridor.

59. Under activity (1.3.c), two new terminals will be constructed at the northern and southern ends of the corridor and the city-centre bus depot upgraded with charging and maintenance facilities for electric buses, climate-proofed against a 1.5-meter flood depth. The deliverables will be two new climate-resilient bus terminals and an improved central depot with physical flood defenses, high-capacity drainage, and off-grid solar/battery autonomy at the central depot for uninterrupted e-bus operations.

60. Under activity (1.3.d), Intelligent Transport Systems (ITS) and a Management Information System (MIS) will be procured and installed to provide live service information, integrated e-ticketing, and improved operational monitoring through the CBS control room. The deliverable will be an operational ITS/MIS system improving service reliability and passenger information.

61. Under activity (1.3.e), 23 signalized pedestrian crossings will be installed near bus stops to improve safety, accessibility and convenience for passengers and pedestrians, forming an essential complement to the upgraded sidewalks and bus shelters along the corridor.

[29] LRCP finances the northern segment (CSI Junction to Dechencholing), including bus shelters and pedestrian crossings along the full corridor. The southern segment (Ngabiphu to CSI Junction) is being independently financed by the Royal Government of Bhutan at a cost of USD 4,700,000.

COMPONENT 2: URBAN MANAGEMENT, PLANNING, AND CAPACITY BUILDING FOR IMPROVED CLIMATE RESILIENCE

62. Component 2 strengthens the institutions, systems, and management arrangements needed to sustain and scale the investments financed under Component 1. Without stronger service delivery institutions, better planning systems, and clearer operational responsibilities, the benefits of the physical investments would be difficult to maintain over time. The component therefore focuses on water and transport sector institutions, project management systems, and the technical assistance required to translate the infrastructure investments into durable improvements in service quality and climate resilience.
63. The purpose of this component is to create the enabling environment for long-term climate-resilient urban service delivery. It will do so by strengthening utility-style water management within Thimphu Thromde, supporting the transition of CBS into a more autonomous and professionally managed transport operator, and providing targeted technical assistance to MoIT on water and transport sector development. These outcomes contribute directly to adaptation by improving the capacity of agencies to plan for and respond to floods, droughts, and other climate shocks, and they reinforce mitigation by institutionalizing the systems needed for low-emission public transport. Over the longer term, Component 2 supports a paradigm shift by embedding climate resilience and low-carbon service standards into the way Bhutan plans, finances, and manages urban services.
64. Component 2 is delivered through several mechanisms. The first is a team of embedded international consultants appointed by the TT PIU to work within the new Water and Wastewater Services Division (WSD), building its operational capacity from the inside. The second is a team of embedded bus operations specialists appointed to work within CBS during the transition to SOE operations. The third is a structured call-down arrangement managed by the PMU to engage specialist consultants for targeted water- and transport-sector assignments. The fourth is a Project Management Consultant (PMC), engaged by the MoIT PMU to provide resident project management expertise, coordinate implementation across both sectors, and procure and oversee specialized technical inputs. The final mechanism are a team of engineering consultants, engaged by the TT PIU to support the procurement and supervision of construction works.

Sub-component 2.1: Capacity building and institutional strengthening for resilient and sustainable water service delivery

65. Sub-component 2.1 complements the water infrastructure investments under Sub-component 1.1 by building the institutional and operational capacity needed to manage the system on a more resilient and financially sustainable basis. Sub-activities (a) through (e) are delivered by the embedded WSD consultants working within Thimphu Thromde. Sub-activities (f) through (h) draw on the call-down arrangement. By improving the performance of the ring-fenced utility to deliver water service needs across the service area, the activities under subcomponent 2.1 will benefit households by allowing the utility to be better-informed about local residential needs in the water sector, providing a better understanding of local residences' ability to pay and potential subsidy needs, improving information available to the utility on unconnected households and the potential for establishing such connections, as well as better planning for facing climate risks. Such improvements to utility performance will improve the utility's capacity to specifically address poorer resident's water needs with regard to future planning, tariff-setting, and billing.
66. Under activity (2.1.a), embedded WSD consultants will establish a ring-fenced Water and Wastewater Services Division within Thimphu Thromde, with a defined organizational structure, staffing plan, budget framework, and accountability arrangements that allow water and wastewater services to progressively align with international service standards. The first annual business plan and financial accounts will be prepared, key WSD staff will be recruited and trained in utility-style operating procedures, and management responsibilities will be progressively transferred to WSD counterparts. The deliverables are a formally established WSD with

approved governance structure; the first annual business plan and financial accounts endorsed by TT management; and documented training records for WSD staff.

67. Under activity (2.1.b), the embedded WSD consultants will design, procure, install, and commission the SCADA system across the city core's DMAs. The hydraulic model will be calibrated to reflect actual network conditions, and the system will be configured for real-time leak detection and pressure monitoring. WSD operators will be trained to interpret SCADA data and apply it to day-to-day network management, maintenance scheduling, and capital investment prioritization. Baseline performance data from the ADB-supported system will be collected to determine the requirements for new SCADA system integration. The TORs for the SCADA systems will include technical requirements to be able to be integrated with the ADB-supported SCADA systems, while taking care to avoid single source procurement issues, along with direct engagement with the operators of these SCADA systems to test integration of each system. Procured equipment will be tested to be complementary with the ABD-supported SCADA system. A point person in the PIU will be identified to oversee system integration, with the ADB requirements and current performance defining the floor of the expected performance of the new SCADA systems. The deliverables are a commissioned and operational SCADA system integrated across the city core's DMAs; a calibrated hydraulic model; and documented evidence that WSD operators are trained and using the system in daily network management.

68. Under activity (2.1.c), the embedded WSD consultants will establish pressure zone management across the distribution network, with DMAs delineated and configured for performance monitoring. A structured preventative maintenance program will be designed with defined inspection cycles and trigger thresholds. SCADA-generated flow and pressure data will be used to identify priority investments and prepare annual maintenance and capital investment plans for WSD and Steering Committee approval. Deliverables are at least one annual maintenance and capital investment plan prepared and approved and documented pressure zone management procedures adopted by the WSD.

69. Under activity (2.1.d), the embedded WSD consultants will assess existing billing practices and revenue collection, and design and deploy a digital billing system covering the WSD's customer base. A tariff review will be conducted analyzing cost-recovery options and affordability thresholds, leading to a tariff reform report with phased implementation recommendations. Deliverables are an operational digital billing system covering the WSD's customer base; and a tariff review report submitted to TT and RGoB.

70. Under activity (2.1.e), the embedded WSD consultants will map climate-related risks to each segment of the water supply chain and develop standardized emergency response procedures for floods, glacial lake outburst floods, pipe bursts, and blockages. Roles, communication protocols, and escalation procedures will be defined, a business continuity plan covering service restoration priorities will be prepared, and at least one full simulation exercise will be conducted to test and refine the procedures. The deliverable will be a documented and tested emergency response and business continuity plan, formally adopted by TT.

71. Under activity (2.1.f), international specialists engaged through the call-down arrangement will assess the feasibility and institutional requirements for introducing private sector participation in water service delivery in smaller Thromdes, analyze options for nationally consistent climate-resilient regulatory frameworks and service standards, and prepare policy options papers with implementation recommendations. Technical inputs will be provided to MoIT on the prioritization and structuring of future water investments consistent with LRCP outcomes. This activity will also involve two policy-focused workshops bringing together water sector specialists from other Thromdes and MoIT officials to discuss emerging policies, regulations, and investment priorities.

72. Under activity (2.1.g), local consultants will develop and begin implementing a water conservation and customer engagement communications strategy for the WSD, covering demand management messaging and efforts to shift household attitudes towards more sustainable water consumption practices. The strategy will include the production of materials for

distribution through community channels and targeted outreach to residential and commercial water users, targeting a reduction in per capita consumption to 100 litres per capita per day in line with the Water Sector Master Plan. Deliverables are an approved communications strategy and documented evidence of rollout including produced materials and outreach.

Sub-component 2.2: Capacity building and institutional strengthening for resilient and sustainable transport and urban service delivery

73. Sub-component 2.2 complements the transport investments under Sub-component 1.3 by strengthening the institutions and management systems needed to operate and expand low-emission public transport. Its central objective is to support the transition of CBS into a professionally managed State-Owned Enterprise (SOE) with the governance, staffing, commercial strategy, and technical systems required to deliver reliable e-bus services under a Public Service Agreement (PSA). Sub-activities (a) through (c), (f) are delivered through the PMC, which procures and oversees a team of embedded bus operations specialists working within CBS. Sub-activities (d), (e), and (g) are delivered through the call-down arrangement. Implementation is led by MoIT, with CBS assuming progressively greater operational responsibility as the project proceeds.

74. Under activity (2.2.a), the embedded bus operations specialists procured by the PMC will draft the legal instruments required to establish CBS as a State-Owned Enterprise under Bhutanese corporate and public sector law, including the SOE charter, governance framework, and national mandate for urban and inter-urban transport. The Public Service Agreement between CBS and Thimphu Thromde will be prepared, defining service standards, route obligations, performance indicators, fare-setting mechanisms, and financial reporting requirements. The first CBS annual business plan and financial accounts will be prepared under the new governance structure. Deliverables are legal instruments establishing CBS as an SOE; a signed PSA between CBS and TT; and the first CBS annual business plan and financial accounts prepared under the new governance structure.

75. Under activity (2.2.b), the embedded bus operations specialists procured by the PMC will provide design and deliver training programs for CBS drivers in e-bus operation, mechanics in electric vehicle maintenance and diagnostics, and customer service staff in passenger management and accessibility. A comprehensive CBS operations manual will be developed covering fleet scheduling, depot management, fare collection, incident response, and reporting. A period of shadow operations will be conducted during which CBS will run services under PSA conditions to test service standards, ticketing systems, and staff readiness before full rollout. Deliverables are CBS staff trained in e-bus operations, maintenance, and customer care; a documented readiness assessment completed following shadow operations; and CBS operating scheduled e-bus services on the corridor under the PSA.

76. Under activity (2.2.c), the embedded bus operations specialists procured by the PMC will support CBS in developing a commercial assessment of non-fare revenue opportunities, including business cases for retail franchises at the Dangrina and Ngabiphu terminals, an advertising framework for bus stops and on-bus placements, and an assessment of demand for bus leasing arrangements. A phased implementation roadmap with revenue projections will be prepared. The measurable deliverable will be a revenue diversification strategy and associated implementation roadmap for CBS, endorsed by CBS management.

77. Under activity (2.2.d), international specialists engaged through the call-down arrangement will prepare capital investment, asset management, and maintenance plans for the BPS corridor infrastructure, bus fleet, and terminal facilities, drawing on traffic and ridership data and aligned with projected climate risks. The plans will set out maintenance schedules, investment priorities, and handover arrangements to guide MoIT's stewardship of the assets after project closure. The deliverable will be an approved set of capital investment and asset management plans for the gradual introduction of bus services and infrastructure.

78. Under activity (2.2.e), international specialists engaged through the call-down arrangement will support MoIT in prioritizing and implementing policies, strategies, and regulations under the Low-Emission Transport Master Plan and National Adaptation Plan, including parking demand management, freight policies, and fare-setting frameworks. The technical assistance to support the implementation of national plans such as the LETMP (which includes policies such as parking rationalization in the city centre, corridor-specific pedestrian improvements, improvements to public transport supporting TOD, and design of mobility hubs) which will drive the uptake of public transport. Deliverables are policy briefs and draft regulations for priority LETMP measures, submitted to MoIT.

79. Under activity (2.2.f), the embedded bus operations specialists procured by the PMC will finalize the ITS and MIS procurement specification, provide technical evaluation support during tendering, and support CBS through the installation, integration, testing, and commissioning of the system across the control room and bus fleet. CBS staff will be trained in system operation and the use of smartcard and scheduling data for service planning, and national standards for ITS interoperability and smartcard payments will be developed for adoption by MoIT. Deliverables are a commissioned and operational ITS/MIS system with CBS staff trained in its use and published national ITS interoperability and smartcard payment standards.

80. Under activity (2.2.g), international specialists engaged through the call-down arrangement will collect and analyze ridership data, school travel patterns, and employer commuting profiles to assess demand for dedicated services such as school buses and employer-sponsored transport. The impact of these services on peak-hour demand will be modelled, and the commercial viability of inter-urban e-bus deployment to secondary cities will be evaluated. Deliverables are a demand analysis report and policy options for integrating such services with the CBS network, submitted to MoIT.

81. Under activity (2.2.h), local consultants will develop and implement a communications and awareness campaign to inform residents of the benefits of public transport and non-motorized transport and to build support for the broader mobility reforms. The campaign will be based on a baseline assessment of commuter attitudes and travel behavior and will include the production of materials covering the environmental, health, and cost benefits of switching from private vehicles to public and non-motorized transport, with targeted outreach. Deliverables are an approved communications strategy endorsed by MoIT and CBS and a documented record of outreach activities including produced materials and evidence of public engagement.

82. Under Activity 2.2(i), international and local consultants will prepare the conceptual design, functional specifications, and quality control framework for the Bhutan Land Information System (BLIS). A private sector firm will develop and deploy the core software. The system will integrate modules for land registration, cadastre, mortgages, leases, public land management, dispute management, and e-services into a single platform, upgrade the existing land registry system (eSakor), incorporate the Land Bank Management System (LBMS), implement an e-services portal, and ensure interoperability with the Department of Human Settlement's building records, the land valuation rates of PAVA, and Bhutan's National Spatial Data Infrastructure. Training and capacity building will be delivered to end users. BLIS will improve the disaster risk identification of land and buildings, enhance the management and protection of Bhutan’s natural resources, increase public land and building asset use efficiency and revenues, and direct public lands toward their highest and best environmental and economic use. The deliverable will be a fully functional BLIS solution.

B.4. Implementation arrangements (max. 1500 words, approximately 3 pages plus diagrams)

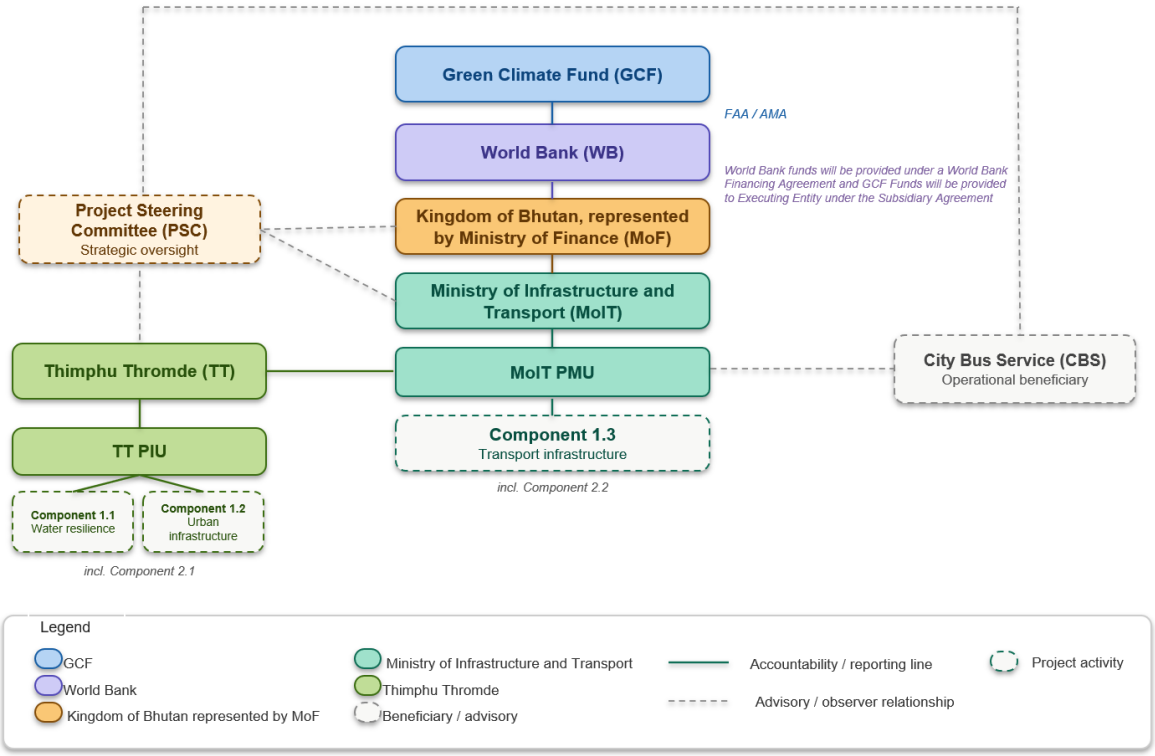
Overview

83. The World Bank will serve as the Accredited Entity (AE) to the GCF and will administer GCF resources in accordance with the Accreditation Master Agreement (AMA) and the Funded Activity Agreement (FAA). The World Bank contractually requires that the Executing Entity to follow its policies and procedures relating to procurement, financial management, environmental and social standards, integrity, and monitoring and evaluation. The World Bank will supervise project implementation and report progress to the GCF in accordance with the reporting requirements established under the FAA. World Bank resources will be provided to the Kingdom of Bhutan through a Financing Agreement between the World Bank and MoF, consistent with standard IDA procedures.

84. The Executing Entity (EE) for LRCP is the Kingdom of Bhutan, represented by its Ministry of Finance and acting through its Ministry of Infrastructure and Transport (MoIT). Implementation of project activities will be coordinated by MoIT, which will host the Project Management Unit responsible for overall project coordination. Implementation responsibilities for specific project components will be carried out in collaboration with Thimphu Thromde (TT)'s Project Implementation Unit.

85. Figure 5 illustrates the overall institutional arrangements of LRCP, including the governance structure, the relationships between the Accredited Entity and the Executing Entity, and the roles of the implementing agency and operational beneficiary.

Figure 5: Institutional arrangements



Governance Arrangements

86. Strategic oversight of LRCP will be provided by a Project Steering Committee (PSC), which will be established by the Kingdom of Bhutan at the beginning of the project implementation period. The PSC will serve as the project's high-level decision-making and coordination body. Its role will be to

provide strategic guidance, ensure alignment with national policies and development priorities, facilitate coordination among implementing agencies, and review overall project performance.

87. The PSC will be chaired by the Secretary of MoIT and will include representatives from the Ministry of Finance, Thimphu Thromde, the City Bus Service, and the Bhutan Construction and Transportation Authority.

88. The PSC will meet at least twice per year and will review project progress, approve Annual Work Plans of the PMU and PIU, and provide guidance on major policy or implementation issues that may arise during implementation.

Project Management Arrangements

89. Day-to-day project coordination and management will be carried out by a Project Management Unit (PMU) established within the Department of Human Settlement (DHS) of the Ministry of Infrastructure and Transport. The PMU will be responsible for overall project management, including coordination across implementing entities, procurement oversight, financial management coordination, monitoring and evaluation, safeguards compliance, and reporting to the World Bank. The PMU will consolidate progress information from its own oversight activities and from TT. It will report to the World Bank which will in turn report to GCF. The PMU will also provide administrative and technical support to the Project Steering Committee.

90. The PMU will be led by a Project Director appointed by the Government and will include specialists responsible for procurement, financial management, environmental and social safeguards, monitoring and evaluation, gender, and legal matters. These specialists will be drawn from existing MoIT staff.

91. To strengthen implementation capacity, the PMU will be supported by a Project Management Consultant (PMC). The PMC will provide technical and operational support to the PMU, including assistance with procurement processes, engineering review, contract administration, and coordination of technical consultancies. The PMC will support the PMU in fulfilling its management responsibilities.

92. The PMU will develop the Operations Manual prior to the procurement of buses, establishing the operational and institutional framework required for the delivery of scheduled e-bus services. The Operations Manual will be prepared in close coordination with CBS management and MoIT, and will include, among others: technical standards and specifications for buses and the ITS; bus fleet management, operations, and maintenance procedures; route planning and management; service frequencies and scheduling; operational performance standards and monitoring arrangements; and other relevant operational and institutional requirements.

Project Implementation Arrangements

93. Implementation responsibilities for infrastructure investments will be carried out by the relevant sector institutions through dedicated implementation units. Responsibilities are organized by project component.

Ministry of Infrastructure and Transport (MoIT)

94. Through the PMU, MoIT will manage procurement and supervision of construction contracts under Component 1.3. These investments include bus priority lanes, bus stops and shelters, terminals, depots, charging infrastructure, and intelligent transport systems (see C1.3, activities a – e). MoIT will also coordinate institutional strengthening activities under Component 2.2. These activities support public transport governance reforms and the operational transition of the City Bus Service (see C2.2, activities a-i). Procurement responsibilities under the project will be shared between MoIT and Thimphu Thromde (TT), both of which have relevant institutional experience implementing infrastructure activities and managing procurement under government and development partner-

financed projects. Given the complexity of the proposed investments, additional dedicated procurement capacity and strengthened coordination arrangements will be established within the PMU/PIU, with a detailed procurement capacity and risk assessment to be reflected in the Project Procurement Strategy for Development (PPSD). Further details are provided in the Feasibility Study (see Section 9.4.1).

95. A Financial Management (FM) assessment of the implementing ministry has been carried out in accordance with World Bank policy. The assessment determined that acceptable financial management arrangements are in place to ensure that: (i) project funds will be used for the intended purposes in an efficient and economical manner; (ii) financial reports will be prepared in an accurate and timely manner; and (iii) project assets and resources will be adequately safeguarded. Further details are provided in the Feasibility Study (see Section 9.4.1). Both MoIT and TT will be allocated/transferred funds by MoF to separate Fund Identification Code based on the Annual Work Plan (AWP) approved by PSC. PIU TT and PMU will prepare AWP for their respective activities allocated under the project, and PMU will consolidate AWP and present to PSC for approval.

Thimphu Thromde (TT)

96. Through the PIU, Thimphu Thromde will manage procurement and supervision of construction contracts under Components 1.1 and 1.2. These investments include water system resilience measures such as SCADA systems, raw water intake upgrades, transmission protection works, and leakage reduction programs. They also include pedestrianization, sidewalk improvements, drainage upgrades, and improvements to public spaces and connectivity (see C1.1, activities a-e and C1.2, activities a-e). Thimphu Thromde will also coordinate institutional strengthening activities under Component 2.1. These activities support the establishment and strengthening of water service delivery systems (see C2.1, activities a-g).

97. A capacity assessment of Thimphu Thromde has been conducted in accordance with World Bank procedures. The assessment confirmed that the municipality has adequate institutional arrangements, including Financial Management, to implement infrastructure investments with the support of dedicated project management and technical consultants. Further details are provided in the Feasibility Study (see Section 9.4.2).

City Bus Service (CBS)

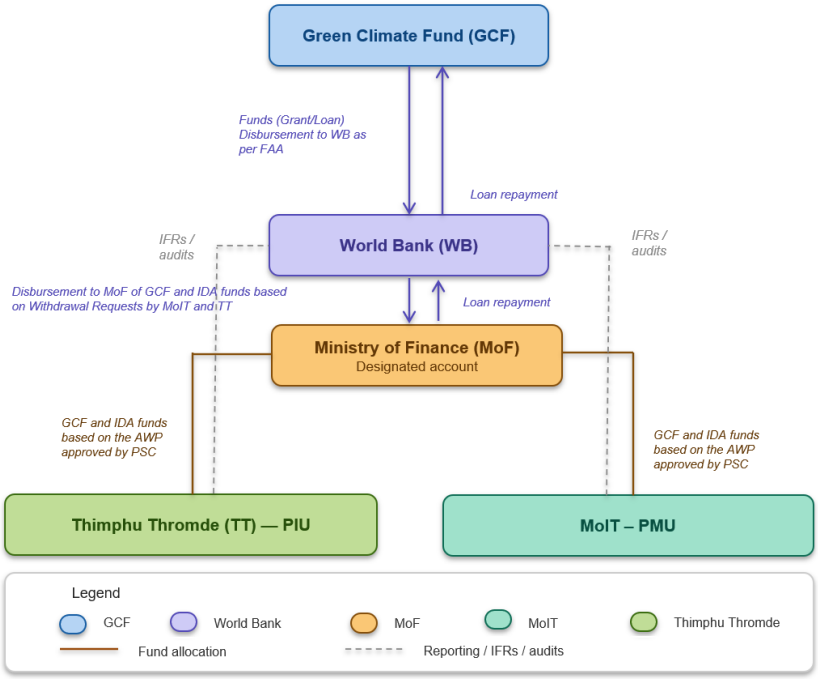
98. CBS will not have a direct role in project management or procurement during project implementation. Instead, CBS will serve as the operational beneficiary of public transport infrastructure financed under Component 1.3 (see C1.3, activities a – e). CBS will also benefit from institutional strengthening activities under Component 2.2 that support its transition into an independently managed state-owned enterprise (see C2.2, activities a – i). Following completion of infrastructure investments, CBS will assume responsibility for operation and maintenance of the electric bus fleet, bus terminals, depots, and intelligent transport systems. The legal and contractual arrangements for the transfer of assets to CBS will be formalized prior to project close. E-buses, terminals, and charging infrastructure procured under Component 1.3 will be transferred to CBS under an asset transfer agreement between MoIT and CBS, consistent with CBS's transition to an SOE and the terms of the Public Service Agreement with Thimphu Thromde.

Financial Management and Flow of Funds

99. GCF financing will be administered by the World Bank as the Accredited Entity. Following signature and effectiveness of the Funded Activity Agreement, IDA will enter into a Financing Agreement (Subsidiary Agreement) with the Kingdom of Bhutan. GCF funds will be disbursed to the Kingdom of Bhutan through the Ministry of Finance, which will manage the project's Designated Account.

From the Ministry of Finance, funds will be allocated to the MoIT and TT based on Annual Work Plans consolidated by the PMU and approved through the PSC. Both MoIT and TT will be responsible for financial management reporting and ensure compliance with World Bank fiduciary requirements for the funds allocated/transferred. Financial flows and contractual arrangements between the AE, the EE, and implementing entities are illustrated in Figure 6.

Figure 6: Flow of Funds



Experience and Track Record of Implementing Institutions

100. The World Bank has extensive experience supporting infrastructure and climate resilience projects in Bhutan and has implemented numerous operations in the water, transport, and urban sectors. The Bank has worked closely with the Ministry of Infrastructure and Transport, the Ministry of Finance, and Thimphu Thromde for several decades. The Ministry of Infrastructure and Transport has a strong track record of implementing infrastructure investments and managing donor-financed projects. The Ministry has led national transport and urban development initiatives and has experience coordinating multi-agency infrastructure programs. Thimphu Thromde is responsible for municipal administration and service delivery in Bhutan's capital city and has implemented several urban infrastructure projects, including water supply improvements and public space upgrades. Together, these institutions provide the institutional capacity required to implement the LRCP and sustain the project's investments beyond the implementation period.

B.5. Justification for GCF funding request (max. 1000 words, approximately 2 pages)

Rationale

101. Bhutan's climate financing needs are estimated at $7.7–14 billion by 2030, with adaptation needs alone at approximately $3.2 billion[30]. These needs far exceed available domestic resources. Public debt stands at approximately 118% of GDP in FY2024/25 and is projected to rise to 141% of GDP by FY2028/29, driven largely by hydropower contingent liabilities[31]. The fiscal deficit stood at

[30] World Bank Group, *Bhutan Country Climate and Development Report (CCDR)*, 2025
[31] International Monetary Fund, Asia and Pacific Department, *Bhutan: 2025 Article IV Consultation — Press Release and Staff Report*, IMF Staff Country Reports No. 26/19, January 2026

2.9% of GDP in FY2025/26. Bhutan's financing envelope is also set to narrow following LDC graduation, as concessional and grant resources, historically over 22% of public resources, gradually taper off. ADB, JICA, UNDP, and SAARC have each allocated their Bhutan financing to other projects, leaving no viable alternative international source for LRCP. Commercial financing is not available on viable terms: at a representative domestic rate of 13.5% over 7 years, the BRT project produces a financial net present value of negative $13.25 million, confirming that private debt cannot close the financing gap (EFA, Annex 3). In a small, landlocked economy like Bhutan where domestic capital markets remain at an early stage of development and commercial financing for first-of-kind clean mobility infrastructure carries risk profiles that the private sector is not yet positioned to absorb, GCF's concessional support plays an indispensable catalytic role creating the conditions under which a sustainable, scalable, and ultimately self-financing public transport system can take root. Bhutan's domestic capital markets are shallow, credit systems are weak, financial instruments are limited, and there is no established private sector appetite for climate infrastructure investment in water or transport. Underpriced public tariffs, limited foreign currency access, and political constraints on tariff reform further deter private participation.

102. Three market failures justify GCF financing: non-internalized climate externalities, whereby the full social value of avoided emissions and improved climate resilience accrues to society but is not captured in revenues; first-mover risk on technology and institutional reform; and the public-good characteristics of adaptation investments such as flood-resilient drainage and pedestrian pathways, which cannot generate cost recovery. Consequently, there are no BRT or other rapid urban transit systems in Bhutan (the project system will be first-of-its-kind in the country; see Annex 22 for additionality demonstration under CDM AM0031), and – despite the RGoB's commitment to low-carbon transport – such systems are unlikely to be developed without GCF financing, considering these barriers.

Coherence of Financial Instruments

103. In the water sector, physical infrastructure investments are financed entirely by IDA ($4.39M grant and $1.32M loan). These investments generate an economic NPV of $3.06M at an EIRR of 19.1% but do not produce revenues sufficient to service commercial debt. IDA grant financing of $3.04M supports water sector institutional strengthening. SCADA systems and capacity building are not revenue-generating in any timeframe and are only viable through grant financing. Water tariffs are aligned with local affordability and there is limited political space for increases sufficient to finance capital or system improvements. Water revenues currently barely cover operational and maintenance costs. Thimphu Thromde has limited financial autonomy and no commercial borrowing capacity. IDA grant financing ensures that water infrastructure improvements reach end users without tariff increases.

104. In the transport sector, GCF provides a grant of $18.43M and a concessional loan of $5.6M, alongside an IDA grant ($1.58M) and IDA loan ($8.68M) for co-financing transport infrastructure. The grant covers the non-revenue-generating works, such as pedestrian access works and the ITS system. The concessional loan applies to components where financial performance improves as modal shift deepens, that is, the first tranche of 50 e-buses and associated charging and ancillary infrastructure. Bus fares have been set through consultations with users and the City Bus Service and are aligned with local affordability. At approximately Nu. 12.50 per trip ($0.134), fares represent less than 2.5% of monthly per capita income. Concessional fares are available for schoolchildren and the elderly. These fare levels are essential for achieving the modal shift that underpins the project's mitigation ambitions, but they mean that farebox revenue cannot finance capital investment. The positive externalities of public transport, including emissions reductions, congestion relief, and improved air quality, reinforce the case for concessional financing. These benefits accrue broadly to society but cannot be captured in farebox revenues.

105. The concessionality requested is the minimum required to ensure viability. Even at the most concessional all-loan terms available, the project's equity returns remain below the 12% cost of

capital (MIRR of 6.1%, equity FNPV of –$13.25 million), leaving it unable to attract or retain private equity. The grant component is calibrated to close precisely this gap — lifting equity FNPV to +$0.41 million and MIRR to 13.0% — without generating windfall returns for investors. The blended structure therefore represents the minimum required to convert a sub-hurdle, value-eroding proposition into a bankable project. Bhutan's structural constraints, including public debt projected at 141% of GDP by FY2028/29, shallow domestic capital markets, an absence of private climate infrastructure investors, limited foreign currency reserves, and declining preferential aid, mean that even moderate increases in financing cost significantly impair project viability. The risk-sharing structure reflects each instrument's role. GCF and IDA grant financing is reserved for infrastructure that is not revenue-generating, including pedestrian and public realm investments under Sub-component 1.2 and the institutional reforms under Component 2 that are not viable on any commercial basis. The bus priority corridor infrastructure under Sub-component 1.3 is financed through a blend of GCF grants and IDA grants and loans, reflecting its role as enabling infrastructure for the revenue-generating bus system. The e-buses themselves and the associated charging infrastructure is financed entirely through GCF and IDA loans, where the financial position improves progressively as modal shift deepens and CBS transitions to SOE operations, making a reimbursable instrument appropriate over the medium term while remaining well below commercial rates.

B.6. Exit strategy (max. 500 words, approximately 1 page)

106. LRCP operationalizes the “avoid, shift, improve” framework across water and transport systems. In water, it avoids climate impacts through resilient infrastructure, shifts toward more efficient and equitable distribution, and improves performance through SCADA-enabled management. In transport, it avoids motorized travel, shifts travel to public and non-motorized modes by enhancing walkability and creating a high-quality transit corridor, and improves performance through electric buses, reduced travel time for bus users, and intelligent transport systems.

107. The project is designed to ensure that these improvements continue beyond the implementation period without reliance on concessional financing. The exit strategy is structured around clear asset ownership arrangements, defined operation and maintenance responsibilities, institutional ownership, and financial sustainability mechanisms.

108. At the system level, LRCP combines infrastructure investments under Component 1 with institutional strengthening under Component 2 to establish durable service delivery arrangements. In the water sector, Thimphu Thromde will operate a strengthened Water and Wastewater Services Division, supported by SCADA-enabled monitoring, improved asset management, and enhanced billing systems, enabling reliable service under increasing climate variability. In the transport sector, CBS will serve as the long-term operator of public transport services, with project-supported activities under Sub-component 2.2 enabling its transition toward a professionally managed State-Owned Enterprise. Activities under Sub-component 2.2 will also support the definition of service standards, performance obligations, and institutional responsibilities for transport service delivery.

109. Asset ownership and operation and maintenance responsibilities after project completion are defined as follows. Thimphu Thromde will own and be responsible for operation and maintenance of pedestrian infrastructure, including sidewalks, footpaths, urban realm improvements, and associated non-motorized transport facilities. Bus terminals and e-bus infrastructure (including electric buses, charging systems, and depot facilities) will be owned and operated by CBS. Bus stops and associated passenger access infrastructure will be subject to final allocation under the SOE framework, which will define whether ownership and maintenance responsibilities rest with CBS or Thimphu Thromde, based on operational efficiency and institutional capacity considerations.

110. All infrastructure financed under the project will be supported by operation and maintenance plans that define lifecycle requirements, responsibilities, and budget allocations. In the water sector, Thimphu Thromde will manage water infrastructure, including treatment systems, transmission networks, and distribution systems, supported by preventive maintenance, monitoring, and

emergency response procedures. In the transport sector, CBS will operate and maintain electric buses, charging systems, terminals, depots, and intelligent transport systems, supported by supplier-backed service agreements and technical training. Battery lifecycle management will include warranties and end-of-life arrangements such as take-back or certified recycling.

111. Financial sustainability will be reinforced through improved cost recovery and operational efficiency. In the water sector, improved billing systems, tariff adjustments, and reduced non-revenue water will enhance revenue generation and enable reinvestment in maintenance and future expansion. In the transport sector, CBS will strengthen financial performance through increased ridership and diversified revenue streams, including fare revenues and ancillary income. The project is designed to create a financially sustainable ecosystem for future expansion. The positive Modified Internal Rate of Return (MIRR) of 13% achieved with GCF support demonstrates that the operational model can generate sufficient cash flows to be attractive for potential future financing.

112. The sustainability of Component 2 activities will be ensured through institutionalization within implementing agencies rather than continuation as project-based functions. Capacity building, operational systems, and planning tools introduced under the project will be embedded within the staffing structures, budget processes, and routine functions of Thimphu Thromde, MoIT, and CBS. This ensures that asset management, service planning, system monitoring, and policy implementation continue as core government responsibilities after project completion.

113. Finally, LRCP contributes to a long-term paradigm shift by demonstrating how climate-resilient water systems, pedestrian friendly public realm improvements, and low-emission transport can be delivered as an integrated urban system. These approaches will be embedded within national and municipal practices, enabling replication in other cities and supporting the transition toward climate-resilient and low-carbon urban service delivery.

FINANCING INFORMATION

C.1. Total financing

(a) Requested GCF funding (i + ii + iii + iv + v + vi + vii)	Total amount	Currency (USD)
	28	million USD ($)

GCF financial instrument	Amount	Tenor	Grace period	Pricing
(i) Senior loans	5.6	20	5	0.75%
(ii) Subordinated loans				
(iii) Equity				
(iv) Guarantees				
(v) Reimbursable grants				
(vi) Grants	22.4			
(vii) Results-based payments				

(b) Co-financing information	Total amount	Currency
	20	million USD ($)

Name of institution	Financial instrument	Amount	Currency	Tenor & grace	Pricing	Seniority
World Bank	Senior Loans	10	million USD$	40 years	2%	Options
World Bank	Grant	10	million USD$			

(c) Total World Bank IDA (d) financing (c) = (a)+(b)	Amount	Currency
	48	million USD ($)

(d) Other financing arrangements and contributions	

C.2. Financing by component

Component	Subcomponent/activity	Indicative cost million USD ($)	GCF financing		Co-financing		
			Amount million USD ($)	Financial Instrument	Amount million USD ($)	Financial Instrument	Name of Institutions
Component 1.1	Strengthening water supply systems to support	5.71			4.39 1.32	Grants Loan	World Bank

	resilient water services						
Component 1.2	Improving the safety and convenience of sidewalks, footpaths, and passageways to encourage non-motorized transport	6.7	6.7	Grants			
Component 1.3	Investments toward a modal shift to low-emission public transport	27. 59	11.73	Grants	1.58	Grant	World Bank
			5.6	Loan	8.68	Loan	World Bank
Component 2.1	Capacity building and institutional strengthening for resilient and sustainable water service delivery	3.04			3.04	Grants	World Bank
Component 2.2	Capacity building and institutional strengthening for resilient and sustainable transport service delivery	2.59	2.59	Grants			
Project Management	Project management and implementation units	2.20	1.28	Grants	0.92	Grants	World Bank
	M&E	0.18	0.11	Grants	0.08	Grants	World Bank
Indicative total cost (USD)		48	28		20		

C.3 Capacity building and technology development/transfer (max. 250 words, approximately 0.5 page)	
C.3.1 Does GCF funding finance capacity building activities?	Yes ☒ No ☐
C.3.2. Does GCF funding finance technology development/transfer?	Yes ☒ No ☐

114. LRCP includes $2.59 million in GCF grant funding dedicated to capacity building and technology development across the urban transport sector. These investments are essential to institutionalizing climate-resilient service delivery and enabling long-term systems transformation and institutional reform.

115. Capacity-building activities will support the establishment of a ring-fenced water division in Thimphu Thromde and the transition of CBS into an independent SOE with a national mandate. This includes technical assistance for developing business plans, HR policies, budgeting, regulatory support, tariff reforms, and disaster response planning. Institutional strengthening will also support the MoIT in implementing the LETMP, NAP, and CCAP.

116. Finally, the project will finance the design, procurement, installation, testing, and maintenance of key digital systems to improve operational efficiency and climate responsiveness. This includes a SCADA system for real-time monitoring and leakage control in Thimphu's water network WTPs, and an ITS and MIS to support route scheduling, real-time passenger information, digital ticketing, incident response, and fleet optimization.

CTED PERFORMANCE AGAINST INVESTMENT CRITERIA

D.1. Impact potential (max. 500 words, approximately 1 page)

Impact Potential of the LRCP

117. LRCP is designed to deliver transformational mitigation and adaptation impacts by enabling a paradigm shift in the provision of urban services in Thimphu. The project directly addresses the GCF's Mitigation Result Areas (MRAs) and Adaptation Result Areas (ARAs) through a comprehensive, integrated approach.

Mitigation Impact: Contribution to Low-Emission Sustainable Development Pathways

118. LRCP will significantly contribute to MRA 2: Low-emission transport through system-wide interventions:

119. *Low-Carbon Mobility Transformation:* The introduction of 50 electric buses, a bus priority corridor with dedicated lanes, and complementary transport policies will support a modal shift of 30% from private vehicle use to public transport along the proposed corridor by 2048, avoiding roughly 34 million vehicle-km of private car travel annually. These figures are supported by detailed traffic modelling along the proposed corridor. This transition is expected to result in the reduction of approximately 69,519 tonnes of CO_2eq over 20 years, conservatively estimated against a business-as-usual (BAU) scenario. Emissions savings will be driven by avoided private vehicle trips, reduced traffic congestion (avg. travel time reduced by appx. 20% by 2048), and the decarbonization of the public transport fleet, powered by Bhutan's 100% renewable hydropower. For the broader city, these investments are projected to increase the share of trips made by bus by 17 percentage points, from 8% to 25%, compared to BAU. These measures are key to Bhutan's low-emission development pathway: while Bhutan is a net carbon sink for now, its LTS notes that a BAU trajectory would put its carbon-neutral status at risk by 2047–2048, as rising emissions and declining forest sink capacity converge. The transport sector is the primary source of energy-related GHG emissions (60%), and expected to increase in a BAU scenario due to continued uptake of private vehicle use. Therefore, the LTS identifies the development of NMT infrastructure and deployment of electric Bus Rapid Transit (with 100% of bus sales to be electric by 2045) – both key elements of the project – as priorities.

120. *Operational Efficiency for Urban Services:* LRCP's water sector investments will increase energy efficiency through the installation of SCADA systems, rehabilitation of transmission lines, and reduction of non-revenue water (NRW). Improved system reliability and leak detection will reduce the energy intensity of water supply operations. Given the low carbon intensity of Bhutan's hydropower-dominated electric grid and its largely gravity-based water supply, energy savings (roughly 65 MWh over 20 years) and associated GHG reduction are relatively small.[32] Nonetheless, they support the country's low-emissions and resilient pathway: as climate change poses increasing risks to hydropower generation[33], and electricity demand continues to rise (including to accommodate increasing vehicle electrification), efficient use of electricity helps avoid incentives to invest in higher-emissions supplementary energy sources. In addition, Bhutan exports a substantial amount of surplus hydropower to India, particularly during monsoon season (May-October), and also sometimes imports energy from India during the dry season (November-April) when hydropower is unable to meet peak demand.[34] Enhancing efficient use of electricity therefore increases the amount of clean energy available for export, displacing generation at the prevailing regional grid emission factor,.

Adaptation Impact: Contribution to Climate-Resilient Sustainable Development

[32] LRCP EFA
[33] Bhutan 21st Century Economic Roadmap, https://pmo.gov.bt/wp-content/uploads/2026/02/document-1753155904040.pdf
[34] " Central Electricity Authority (CEA), Government of India, Ministry of Power, *CO2 Baseline Database for the Indian Power Sector, User Guide*, Version 22.0, August 2026. https://cea.nic.in/wp-content/uploads/baseline/2026/09/User_Guide__Version_22.0.pdf

121. LRCP will strengthen resilience in alignment with ARA 2 (health, well-being, food and water security) and ARA 3 (infrastructure and built environment) through the following mechanisms:

122. *Resilient and Equitable Urban Mobility:* Transport interventions will enhance adaptive capacity for road users, particularly public and non-motor transport users. Improvements include climate resilient road and bridge upgrades, safer sidewalks, ramps, bus shelters, and well-lit access routes. Heat-resilient, air-conditioned e-buses and robust first- and last-mile connectivity will reduce heat stress and exposure to extreme weather. Bus-based mobility will also improve the city's capacity for evacuation during disasters, while climate-resilient drainage and roadside infrastructure will mitigate flooding-induced disruptions. Approximately 72,448 direct beneficiaries[35] (users of public transit and NMT), of which 48.5% female, are expected to benefit from more climate-resilient public and non-motor transport systems by the end of implementation.

123. *Water Security and Public Health:* LRCP will ensure continuous and equitable access to safe water, including during periods of climate change-exacerbated drought, by improving water supply resilience, reducing NRW, and enhancing operational autonomy. Key adaptation results of the water component include: Improved availability of safe water (increasing the proportion of core city residents with at least 15 hours per day (12 hours during the dry season) of treated water supply from ~17% to 100%) and increased resilience of water supply via reduced losses (NRW reduced from >50% to 25% in city core.) Water supply improvements are expected to serve 52,046 direct beneficiaries[36] by project end, of which 48.5% female. These measures directly contribute to ARA 2 by improving water security, building resilience to climate shocks including droughts and flooding, reducing the risk of waterborne disease outbreaks, and enhancing public health. Upgraded drainage systems—integrated with Sustainable urban Drainage Systems (SuDS)—will also mitigate contamination of downstream water sources, supporting urban water security and environmental protection.

124. *Digital Systems for Faster Response and Adaptive Management:* SCADA-enabled water operations and real-time mobility data will improve the city's ability to anticipate, monitor, and respond to climate-related disruptions. Enhanced asset management, leak detection, and performance monitoring will allow for more agile and climate-responsive service delivery across sectors.

125. The total value of resilience improvements to water and transport infrastructure, under ARA 3, is approximately US $45.5 million, while the incremental cost of climate resilience is approximately US $1.61 million, based on project budget estimates and engineering studies (see Annex 3 – EFA for detailed calculations).

Conclusion

126. LRCP offers strong impact potential by directly advancing Bhutan’s Nationally Determined Contributions (NDCs) and National Adaptation Plan (NAP) objectives. Its contributions to both mitigation and adaptation result areas demonstrate the project’s potential to drive climate-resilient, low-emission urban transformation. The integrated focus on behavioral shifts, demand management, and service efficiency positions LRCP as a replicable model for sustainable development in Bhutan and other mountainous, rapidly urbanizing countries.

D.2. Paradigm shift potential (max. 500 words, approximately 1 page)

127. LRCP uses Thimphu as a demonstration city to catalyze systemic transformation in urban service delivery in Bhutan. By simultaneously addressing infrastructure deficits and institutional weaknesses across transport and water, it establishes a replicable model for climate-resilient, low-emission urban development with direct applicability to other mountainous, rapidly urbanizing areas.

Potential for Scaling Up and Replication

[35] Of which 52,117 unique (not also direct beneficiaries of water activities) -- see Adaptation Beneficiary Analysis.
[36] Of which 31,715 unique (not also direct beneficiaries of transport/public space activities).

128. Bhutan's secondary cities face transport and water challenges that closely mirror Thimphu's at an earlier stage of growth: rising private vehicle dependence, inadequate public transport, deteriorating pedestrian infrastructure, and water systems characterized by high non-revenue losses and weak operational governance. For example, Phuentsholing suffers from chronic traffic congestion while Samdrup Jongkhar and Sarpang experience intermittent water supply, inadequate sewerage, and regular flooding. LRCP responds through two transferable institutional and governance models, each combining strong institutional design with the infrastructure needed to make it work. In transport, the primary transferable model is the CBS transition to a State-Owned Enterprise operating under a Public Service Agreement, a governance framework establishing clear mandates, accountability structures, and a basis for long-term financial planning applicable in any Bhutanese city. The whole-of-system infrastructure package (electric buses, NMT improvements, unified ticketing, and bus priority lanes) is integral to this model, providing the operational foundation on which it is built and demonstrated at scale. Bhutan's 13th Five-Year Plan already commits to 45 additional electric buses for other cities, reflecting national intent to replicate the approach. In water, the primary transferable model is the ring-fenced Water and Wastewater Services Division, a governance and operational structure with independent accounting, SCADA-informed asset management, and performance-based private sector engagement that provides a replicable blueprint for other Thromdes. Together, the governance model and the infrastructure investments it oversees demonstrate what climate-resilient service delivery can achieve at scale. Both models also offer lessons for other mountainous, rapidly urbanizing areas facing similar terrain constraints and institutional challenges.

Potential for Knowledge Sharing and Learning

129. ITS and SCADA data will go beyond immediate operations: transport performance data will support network benchmarking and investment planning by MoIT and other Thromdes, while SCADA-generated reporting will inform tariff-setting, capital prioritization, and climate adaptation decisions nationally. In transport, international advisors supporting the CBS SOE transition will train local staff in fleet management, ITS operations, and financial planning. In water, embedded consultants within the Water and Wastewater Services Division will deliver structured training in SCADA operations, climate-resilient network management, and emergency response, building institutional knowledge that persists after the project closes.Two policy workshops will bring operational staff together to discuss emerging policies, regulations, and investment priorities. , supporting replication across Bhutan.

Contribution to the Creation of an Enabling Environment

130. Component 2 creates the enabling environment for sustained, scaled climate-resilient service delivery through institutional reforms. In transport, the CBS transition to an SOE under a Public Service Agreement establishes clearer mandates, accountability structures, and a basis for financial planning. Though public service contributions will remain necessary over the long term, the PSA framework progressively reduces dependence on ad hoc government support. In water, the ring-fenced Water and Wastewater Services Division with SCADA-informed asset management, independent accounting, and performance-based private sector engagement provides a replicable governance model for other Thromdes, with cost-recovery tariff reform progressively improving financial sustainability as the system matures. By institutionalizing these reforms within national agencies, LRCP ensures the enabling environment outlasts the project and supports scale-up elsewhere.

Contribution to the Regulatory Framework and Policies

131. LRCP operationalizes a suite of national and local policy frameworks. In transport, it implements key elements of the Low Emission Transport Master Plan (LETMP) and the 2021 Low Emission Development Strategy, with technical assistance also developing complementary instruments including parking demand management, freight policies, and fare-setting frameworks. In water, it operationalizes the Water Sector Master Plan, the Thimphu Structure Plan, and the City Core Action Plan. Component 2 institutional reforms are the mechanisms through which these strategies achieve durable effect. LRCP operationalizes commitments the Government of Bhutan has already made, reducing implementation risk and strengthening prospects for scale-up.

Contribution to Climate-Resilient Development Pathways

132. LRCP is aligned with Bhutan's 2021 NDCs, which prioritize transport decarbonization and climate-resilient water services, and with the 2023 NAP, which calls for strengthening urban infrastructure against climate hazards and reducing water system losses. The long-term structural change LRCP contributes to these goals is grounded in institutional reform and policy change, working in concert with targeted infrastructure investment. On mitigation, the CBS SOE model, with its PSA accountability framework, performance incentives, and financial planning capacity, is what embeds low-emission transport as the default service delivery model for the long term. The projected reduction of 69,519 tonnes CO_2eq over 20 years is made possible by this institutional model operating the electrified public transport fleet running on Bhutan's 100% renewable hydropower. On adaptation, the ring-fenced Water and Wastewater Services Division, with SCADA-informed network management, climate-aware capital planning, and tested emergency response procedures, is what ensures durable resilience outcomes are sustained beyond the project period. The infrastructure investments are the operational foundation on which these institutional models are built and through which they deliver results. These governance reforms operationalize the sectoral strategies underpinning the NDCs and NAP: the LETMP and Low Emission Development Strategy in transport; the Water Sector Master Plan and City Core Action Plan in water. Taken together, they establish a nationally replicable model for climate-resilient urban service delivery, consistent with Bhutan's carbon neutrality commitment.

D.3. Sustainable development (max. 500 words, approximately 1 page)

133. LRCP generates measurable co-benefits across environmental, social, economic, and gender dimensions, aligned with SDGs 3, 6, 7, 9, 11, and 13, and directly reflected in the project's Theory of Change:

Environmental co-benefits

134. Beyond its key climate mitigation benefits, the shift to public and non-motor transport will improve air quality and public health: reductions in diesel and petrol consumption, estimated at 13,276 and 42,999 thousand litres respectively over 20 years, will lower local concentrations of PM2.5, NOx, and SO2, with clean air benefits valued at a net present value of $2.2 million (12% discount rate, EFA). In the water sector, reducing NRW from over 50% to 25% will recover approximately one quarter of all treated water currently lost to leakage and unauthorized connections, making that volume available to additional households without increasing abstraction from climate-stressed sources.

Social co-benefits

135. Increasing water supply from 3–9 hours per day to 15 hours per day, beyond the key adaptation benefits described in section D.1, will reduce the risk of waterborne disease outbreaks and enhance public health, with particular gains for the more than 77% of households currently reliant on portable water during dry periods, reducing the time and health burden borne disproportionately by women and girls. Provision and improved separation of pedestrian infrastructure (sidewalks and crossings) will improve safety and reduce road traffic accidents. Upgraded bus infrastructure with lighting, real-time information displays, and priority seating will improve safety and accessibility for women, people with disabilities, and the elderly. Passenger surveys confirm that most CBS users are in the bottom 40% income bracket, meaning improved public transport disproportionately benefits the urban poor. Average bus fares of approximately Nu. 12.50 per trip represent less than 2.5% of monthly per capita income, keeping public transport affordable for low-income households. The project's beneficiary analysis estimates 104,162 direct beneficiaries by project close (with double counting removed).

Economic co-benefits

136. The EFA estimates a Net Present Value (NPV) of $23.9 million for the pedestrian and transport investments (excluding GHG benefits), rising to $25.9 million at mid-range carbon pricing. The Bus Priority Corridor is projected to reduce bus travel times by over 20% once operational. This efficiency generates significant economic benefits, with travel time savings from all users growing from $2.37 million per year upon opening of the Bus Priority Corridor to $3.87 million per year by 2048 as modal shift deepens. Vehicle operating cost savings generate an NPV of $8.46 million over the project period, with avoided

road accident costs contributing a further $3.12 million. Improved access to efficient public transport helps connect residents to jobs and economic opportunity. Reduced congestion and improved pedestrian facilities also support over 200,000 annual tourists who visit Thimphu's commercial centre, further benefiting local businesses. The water investment generates an ENPV of $3.06 million (EIRR 19.1%).

Gender-sensitive development

137. Women in Thimphu have a labour force participation rate of 31.9% and earn on average 25% less than men, while relying more heavily on public transport. 44% report that the current bus system requires better security. LRCP addresses these gaps through improved lighting, real-time passenger information, and anti-harassment measures. Increased water supply reliability directly reduces the burden of water collection borne primarily by women. The Gender Action Plan (Annex 8) ensures women participate meaningfully in project planning and feedback.

D.4. Needs of recipient (max. 500 words, approximately 1 page)

Vulnerability of the Country

138. Thimphu faces multiple interacting climate hazards: flooding, landslides, urban heat stress, and drought. Between 1985 and 2015, the built-up area exposed to pluvial flooding nearly tripled to 1.7 km²; a current 100-year flood event is projected to recur every five years by the 2060s. Flooding damages water intake structures and transport bridges built to design standards already being exceeded. Drought compounds these pressures: over 77.5% of households resort to portable water during dry periods, and the water network, largely installed over 40 years ago, suffers non-revenue water losses exceeding 50% and average supply of only 3–9 hours per day. Urban heat island hotspots reach 43°C in summer, exacerbating water scarcity and infrastructure deterioration (see Section B.1).

Vulnerable Groups and Gender Aspects

139. Women, low-income households, youth, persons with disabilities, and the elderly are disproportionately affected. As documented in Annex 8, women in Thimphu have a labour force participation rate of just 31.9%, earn on average 25% less than men, and rely more heavily on public transport. 44% of women report that public transport requires better security, and younger women frequently avoid buses due to harassment concerns. Women also bear the primary burden of water collection, and unreliable supply imposes disproportionate time and health costs that intensify during floods when damaged infrastructure limits their mobility and access to services. Women entrepreneurs on Norzin Lam face additional livelihood risks from construction disruption, and female persons with disabilities receive less assistance than male counterparts. Youth unemployment among women (21.2%) is nearly 50% higher than among men (14.5%). LRCP responds through inclusive infrastructure, concessionary fares, bus safety measures, SEA/SH safeguards, and a Gender Action Plan with dedicated gender expertise in the PMU.

Economic and Social Development Level

140. Despite graduating from LDC status in 2023, Bhutan faces severe fiscal constraints. Total public debt stood at 118% of GDP in FY2024/25, driven by hydropower contingent liabilities, and is projected to reach approximately 141% of GDP by FY2028/29. The fiscal deficit is widening to 2.9% of GDP in FY2025/26 and 4.1% in FY2026/27, while the current account deficit stands at 19% of GDP in FY2024/25 [37]. Bhutan's financing envelope is also set to narrow following LDC graduation, as concessional and grant resources, historically over 22% of public resources, gradually taper off. Bhutan imports all its fossil fuels, and continued vehicle growth will further undermine fiscal and energy resilience.

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International Monetary Fund, Asia and Pacific Department, *Bhutan: 2025 Article IV Consultation — Press Release and Staff Report*, IMF Staff Country Reports No. 26/19, January 2026

Absence of Alternative Sources of Financing

141. Bhutan's climate financing needs are estimated at US$7.7–14 billion by 2030, against adaptation needs of approximately US$3.2 billion, far exceeding available funding (Section B.5). Capital markets are shallow, Thimphu Thromde lacks borrowing capacity, farebox revenues cannot finance capital investment, and water revenues barely cover operational costs. Commercial financing at around 13.5% over 7 years produces an FNPV of negative $13.25 million for the BRT, confirming it is not viable without concessional support (Section B.5). Other potential sources, including ADB, JICA, UNDP, and SAARC, have allocated their financing for Bhutan to other projects. Without GCF support, the transport fleet defaults to diesel, climate-resilient water infrastructure remains unfinanced, and pedestrian investments would not proceed.

Need for Strengthening Institutions and Implementation Capacity

142. Institutional weaknesses compound physical vulnerability. Water services lack utility-style management and data infrastructure for climate-informed operations, and CBS lacks the structure to plan and finance fleet renewal. Neither sector systematically integrates gender, disability, or climate risk into service design (Feasibility Study, Chapter 5). Component 2 addresses these gaps through CBS's SOE transition, a ring-fenced Water and Wastewater Services Division with SCADA-based management, and embedded technical assistance, building capacity to sustain and replicate climate-resilient service delivery.

D.5. Country ownership (max. 500 words, approximately 1 page)

Alignment with National Climate Strategy and Existing Policies

143. LRCP is fully aligned with Bhutan's 2021 NDCs, which identify surface transport decarbonization as one of four priority focus areas and climate-resilient water services as a key investment priority, and with the 2023 NAP, which calls for reducing water system losses, ensuring reliable service delivery, and enhancing infrastructure resilience. LRCP operationalizes these commitments through a suite of national and local instruments, including the Low Emission Transport Master Plan (LETMP), the 2021 Low Emission Development Strategy for Transport, the Water Sector Master Plan (WSMP), the Thimphu Structure Plan, and the City Core Action Plan. All project activities are embedded within Bhutan's 13th Five-Year Plan (2024‑2029).

Local Asset Ownership and Institutional Capacity

144. All project assets will be owned by local entities with public service mandates. Water infrastructure will vest in Thimphu Thromde (TT), responsible for municipal water and wastewater delivery, while the electric bus fleet, terminals, depots, and intelligent transport systems will transfer to the City Bus Service (CBS), which holds the mandate for low-emission public transport in Thimphu.

145. Component 2 builds the capacity of TT and CBS to sustain and scale these investments. For TT, this means establishing a ring-fenced Water and Wastewater Services Division with SCADA-based asset management, capacity support through embedded consultants, and cost-recovery tariff reform. For CBS, it means supporting the transition to a State-Owned Enterprise under a Public Service Agreement framework with embedded operational support and financial planning capacity. Both reforms are designed to enable TT and CBS to independently deliver climate-resilient services after project completion and provide replicable models for other Thromdes and urban centres (see Section B.4). A January 2024 bus priority corridor pilot demonstrates early government commitment to de-risking implementation, and a Project Steering Committee (PSC) chaired by MoIT with representation from MoF, TT, CBS, and the Bhutan Construction and Transportation Authority provides high-level governance (see Section B.4).

Role of the National Designated Authority

146. Bhutan's NDA to the GCF is the Ministry of Finance (MoF). The NDA serves as the primary interface between the RGoB and the GCF, communicating national climate priorities, providing strategic direction to GCF programming and planning, and endorsing projects for submission to the Fund. For

LRCP, the NDA has issued the No Objection Letter (NOL) confirming that LRCP is consistent with Bhutan's national climate strategies and country-driven priorities.

Engagement with Civil Society and Relevant Stakeholders

147. Stakeholder engagement has been central to LRCP's design and will remain integral throughout implementation, encompassing urban residents, transport users, water-stressed communities, women, youth, persons with disabilities, civil society organizations, and private sector actors. The engagement approach is formalized in the Stakeholder Engagement Plan (Annex 7) and Environmental and Social Management Plan (ESMP). Gender-responsive participation is governed by the Gender Assessment and Action Plan (Annex 8, Sections 2 and 3), covering inclusive engagement of women and marginalized groups across planning, implementation, and monitoring. A project-specific Grievance Redress Mechanism will ensure transparent recourse for all affected persons, and the SEA/SH Prevention and Response Action Plan (Annex 8, Section 7) addresses gender-based violence and harassment risks.

D.6. Efficiency and effectiveness (max. 500 words, approximately 1 page)

Alignment with GCF's Efficiency and Effectiveness Criteria

148. The LRCP is designed to deliver high-impact outcomes in transport decarbonization, resilient and low-emission urban infrastructure, and urban water resilience through a cost-effective and financially sustainable investment approach. The proposal demonstrates strong economic returns, strategic use of concessional finance, and operational efficiency in both capital and non-financial terms.

Cost-Effectiveness and Economic Efficiency

149. The economic and financial modelling for LRCP underscores its cost-effectiveness and strong value for money: Transport investments demonstrate an ENPV of US$26.5 million and an EIRR of 22.9% (with high GHG Benefits). Water sector investments also show strong viability with an EIRR of 19.07% and an NPV of economic benefits of US$3.06 million.

150. The project avoids damages of about $64.14 million from flood impacts by reducing exposure of residential, non-residential, and infrastructure assets within the settlement zone. In addition, the transition from private cars to electric buses shields beneficiaries from oil price volatility while generating clean air co-benefits valued at $2.2 million, reflecting avoided health and environmental costs associated with reduced vehicle emissions.

151. GCF support is critical for project viability. For component 1.3 – Modal shift investments to low emission transport, the Financial NPV (FNPV) is US$0.41 million with GCF funding, but would be US$-13.25 million without GCF funding, clearly demonstrating the financial feasibility gap addressed by concessionality. This outcome is particularly significant in a resource-constrained context like Bhutan.

Financial Sustainability and Revenue Generation

152. The financial modelling confirms that the urban transport system—specifically the City Bus Service—can achieve long-term financial sustainability: annual farebox revenue for the "With project" scenario is estimated to significantly increase to US$5.03 million by 2050, supporting future capital expenditures without additional government or donor financing.

153. In the water sector, efficiency gains from reducing leakages and improving asset management will reduce operational costs and defer capital-intensive expansion, with the project aiming to reduce Non-Revenue Water (NRW) from over 50% to 25%.

Appropriateness of Concessionality and GCF Role

154. GCF concessional finance plays a catalytic role. Without it, the City Bus Service would likely revert to diesel-powered fleet replacements and bus mode share would remain low, undermining Bhutan's NDC targets. The total GHG emission reduction over 2029 to 2048 is estimated at 69,519 tCO_2eq. It should be

noted that this is a very conservative estimate; actual emissions reduction will be closely monitored and is likely to be higher.[38]

155. The total, undiscounted cost of carbon abatement through the public transport activities (Subcomponent 1.2c, 1.2e, 1.3, and 2.2a-h which have a total GCF cost of USD 21 million) is estimated at USD 301.93/tonne CO_2, based on GHG reductions of 69,519 tCO_2 between 2029 and 2048. This is on the higher end compared to similar BRT projects, reflecting Thimphu's relatively small population (virtually all comparable projects have been undertaken in cities at least 20x more populous), which inherently limits the potential scale of absolute GHG emissions reduction, even with a large modal shift, and means a higher cost of infrastructure per passenger. The marginal cost of abatement, based on NPV of net costs (accounting for benefits such as travel time savings, reduced vehicle operating costs, and improved safety), is US$ -119/tCO_2, reflecting the project's considerable benefits beyond GHG emissions reduction.

156. The structure of concessionality (GCF grants: US$22.4 million, concessional loans: US$5.6 million) is appropriate. Grants are allocated to investments with significant public-good and adaptation benefits (e.g., Component 1.2 "Improved pedestrian infrastructure" receives US$6.7 million in GCF Grants). Concessional loans support components with partial cost-recovery potential, such as electric buses (e.g., Component 1.3 receives US$5.6 million in GCF Loans). This reflects the minimum blend required to achieve feasibility and affordability.

Use of Non-Financial Best Practices and Operational Efficiency

157. The project incorporates global best practices, drawing on international case studies for urban and transport design. In water, it focuses on smart optimization of existing assets, including SCADA systems for real-time monitoring and targeted upgrades. Behavioral change is also promoted, with strategies to reduce household water use from 135 to 100 liters per person/day.

Conclusion

158. LRCP represents a highly efficient and effective investment, delivering strong economic returns, leveraging GCF concessionality to crowd in co-finance, and maximizing impact through operational excellence and global best practices.

[38] See *Annex 22: Assessment of GHG Emissions Reduction & MRV* for more detail, including a sensitivity range under different assumptions. This central estimate uses conservative parameters on mode shift, bus occupancy and diesel bus efficiency.

CAL FRAMEWORK

*This section refers to the project/programme's logical framework in accordance with the **GCF's Integrated Results Management Framework** to which the project/programme contributes as a whole, including in respect of any co-financing.*

E.1. Project/Programme Focus

Please indicate whether this proposal is for a mitigation or adaptation project/programme. For cross-cutting proposals, select both.

☒ Reduced emissions (mitigation)

☒ Increased resilience (adaptation)

E.2. GCF Impact level: Paradigm shift potential (max 600 words, approximately 1-2 pages)

Assessment Dimension	Current state (baseline)		Potential target scenario (Description)	How the project/programme will contribute (Description)
	Description	Rating		
Scale	Thimphu's public transport system is almost entirely fossil-fuel-dependent. Moreover, the unreliability of the bus system, combined with safety concerns and limited accessibility means that private cars are increasingly favoured by the population to travel into the city, exacerbating emissions from the transport sector. Thimphu's water supply system is fragmented, with aging infrastructure, high levels of NRW, and limited resilience to climate impacts such as landslides, droughts, and flooding. Water availability is uneven across the city and many neighborhoods experience only intermittent supply. Digital monitoring and adaptive management systems are largely absent.	Low	Paradigm shift lies at the core of the project transport objective which seeks to encourage a modal shift from private vehicles to public and non-motorised transport in Bhutan. This will be reinforced by an evidence-based approach to planning and managing the development of Bhutan's cities and public transport system towards long-term benefits, climate resilience, and economic development, while also mobilising investment for low-emission transport and associated infrastructure. Under the Water Master Plan, Thimphu aims to achieve universal climate-resilient water services which are continuous and optimize the use of treated water.	The LETMP sets out eleven strategies for implementing a low-emission transport system for Thimphu, which will be incorporated into the Thimphu Structure Plan, but which are all relevant to the development of transport networks in other cities in Bhutan. The project will use a combination of push and pull factors that will incentivise the use of low-emission public transport modes. LRCP will enhance the climate resilience of the entire water supply chain – from intake to distribution – by upgrading infrastructure, reducing NRW, installing SCADA systems, and enhancing institutional capacity. These actions will ensure reliable 24/7 supply even under extreme climate conditions and enhance equity across neighborhoods.

				Capacity building will also ensure that investments fully mainstream climate resilience, such that road, public transport, NMT and water infrastructure are resilient to changing climate hazards.
Replicability	Low-emission alternatives for public transport and halting the rapid emissions growth in the transport sector have not yet been implemented for Thimphu, nor indeed Bhutan as a whole. Water services have developed in an ad hoc manner, using inconsistent technologies and facing severe service gaps. There is no structured model for modern, climate-resilient water utilities in Bhutan. Institutional structures lack autonomy and dedicated financing.	Low	There is potential for replication of the LRCP model to other areas of Bhutan, as well as other countries in the region. Many of the challenges to improving bus services and non-motorized transport in Thimphu are common throughout the South Asia region – such as the combined need for increased physical capacity on the bus network, institutional reforms, stronger service delivery approaches, and infrastructure development. The proposed project therefore offers opportunities for both demonstration impact and potential replication in a region where emissions from urban transport are a globally significant issue. Most notably, Thimphu's scale offers the potential to demonstrate a transformational step change in urban transport in an environment where cause and effect are readily identifiable and governance risks to the program are relatively low. LRCP will establish a model structure with ring-fenced budgeting, performance-based contracts, and digital monitoring. This will form a replicable institutional and operational model for other Bhutanese cities. Improved data systems and the use of SCADA will generate insights for replication.	The technical assistance provided through the project will support the process of planning and scaling a similar approach in other cities, and LRCP will result in the City Bus Service becoming an efficient transport operator that is fully accountable for the services it provides under Public Service Agreements with other *thromdes*. Similarly, the performance contract for private sector maintenance of the systems and plants is replicable in other urban areas. The project will institutionalize planning and budgeting processes for climate-resilient services, including the creation of a municipal water and wastewater division. The introduction of private sector expertise and digital platforms will provide proof of concept for other urban areas. The project will also support inter-municipal learning and capacity-building to support scale-up.

Sustainability	Efforts towards the modal shift are embedded in multiple policies that have been developed to ensure that Bhutan's development pathway is responsive to changing demands in the transport sector to prevent the proliferation of unsustainable transport modalities and maladaptation to climate change that would prevent the country from achieving its net-zero ambitions. Thimphu's water supply system suffers from weak institutional capacity, with water services managed by an under-resourced municipal unit lacking structured mandates and modern tools. Maintenance is reactive and there is limited capacity to manage shocks or disruptions caused by climate variability.	Medium	The increase in fare box revenues from the higher passenger numbers without an unaffordable increase in bus fares or government subsidies, means that CBS will be able to finance the continued increase in bus capacity and to replace the remaining diesel bus fleet at the end of its economic life, without long-term dependence on GCF concessionary finance. The city will have a dedicated municipal water and wastewater division with improved technical expertise, clear operational mandates, and the ability to manage climate-related risks. Infrastructure will be climate-resilient, minimizing downtime during extreme weather events.	The project will elicit a modal shift in transport demand in favour of public transport and NMT options in Thimphu and, eventually, other cities in Bhutan. The project also provides an opportunity to introduce zero emission buses to these services which can then be applied nationally, taking advantage of Bhutan's surplus of electricity from renewable sources. The project also allows RGoB to fulfil its commitment to protect the natural environment by reducing air and waterborne pollution. The project will create a durable shift in how urban water systems are managed - moving from reactive, ad hoc responses to a structured, climate-resilient, and technology-enabled service model. These improvements will ensure that water systems remain reliable and adaptive long after the project ends, embedding sustainability in both institutions and infrastructure.

E.3. GCF Outcome level: Reduced emissions and increased resilience (IRMF core indicators 1-4, quantitative indicators)						
GCF Result Area	**IRMF Indicator**	**Means of Verification (MoV)**	**Baseline**	**Target**		**Assumptions / Note**
				Mid-term	**Final**[39]	
MRA2 Low-emission transport	Core 1: GHG emissions reduced, avoided or removed/sequestered	*Ex-ante and ex-post periodic analyses (conducted by a third-party contractor)*	*0 tCO_2eq*	*3,818 tCO_2eq*	*11,339 tCO_2eq (by project end)* *69,519tCO2eq (over 20 years)*	*The energy supply for bus charging infrastructure remains dominated by renewable sources. Push policies are introduced to reinforce the target modal shift.*
ARA3 Infrastructure and built environment	Core 2: Direct and indirect beneficiaries reached *[Transport & Public Space interventions – Comp. 1.2-1.3]*	*CBS's smartcard data on bus users* *Periodic surveys* *Project M&E reports*	*0*	*Direct: 61,652 (52,956 unique)* *Female: 48.5%* *Indirect: 315,600* *Female: 156,066*	*Direct: 72,448 (52,117 unique)* *Female: 48.5%* *Indirect: 313,013* *Female: 155,522*	*NMT/road infrastructure is well-maintained and remains accessible* *Bus fares remain affordable for the majority of citizens* *Notes:* *Direct beneficiaries are city bus and NMT users; tourists/visitors to Thimphu will indirectly benefit.* *For Core 2, overlap exists between beneficiaries of transport and water adaptation interventions.* *Both non-unique and unique direct beneficiary targets are presented here. See attached Adaptation Beneficiary analysis for detailed approach to avoiding double counting.*

[39] The final target means the target at the end of project/programme implementation period. However, for core indicator 1 (GHG emission reduction), please also provide the target value at the end of the total lifespan period which is defined as the maximum number of years over which the impacts of the investment are expected to be effective.

ARA2 Health, well-being, food and water security	Core 2: Direct and indirect beneficiaries reached *[Water supply interventions – Comp. 1.1]*	*SCADA system data on supply hours and pressure* *Survey data*	*0*	*Direct: 25,001 (16,305 unique)* *Female: 48.5%* *Indirect: 318,232* *Female: 157,342*	*Direct: 52,046 (31,715 unique)* *Female: 48.5%* *Indirect: 323,988* *Female: 160,134*	*Beneficiaries are currently underserved core city residents gaining access to treated piped water for at least 12 hours/day throughout the dry season and 15 hours/day otherwise (see Adaptation Beneficiaries analysis for calculations); measures resilience to climate change-exacerbated water scarcity.* *Assumptions: successful SCADA rollout, improved infrastructure resilience, adequate staffing of the new water division; water charges remain affordable for poorer households and unauthorised connections are eliminated* *For Core 2, overlap exists between beneficiaries of transport and water adaptation interventions.* *Both non-unique and unique direct beneficiary targets are presented here. See attached Adaptation Beneficiary analysis for detailed approach to avoiding double counting.*
ARA3 Infrastructure and built environment	Core 3: Value of physical assets made more resilient to the effects of climate change and/or more able to reduce GHG emissions	*Economic and Financial Analysis* *Engineering design and construction documentation*	*US $0*	*Value of physical assets made resilient: US$ 25.73 million*	*Value of physical assets made resilient: US$ 45.45 million*	*Please see Flood risk assessment in Annex 3 for a detailed breakdown of this calculation. Incremental cost of resilience is based on detailed engineering studies that provide estimates of typical cost factors for resilience measures and project budget estimates.*

E.4. GCF Outcome level: Enabling environment (IRMF core indicators 5-8 as applicable)

Core Indicator	Baseline context (description)	Rating for current state (baseline)	Target scenario (description)	How the project will contribute	Coverage
Core Indicator 5: Degree to which GCF investments contribute to strengthening institutional and regulatory frameworks for low emission climate-resilient development pathways in a country-driven manner	RGoB has developed a range of policy frameworks and environmental commitments in the transport and water sectors with the support of DFIs but will need to adopt regulatory, fiscal, institutional and enforcement measures to monitor and implement them. It will also need to plan an effective communications strategy to change behaviours.	*medium*	CBS, MoIT, and TT have the necessary capacity and skills to procure investments in the built environment and to develop low-emission transport systems in Bhutan that are responsive to needs and operate in line with nationally accepted standards. MoIT and TT have strengthened institutional and regulatory frameworks to ensure climate-resilient water supply systems in Thimphu. The Thromde demonstrates enhanced capacity for planning, budgeting, and implementing climate-resilient infrastructure aligned with national strategies like the CCAP and NAP, fostering sustainable urban service delivery and development.	The project will establish CBS as an efficient state-owned enterprise and provide the necessary training to build institutional capacity. MoIT will facilitate agreements for the extension of CBS services to other Thromde and develop national standards for ITS smartcard payment systems, and transit-oriented development. TT will introduce private sector operators under performance contracts to the management and operation of water services. The project will strengthen Thimphu Thromde's service delivery through capacity development for climate-resilient planning, and stakeholder communication strategies.	*National level (one country)*

Core Indicator 6: Degree to which GCF investments contribute to technology deployment, dissemination, development or transfer and innovation	The project presents an opportunity to utilise state-of-the-art technology to improve the user experience of public transport and for the operators to manage water services reliably and efficiently. Current bus services use ICE vehicles and inadequate maintenance facilities with a poor record of reliability. Although improving, the use of smartcards and the provision of online information is basic. Digital monitoring and adaptive management systems are largely absent, contributing to the haphazard management of water services.	*low*	Bus services in Bhutan will transition to the use of e-buses, supported by digital solutions for scheduling, monitoring, ticketing, and customer information, with robust charging infrastructure in place. Services will be scheduled to meet customer demand and be cleaner, safer, and more reliable. Thimphu will establish an integrated SCADA system covering the municipal water network in the core city. This system will enable real-time monitoring of leaks, water pressure, and consumption patterns, allowing for timely operational responses, improved water conservation, and resilience to climate-induced shocks. Response to disasters will be improved through better risk assessment and data collection, and training.	The project will result in effective systems for e-bus operations in Thimphu, providing charging infrastructure, ITS and MIS systems that will improve the efficiency and reliability of bus services. The project will directly finance the deployment of a SCADA system across the water distribution network. Capacity-building programs will ensure municipal staff and private contractors are trained in the use, maintenance, and interpretation of the data. The project also supports performance-based contracts with private sector operators that incentivize the use of smart technology for operational efficiency.	*Single sub-national area within a country*

E.5. Project/programme specific indicators (project outcomes and outputs)					
Project/programme results			***Baseline***	***Target***	

(outcomes/ outputs)	*Project/programme specific Indicator*	*Means of Verification (MoV)*		*Mid-term*	*Final*	*Assumptions/note*
Outcome 1: Urban water services in the project area will become more reliable and more resilient to climate hazards, especially drought, flooding, and rainfall-triggered landslides	Reduced water losses in city core distribution network, reflecting reduced vulnerability to climate-driven resource and infrastructure stress	Reports generated from SCADA monitoring system	Over 50% water losses	Down to 35% water losses in city core	Down to 25% water losses in city core	This indicator measures reduced vulnerability to, among others, drought-induced scarcity and flood- or landslide-related pipe damage.
Output 1.1a: Climate-resilient water and supply infrastructure and distribution networks are established and operational	Increased supply hours, maintained consistently across seasons including during the dry season and other climate stress periods	Reports generated from SCADA	3-9 hours/day in city core	Minimum 10 hours/day throughout year	15 hours/day (with a minimum of 12 hours/day maintained throughout the dry season)	Measures reduced vulnerability to climate change-exacerbated drought/water scarcity. Dry season is December through February.
Output 1.1b: Climate-informed decision-making systems and operational control mechanisms are established and functioning in water supply operations	Percentage of distribution network covered by real-time SCADA monitoring, enabling automated detection of leakage and anomalous pressure or flow conditions caused by floods, landslides, or drought-related stress demands	Reports generated from SCADA	0%	75%	100%	This will support reduced hours of infrastructure downtime (non-performance or underperformance) during shocks.
Outcome 2: Climate-resilient urban mobility infrastructure in the project area encourages a shift from private vehicle use	Percentage peak-period modal shift from private vehicles to public	CBS smartcard data Pedestrian and traffic surveys	2023 traffic survey by technical consultants and	Bus mode share increase to 15%	Bus mode share increase to 20% by 2031 (25% by 2047)	Assumptions: Improvements to services and infrastructure, including the introduction of priority bus lanes and improved accessibility, will serve as

toward walking and non-motorized transport	and non-motorised transport[40]		analysis of smartcard data Private vehicles accounted for 48.8% of commuter mode share, and walking 22%, in 2019; bus accounted for roughly 8% in 2023[41]	Walk mode share maintained	Walk mode share maintained	sufficient pull factors towards public and non-motorised transport, while complementary policies such as restrictions on parking create sufficient push factor to discourage private vehicle use. Modal share targets are for city as a whole.
Output 1.2: Climate-resilient pedestrian access and public realm infrastructure are established	Length of improved urban placemaking and NMT infrastructure, with SuDS and roadside drainage installed and verified as operational by site inspection	Construction reports Site Surveys; site inspection reports; post-rain site assessments conducted by PIU engineers	0 km	6 km	12 km	This includes investments in Norzin Lam as well as improvements along the Bus Priority Corridor.
Outcome 3: Climate-resilient and low-emission urban passenger transport in Thimphu encourages a shift from private car use toward electric public transport, maintains reliable mobility under climate stress, and reduces GHG emissions from the transport sector.	GHG emissions reduced, avoided or removed/sequestered through modal shift to public transport	Ex-ante and ex-post periodic analyses conducted by a third-party contractor)	0 tCO_2eq	3,818 tCO_2eq	11,339 tCO_2eq (69,519 tCO_2eq by 2048)	Bus Priority corridor operation expected to begin 2029 (midterm year)
	Average number of flood or landslide-related closure or restriction days on the Bus Priority Corridor per year	Thimphu Thromde and/or CBS records	TBD[42] (days)	25% reduction from baseline	50% reduction from baseline	BPC civil works including climate resilience measures expected completion by midterm

[40] This indicator contributes to both Outcomes 2 and 3. It is measured under Outcome 2 to ensure that the matrix remains easy to follow.
[41] Baseline will be updated at project inception.
[42] Baseline to be established at project inception.

Output 1.3 Climate-resilient and low-emission public transport system is established and operational	Direct users that benefit from improved access to low-emission, climate-resilient transport infrastructure and services	CBS smartcard data; passenger surveys	0	61,652	72,448	Includes bus and NMT users.
Outcome 4: the institutions responsible for water and public transport will have enhanced capacity to operate, maintain, finance, and replicate climate-resilient and low-emission urban systems	Thimphu Thromde demonstrates improved water service management	Annual maintenance plans Documented disaster and emergency response protocols tested at least annually Annual business plans and budget submissions Consultant progress reports	No formal maintenance strategies, emergency response protocols, or integrated technical and financial planning processes in place	Division prepares maintenance strategy and business plan with embedded expert support; begins implementation of emergency response protocols and budgeting processes	Division regularly prepares and applies maintenance strategies, emergency protocols, business plans, and budgets to guide climate-resilient water service management with reduced external support	
	City Bus Service (CBS) is equipped with internal systems and staff capacity to support State-Owned Enterprise (SOE) operations	CBS annual business plans Internal financial reports and accounting records Documented Standard Operating Procedures (SOPs) for service delivery Consultant progress reports	CBS lacks internal business planning, financial reporting, and appropriate service operations procedures	CBS has developed and piloted at least two core internal systems — such as an annual business plan and internal financial reporting tools — with support from embedded consultants, and has begun applying them in	CBS independently prepares and uses annual business plans, financial reports, and operating procedures to manage service delivery	

				day-to-day service planning and management		
Output 2.1: Institutional systems, tools, and capacities are strengthened to independently and sustainably deliver climate-resilient water services and plan future investments	Number of municipal staff trained in SCADA use, climate-resilient planning, and emergency response	Training reports; Attendance records; Staff feedback	No structured training program	All staff trained across operations and management	Continuous training with refreshers	
Output 2.2: City Bus Service is in a position to operate as an SOE with national mandate to sustainably operate low-carbon public transport supports its expansion to other cities	Non-fare revenue as a share of CBS operating costs	CBS financial reports	<5%	5%	≥10%	Political support for SOE model continues and PSA accountability is maintained Advertising, leasing, and retail partnerships are successfully implemented Further e-bus services funded under 13FYP and services introduced in other urban areas and for some inter-urban routes
Co-benefit: Improved household hygiene and health	Percentage of households in target areas experiencing reliable daily access to piped water supply (≥15 hours/day; ≥12 hours/day during dry season), contributing to improved household hygiene and health	Household survey (baseline and endline) Thimphu Thromde water supply performance reports SCADA system logs (if disaggregated data available)	Appx. 17%[43]	Increase of 42 percentage points from baseline	Increase of 83 percentage points from baseline	

[43] Estimated based on data in Water Supply Masterplan (2023) – see Adaptation Beneficiaries analysis. To be confirmed at project inception

Co-benefit: Improved air quality and reduced pollution	Concentration of PM2.5, NOX, and SO2 in Thimphu	Permanent roadside monitoring stations	TBD[44]	Baseline minus 6%	Baseline minus 16%	A modal shift to public transport will decrease the number of vehicles per passenger-km travelled, which – along with electrification of bus fleet – will reduce emissions and noise pollution.

E.6. Project/programme activities and deliverables

Activities	Description	Sub-activities	Deliverables
1.1: Strengthening water supply systems to support resilient water services	These activities strengthen the resilience of Thimphu's water supply system against the increasing climate risks of drought, flooding, and rainfall-triggered landslides. Raw water intake infrastructure at key stream sources will be upgraded to function reliably under both flood and drought conditions, reducing the risk of service failure during extreme hydrological events. Vulnerable hill slopes and transmission line corridors will be stabilized against erosion and landslide risk, protecting supply continuity during high-rainfall events. Water treatment plant operations and transmission routing will be reorganized to optimize storage and distribution across DMAs, improving supply equity and continuity including during prolonged droughts. Non-revenue water losses along Norzin Lam and the transport corridor will be reduced through replacement of deteriorated mains, active leakage control, and installation of smart meters, advanced pressure valves, bulk water meters, and flow meters, conserving scarce resources and improving service reliability under increasing climate stress. The SCADA system will be installed to monitor the performance of water and wastewater treatment plants. It will also be integrated into the DMAs (District Metered Areas) around Norzin Lam and the transport corridor, including components like bulk meters and pressure relief valves. This system will enable accurate monitoring of capacity utilization and actual demand, and help Thromde forecast future demand for planning upgrades.	a) Installation of SCADA system to monitor the performance of water and wastewater treatment plants and key components of the distribution network across the city core DMAs, enabling real-time monitoring, leak detection, and hydraulic analysis b) Improve 2 raw water intake systems to function effectively under extreme climatic conditions, with structural improvements to sediment handling and flow control c) Slope stabilization and erosion-control measures along 4 vulnerable transmission corridors (1 raw water and 3 treated water), covering 297 m of raw water transmission lines and 3.6 km of treated water transmission lines, with improvements at 37 points including 12 retaining wall sites, 8 slope stabilization sites, 15 pipe anchoring sites, 1 drainage work site, and pipe replacement at 1 site, to reduce the risk of landslide-related service interruptions d) Reorganize WTP operations and transmission routing to optimize storage and distribution across DMAs, improving the equity and continuity of supply including during prolonged droughts	Operational SCADA system across the city's DMAs enabling real-time performance monitoring, leak detection, data-driven network planning, and changes in system downtime Climate-resilient intake infrastructure at 2 key stream sources supplying the city, reducing the risk of service failure during hydrological events Stabilized transmission corridors at 37 improvement points along 4 corridor lengths (297 m raw water; 3.6 km treated water), protecting key water supply routes Improved distribution management supporting more consistent and equitable service delivery

[44] Baseline to be established at project inception following installation of monitoring equipment.

		e) Upgrade the distribution network along Norzin Lam and the transport corridor to reduce NRW through replacement of deteriorated water mains, active leakage control, and installation of approximately 7,900 smart meters (residential and commercial), coordinated with the street and sidewalk works under Sub-component 1.2	Upgraded distribution network in the project area with smart metering, contributing to the project's target of reducing NRW from over 50% toward 25%
1.2: Improving the resilience and convenience of sidewalks, footpaths, and passageways to encourage non-motorized transport	Improvements to connecting building alleys and footpaths in Norzin Lam and upgraded sidewalks along the bus priority corridor will together improve pedestrian safety, accessibility, and first- and last-mile connectivity to public transport, directly supporting the modal shift away from private vehicles that underpins the project's mitigation ambition. Continuous cable ducts installed beneath sidewalks will support real-time passenger information displays and lighting at bus stops, enhancing the reliability and attractiveness of public transport under all weather conditions. A traffic circulation and management plan for central Thimphu will prioritize pedestrians and public transport while enabling emergency and delivery access. Roadside drainage will be improved and linked to Sustainable Drainage Systems to enhance stormwater management and reduce the risk of flooding.	a) Removal of high kerbs, obstructions, and hazards on footpaths and improvements to the amenity of the area with improved street furniture b) Improvements to sidewalks and connecting paths along the bus priority corridor, constructed to universal access standards c) Provision of continuous cable ducts under the sidewalks for connecting the display boards at bus stops, including spare ducts for any subsequent communications cabling. Provision of electrical power to each bus stop for lighting and information displays d) Implementation of a comprehensive traffic circulation and management plan for the central area, which allows for access by emergency services and for deliveries but prioritizes pedestrians e) Improving roadside drainage along the bus priority corridor and Norzin Lam and connecting the stormwater drains to Sustainable Drainage Systems (SuDS) to	Completed 1.3 kilometre pedestrianization scheme for Norzin Lam supporting walking, urban placemaking, and climate-resilient city-centre mobility Upgraded, climate-resilient sidewalks and connecting paths along the bus priority corridor, constructed to universal access standards Continuous cable ducting installed along corridor sidewalks with power connections established at all 75 bus stops Traffic Circulation and Management Plan for the central area implemented Improved roadside drainage and functioning SuDS installations along the corridor and Norzin Lam

		slow run-off and filter stormwater before discharge	
1.3: Investments toward a modal shift to low-emission public transport	The project will deliver an 18.9 kilometre bus priority corridor with dedicated bus priority lanes in both directions, two new bus terminals, upgrades to the city centre depot with electric bus charging infrastructure, junction improvements, and installation of 75 new bus bays and shelters, together creating the infrastructure conditions for a sustained modal shift from private vehicles to public transport. An initial tranche of 50 electric buses will replace the oldest diesel vehicles in the fleet, reducing transport emissions. An enhanced Intelligent Transport System with real-time journey planning, integrated e-ticketing, and a Management Information System will improve service reliability and passenger experience, reinforcing the attractiveness of low-emission public transport as the default mode of travel. Two bridges will be widened to accommodate the bus lanes and strengthened with scour protection and pier and abutment works to maintain corridor operability during flood and river erosion events. Finally, 23 signalized pedestrian crossings will be installed near bus stops to improve safety and support active travel.	a) Provision of an 18.9 km bus priority corridor with dedicated bus priority lanes in both directions, bus bays, and 75 bus shelters, widening of two bridges to provide for the bus lanes, and the construction of pier and abutment protection in the rivers to prevent bridge scour and provide greater resilience to extreme climate events b) Purchase an initial tranche of 50 e-buses to provide additional capacity for higher-frequency trunk services as the first stage to a zero-emission public transport system c) Construction of two new bus terminals (at the northern and southern ends of the corridor) and upgrading of the central bus depot, all equipped with charging infrastructure for e-bus operations (20 charger units across the three sites) d) Procure ITS and MIS for live information on bus services and for service reliability, including a control room, passenger information screens at 75 bus shelters, in-bus terminals, and a pre-payment system e) Installation of 23 signalized pedestrian crossings near bus stops for the safety and convenience of pedestrians and bus passengers	Continuous 18.9 km bus priority corridor with dedicated lanes, 75 shelters, and resilient corridor infrastructure improving service speed, reliability, and climate robustness Fleet of 50 electric buses ready for service on the corridor Two new bus terminals and an improved central depot with 20 DC fast chargers and the infrastructure needed for e-bus operations Operational ITS/MIS system improving service reliability and passenger information 23 signalized pedestrian crossings installed near bus stops along the corridor
2.1: Capacity building and institutional strengthening for resilient and sustainable water and urban service delivery	This activity builds the institutional capacity needed to manage Thimphu's water system on a resilient and financially sustainable basis, ensuring that the infrastructure investments under Sub-component 1.1 translate into durable improvements in service reliability under increasing climate stress. A ring-fenced Water and Wastewater Services Division will be established within Thimphu	a) Establish a ring-fenced water and wastewater services division within Thimphu Thromde	Functional, ring-fenced water and wastewater services division established within Thimphu Thromde; first annual business plan and financial accounts endorsed by TT

	Thromde with its own budget, staff, and accountability mechanisms. Embedded international consultants will introduce SCADA-informed network management, prepare climate-resilient annual maintenance and capital investment plans, and build internal WSD capacity to operate and maintain the system under drought, flood, and landslide conditions. Digital billing systems and cost-reflective tariffs will strengthen the financial sustainability needed to fund ongoing climate adaptation investments. Emergency response procedures for floods, GLOFs, and drought-related disruptions will be developed and tested, ensuring the WSD can maintain or rapidly restore service continuity following climate-related shocks. Technical assistance to MoIT will support the prioritization of climate-resilient water investments and the development of nationally consistent service standards. A communications strategy will promote water conservation in line with the Water Sector Master Plan target of 100 litres per capita per day. The project will also support the development and implementation of the Bhutan Land Information System (BLIS).	b) Commission and integrate the SCADA system into day-to-day WSD operations, calibrate the hydraulic model, and train WSD staff to use the system for network monitoring, leak detection, maintenance planning, and capital investment decisions c) Introduce utility-style network management practices including pressure zone management and a structured preventative maintenance programme, and prepare annual maintenance and capital investment plans for WSD and Steering Committee approval d) Support the introduction of billing systems and provide advice on tariffs that allow greater cost recovery for water supply and wastewater treatment to enable financial sustainability e) Establish processes for disaster and emergency responses to burst pipes, blockages, floods, and GLOFs f) Provide policy and technical support to MoIT on climate-resilient water investment priorities, private sector participation options in smaller Thromdes, and regulatory frameworks for nationally consistent service standards, including two policy-focused workshops with water sector specialists from other Thromdes and MoIT officials g) Develop and implement a water conservation and customer engagement communications strategy for the WSD,	management; documented training records for WSD staff Commissioned and operational SCADA system integrated across the city's DMAs; calibrated hydraulic model; documented evidence that WSD operators are trained and using the system in daily network management At least one annual maintenance and capital investment plan prepared and approved; documented pressure zone management procedures adopted by the WSD Operational digital billing system covering the WSD's customer base; tariff review report submitted to TT and RGoB Documented and tested emergency response and business continuity plan, formally adopted by TT Policy briefs and technical reports on water sector investment priorities and reform options delivered to MoIT; two policy-focused workshops with water sector specialists from other Thromdes and MoIT officials, held and documented Approved communications strategy; documented evidence of rollout including produced materials and outreach activities

2.2: Capacity building and institutional strengthening for resilient and sustainable transport service delivery	CBS will be established as a State-Owned Enterprise with a national mandate for urban and inter-urban transport, operating under Public Service Agreements with local Thromdes, providing the governance framework needed to embed low-emission public transport as the default mode of travel in Bhutan's cities. CBS will receive technical assistance to build the operational capacity, staff skills, and protocols required to manage an electric bus fleet reliably and efficiently, maximizing the GHG reduction potential of the e-bus investment. It will develop commercial strategies to diversify revenue streams and reduce dependence on public subsidy, strengthening the long-term financial viability of low-emission service delivery. Support will be provided for CBS and MoIT to formulate long-term, climate-resilient investment and maintenance plans aligned with the LETMP, ensuring the corridor infrastructure and fleet are maintained to a standard that sustains modal shift over time. A scalable ITS and integrated payment system will be designed, with national standards for ITS interoperability and smartcard payments developed, improving service reliability and passenger experience to reinforce public transport as a competitive alternative to private vehicles. The project will assess dedicated services and the commercial viability of inter-urban e-bus deployment to secondary cities to reduce peak congestion. A communications strategy will promote awareness of the environmental and health benefits of the new public transport system, supporting behavior change in favor of low-emission mobility.	a) Support CBS in its establishment as an SOE with a national mandate to develop low-emission public transport under PSAs with other Thromdes b) Provide technical support, advice, training and capacity building to CBS in the transition to the new bus services, and the introduction to service of the new e-buses, including training for drivers and customer service c) Support CBS in developing additional sources of revenue such as retail franchises at mobility hubs, advertising at bus stops and on buses, and bus leasing for private or commercial use d) Provide capacity-building support for the preparation of climate-resilient capital, financing, and maintenance plans for the transport network e) Providing technical assistance and institutional strengthening for prioritizing and implementing policies, strategies, and regulations in the LETMP and NAP (including parking restrictions and freight policies that will reinforce the modal shift) f) Develop national standards for ITS and smartcard payments. Finalize the specification of the ITS system upgrade and assist CBS with its installation, testing, and operation, and the use of survey and smartcard data to plan and improve services as appropriate	Legal instruments establishing CBS as an SOE; signed; first CBS annual business plan and financial accounts prepared under the new governance structure CBS staff trained in e-bus operations, maintenance, and customer care; documented readiness assessment completed following shadow operations; CBS operating scheduled e-bus services on the corridor under the PSA Revenue diversification strategy and associated implementation roadmap for CBS, Approved set of capital investment and asset management plans for the corridor infrastructure, bus fleet, and terminal facilities, endorsed by MoIT and the Project Steering Committee Policy briefs and draft regulations for priority LETMP measures, submitted to MoIT Commissioned and operational ITS/MIS system with CBS staff trained in its use; published national ITS interoperability and smartcard payment standards

		g) Analyze the potential for operators to provide dedicated services such as school buses to reduce peak hour demand for the scheduled services as part of the wider rationalization of services set out in Bhutan's LETMP and based on demand data, and evaluate the commercial viability of inter-urban e-bus deployment to secondary cities	Demand analysis report and policy options for integrating dedicated services with the CBS network, including assessment of inter-urban e-bus deployment options, submitted to MoIT
		h) Develop a communications and awareness campaign to inform Thimphu residents of the benefits of using public transport and NMT	Approved communications strategy endorsed by MoIT and CBS; documented record of outreach activities including produced materials and evidence of public engagement
		i) Develop and deploy the Bhutan Land Information System (BLIS), a unified platform integrating land registration, cadastre, public land management, and valuation data to improve disaster risk identification, strengthen natural resource management, and enable more informed government decision-making	Conceptual design of BLIS; procurement specifications for BLIS development; Developer Inception Report; BLIS Implementation Plan; BLIS quality report; Developer Final Report; and the fully functional BLIS deployed at the National Land Commission Secretariat (NLCS) / GovTech data center

E.7. Monitoring, reporting and evaluation arrangements (max. 500 words, approximately 1 page)

159. **The management and oversight arrangements for the implementation of the project will also be used to provide monitoring, evaluation, and reporting of the project against the expected outputs and outcomes, using the indicators described in the logframe**. A Monitoring and Evaluation officer will be appointed within the PMU in MoIT to define and coordinate the baseline data and periodic review and measurement of the indicators and site inspections defined in Section E5. The surveys, audits, reviews and site inspections will be carried out by independent third-party contractors as required by World Bank and GCF policies and procedures.

160. **The PMU in MoIT will produce consolidated quarterly interim financial reports summarizing activities and deliverables completed in the previous quarter, and any variance against the approved work plans and budgets, for the World Bank as AE.** This will include all public communications and consultation activities. The quarterly reports will also contain summaries of any surveys, inspections, or reviews that were due

under the M&E Plan in the previous quarter plus the summary reports from smartcard data on passengers carried and the permanent environmental monitoring to provide a time series of relevant data. A project risk register will be created and updated using a RAG rating.

161. **The Annual Workplan and Budget will report against the outturn of the previous year's workplan and budget, and progress against the Deliverables set out in the Workplan, the Logframe Indicators in this Funding Proposal, and the Environmental, Social, and Gender Management Frameworks**. The Annual Workplan will also include the most recent audited financial statements of CBS and the outturn against the Key Performance Indicators set out in the Public Service Agreement. There will be an annual audit of all expenditures against the GCF grant and IDA financing. All other RGoB expenditure will be subject to internal audit and CBS financial statements will be subject to the financial reporting standards that apply to SOEs in Bhutan.

162. **Within six months of the completion of the Works for Component 1, in addition to the quarterly summary reports, an Interim Report will evaluate the effectiveness of the procurement and implementation challenges for both suppliers and contractors.** The Interim Report will also cover the work to date on the institutional strengthening and capacity building activities. The report will assess the project's contribution to a paradigm shift in travel behaviours and water supply management in Thimphu and also plans to extend this nationally by creating the enabling environment in terms of policies and projects for both public transport and water service delivery. This section of the report will follow GCF's three-point scale rating and will include any additional evaluation and assessment activities. A Final Evaluation and Project Completion Report will be submitted to the AE at the end of the project.

163. **Evaluation Plan:** The project will undergo independent mid-term and final evaluations to assess performance, inform decision-making, and ensure accountability and to assess the project's effectiveness, impact, and sustainability in achieving its climate mitigation and adaptation outcomes. The scope covers all physical investments and institutional reforms across the transport and water sectors. The evaluations will assess the project's success in reducing GHG emissions, strengthening the climate resilience of infrastructure and beneficiaries, and institutionalizing a paradigm shift in urban service delivery. The evaluations will use a mixed-methods approach grounded in the project's M&E framework (Annex 11). This includes quantitative analysis of data from SCADA systems, smartcards, and traffic counts, alongside qualitative methods such as institutional capacity assessments, household surveys, and stakeholder interviews. Performance will be measured against the indicators in the project's logical framework and the GCF Integrated Results Management Framework (IRMF). A project-wide baseline will be established in Year 1. A mid-term evaluation will be conducted in Year 3 to allow for adaptive management, and a final evaluation will be completed at the end of the project to assess overall achievement of objectives. The Project Management Unit (PMU) will commission and oversee the independent evaluators. The final evaluation reports will be submitted to the Project Steering Committee, the World Bank, and the GCF.

ASSESSMENT AND MANAGEMENT

F.1. Risk factors and mitigations measures (max. 3 pages)

Please describe financial, technical, operational, macroeconomic/political, money laundering/terrorist financing (ML/TF), sanctions, prohibited practices, and other risks that might prevent the project/programme objectives from being achieved. Also describe the proposed risk mitigation measures. Insert additional rows if necessary.

For probability: High has significant probability, Medium has moderate probability, Low has negligible probability
For impact: High has significant impact, Medium has moderate impact, Low has negligible impact
Prohibited practices include abuse, conflict of interest, corruption, retaliation against whistleblowers or witnesses, as well as fraudulent, coercive, collusive, and obstructive practices

Selected Risk Factor 1

Category	Probability	Impact
Governance	Low	Medium

Description

- Failure or delay to establishing CBS as an SOE with powers to enter PSAs with thromde and for the MoIT PMU to procure buses and IT systems, and with governance arrangements for the preparation of annual business plans, budgets, and accounts.
- Poor coordination and project management between parties in implementing LRCP results in unforeseen delays in meeting the critical path deliverables and delays full implementation of the services

Mitigation Measure(s)

- Utilise project management planning and best practices, maintain risk registers and provide effective oversight of the process under project management support (discussed under Implementation Arrangements)
- Provide TA from Component 2.2(a) in the preparation of the legal documentation and preparation of a PSA.

Selected Risk Factor 2

Category	Probability	Impact
Technical and operational	Low	Medium

Description

- CBS lacks the resources and experience to prepare procurement documents for the e-buses and ITS and to manage the procurement process. CBS is not able to prepare for the implementation of LRCP services in recruiting and training drivers, mechanics, and administrative staff in time to deliver the additional services because of a lack of resources, budgets, or experienced managers
- Lack of interest from suppliers and contractors results in an ineffective procurement process or poor value for money

Mitigation Measure(s)

- Provide support to the procurement unit in MoIT, and if needed MoF, and TA under project management support
- Provide support from the institutional strengthening budget in Component 2.2 Recruit or second experienced staff to CBS
- Ensure effective marketing of the opportunity through technical and trade channels, and provide potential bidders with good information and sufficient notice of the bidding timetable and process

Selected Risk Factor 3

Category	Probability	Impact
Technical and operational	Medium	Medium

Description

CBS lacks experienced data analysts to plan bus routes, schedules, and dedicated services from surveys, transport plans, and smartcard data to optimise the use of resources and meet demand and reliability targets		
Mitigation Measure(s)		
• Provide support from the institutional strengthening budget in Component 2.2(b) • Second or recruit additional staff and provide short-term budget cover		
Selected Risk Factor 4		
Category	**Probability**	**Impact**
Technical and operational	Medium	Medium
Description		
• Failure to retain staff with detailed knowledge of the technical design of the new PIU • TT is not able to recruit or retain experienced staff for the supervision of the range of construction activities and approval of detailed designs		
Mitigation Measure(s)		
• Senior management should prioritise staff retention in critical areas such as human resource planning and promotions • Provide support from the institutional strengthening budget in Component 2.1 and Component 2.2; second or recruit additional staff and provide short-term budget cover • Embedded consultant contracts will include knowledge transfer and documentation protocols to ensure institutional knowledge is captured and not lost with staff turnover		
Selected Risk Factor 5		
Category	**Probability**	**Impact**
Technical and operational	Low	Medium
Description		
Design standards for NMT infrastructure and legislation on maintaining Rights of Way are not completed in time for the procurement process		
Mitigation Measure(s)		
• Provide support from the policy strengthening budget in Component 2.2(e) and 2.2(f) • Sequence procurement to accommodate potential regulatory delays, ensuring that works not dependent on finalized standards can proceed in parallel		
Selected Risk Factor 6		
Category	**Probability**	**Impact**
Governance	Medium	Medium
Description		
· If parking restrictions, bus-lane compliance, and other demand-management measures are not enforced, the project may not achieve the intended modal shift *· This would reduce expected GHG reductions and limit the broader paradigm shift*		
Mitigation Measure(s)		
• Implement traffic circulation and management measures under Component 1.2(d) • Support policy implementation and enforcement under Component 2.2(e) • Strengthen behaviour change and public awareness under Component 2.2(i) • Reinforce inter-agency coordination under project management support		
Selected Risk Factor 7		
Category	**Probability**	**Impact**
Legal	Medium	Medium

Description
· Delays in completing enabling standards and regulations (e.g., NMT standards, Rights-of-Way requirements) can slow procurement and implementation, pushing back impact delivery
Mitigation Measure(s)
• Accelerate preparation of standards and regulations under Component 2.2(e) and 2.2(f) • Strengthen coordination and approval processes under project management support • Sequence procurement in line with regulatory readiness under project management support

Selected Risk Factor 8		
Category	**Probability**	**Impact**
Forex	Medium	Medium
Description		
· Inflation, foreign exchange pressures, and import restrictions can raise costs or delay procurement of imported equipment (e-buses, chargers, ITS/SCADA), affecting schedule and scope *· The need to import e-buses creates additional exposure, and any barriers to imports could hamper implementation*		
Mitigation Measure(s)		
• Undertake early procurement planning and packaging under project management support • Prioritize procurement of long-lead imported equipment under Component 1.3(b–d) • Include contingencies and flexible procurement strategies under project management support • GCF financing is denominated in USD, providing structural protection against BTN depreciation for the procurement of imported equipment • Contract for the procurement of e-buses, ITS, and SCADA equipment in hard currency where permissible under RGoB procurement rules		

Selected Risk Factor 9		
Category	**Probability**	**Impact**
Other	Medium	Medium
Description		
· Increasing floods, landslides, and extreme rainfall can disrupt construction and damage works-in-progress, delaying commissioning and early benefits		
Mitigation Measure(s)		
• Integrate climate-resilient design across water and transport investments under Component 1 • Strengthen supervision and contingency planning under project management support • Schedule construction of the most exposed works (intake structures, slope stabilization, and bridge works) outside of the peak monsoon season where feasible		

Selected Risk Factor 10		
Category	**Probability**	**Impact**
Reputational	Medium	Medium
Description		
· Even with improved services, travellers may not shift from private vehicles if service quality or demand-management measures are insufficient *· This weakens mitigation outcomes and risks underachievement of GHG reduction targets*		
Mitigation Measure(s)		
• Deliver high-quality and reliable public transport services under Component 1.3 • Implement complementary demand-management measures under Component 2.2(e) • Support behaviour change and user engagement under Component 2.2(i) • Monitor performance through ITS/MIS systems under Component 1.3(d)		

Selected Risk Factor 11		
Category	**Probability**	**Impact**
Legal	Medium	Medium
Description		
· If CBS's SOE/PSA governance and legal powers are delayed, service rollout and long-term sustainability could be compromised		
Mitigation Measure(s)		
• Support CBS establishment as an SOE and PSA development under Component 2.2(a) • Define governance, financial, and reporting frameworks under Component 2.2(a) • Align service rollout with institutional readiness under Component 1.3 and 2.2		
Selected Risk Factor 12		
Category	**Probability**	**Impact**
Technical and operational	Medium	Medium
Description		
· Shortfalls in recruiting and training drivers, mechanics, managers, or data analysts can reduce service reliability and frequency, weakening modal shift and GHG reduction delivery		
Mitigation Measure(s)		
• *Provide training and capacity building under Component 2.2(b)* • *Support operational readiness and transition to e-bus systems under Component 2.2(b)* • A structured shadow operations period is built into the project design, during which CBS will run services under PSA conditions before full rollout, ensuring staff readiness is verified and any gaps addressed before commitment to full service delivery		
Selected Risk Factor 13		
Category	**Probability**	**Impact**
Governance	Medium	Medium
Description		
· Weak coordination between MoIT PMU, Thimphu Thromde PIU, and CBS can cause critical-path delays and interface failures across civil works, utilities, and ITS deployment		
Mitigation Measure(s)		
• Strengthen coordination, planning, and oversight under project management support • Maintain integrated implementation schedules and reporting systems under project management support		
Selected Risk Factor 14		
Category	**Probability**	**Impact**
Technical and operational	Medium	Medium
Description		
· System integration failures, vendor dependence, or inadequate budgeting for upgrades (ITS/MIS + SCADA) can reduce operational performance and weaken M&E evidence of impact		
Mitigation Measure(s)		
• Implement ITS/MIS systems under Component 1.3(d) • Develop technical standards and integration frameworks under Component 2.2(f)		

- Support system integration, testing, and operation under Component 2.2(f)
- Procurement contracts for ITS and SCADA systems will require open-architecture design, source code access, and operator manuals to reduce vendor lock-in and support long-term adaptability and expansion

Selected Risk Factor 15

Category	Probability	Impact
Technical and operational	Medium	Medium

Description

· Charger downtime, spare parts and maintenance challenges, or weak battery end-of-life arrangements can lower fleet availability and reduce service quality and mitigation impact

Mitigation Measure(s)

- Develop charging and depot infrastructure under Component 1.3(c)
- Strengthen operations and maintenance capacity under Component 2.2(b)
- Support asset management and maintenance planning under Component 2.2(d)

Selected Risk Factor 16

Category	Probability	Impact
Governance	Medium	Medium

Description

· If future FYP budgets or tariff reforms do not materialize as expected, O&M and medium-term resilience improvements (especially in water) may plateau

Mitigation Measure(s)

- Support revenue diversification and financial sustainability strategies under Component 2.2(c)
- Strengthen financial planning and asset management under Component 2.2(d)
  Improve billing and tariff systems under Component 2.1(d)
- The PSA framework creates a contractual basis for service funding that reduces dependency on discretionary FYP allocations; the non-farebox revenue strategy under Component 2.2(c) targets progressive reduction of subsidy dependence

Selected Risk Factor 17

Category	Probability	Impact
Reputational	Medium	Medium

Description

· Construction-phase CHS/OHS and SEA/SH risks can cause delays and reputational harm if mitigation measures and GRMs are not effectively implemented and used

Mitigation Measure(s)

- Implement environmental and social management measures under project management support
- Establish and operationalize grievance redress mechanisms under project management support
- Strengthen contractor supervision and compliance under project management support

Selected Risk Factor 18

Category	Probability	Impact
Prohibited practices	Medium	Medium

Description

· Multi-package procurement increases exposure to prohibited practices and fiduciary failures, which could delay disbursement and implementation if controls are weak

Mitigation Measure(s)

- Apply robust procurement and financial management systems under project management support
- Strengthen oversight, audit, and reporting mechanisms under project management support
- Ensure transparency and accountability across procurement processes

POLICIES AND STANDARDS

G.1. Environmental and social risk assessment (max. 750 words, approximately 1.5 pages)

164. On the transport side, the proposed project is designed to provide a safer, zero-emission public transport system, encouraging the use of non-motorised transport. This will contribute to Bhutan's Low Emission Development Strategy, which is one of several strategies aimed at ensuring that the country remains carbon neutral. Adverse environmental and social impacts are likely to only arise during the construction phase and as such will be short-lived and temporary. While certain impacts will be more significant than others, the project has made attempts to reduce the severity of impacts as far as possible, for instance by reducing the project footprint, shifting alignment to reduce impact on private properties during the construction phase, phasing construction activities to reduce disruptions to road users and businesses and ensuring that compensation will be paid to directly affected landowners. The contractors will also be required to produce various management plans to which they will be held accountable, in addition to the ESMP, for aspects such as waste management, traffic management, emergency procedures, and labor management procedures. A Stakeholder Engagement Plan will also be adhered to throughout the project to ensure that the public and interested parties are consulted on risks and options and kept informed. The operational phase will see overarching positive benefits from reduced GHG emissions, leading to improved air quality, an enhanced public transport system that is safer and more reliable with improved mobility and links to other non-motorised transport facilities, universal and equitable access, as well as improved future opportunities for business.

165. The proposed mitigation measures will see impacts reduced to within acceptable limits during the construction phase, while the operational phase is likely to only see significant positive environmental and social impacts. As such, this project should be supported from an environmental and social perspective, assuming all mitigation measures are adhered to. The project was screened in terms of its environmental and social risks, based on the preferred option. In determining the appropriate category, the GCF's Sustainability Guidance Note: *Screening and Categorising GCF-financed activities* was used to ensure alignment with the risk rating.The proposed project involves linear civil works undertaken through the city of Thimphu including road widening, bus fleet, shelters, terminal and depot, and targeted urban upgrading of alleyways, public spaces, and water supply systems. The project will result in a range of impacts, with varying significance levels. The majority of the adverse impacts identified are temporary and occurring during the construction phase. On environmental aspects, the project will have a limited adverse impact, due to the location of the project within an existing urban environment. However, the project is likely to generate significant social impacts during the construction phase, including temporary economic displacement linked to disruptions to road users and pedestrians, business owners, landowners and apartment dwellers resulting from roadworks. It is unlikely that any buildings will need to be relocated but direct temporary restrictions on access will be experienced and some structures will require compensation along with minor land parcel readjustment. Adverse impacts on land use and business have been minimized through project design by reducing the project footprint and shifting alignment to reduce impact on private properties to the extent feasible. Alternative access to businesses and dwellings from back streets is also possible in many areas. Other construction phase risks involve traffic safety and community and worker health and safety due to proximity of civil works to surrounding public facilities (including schools). Sexual Exploitation and Abuse/Sexual Harassment (SEA/SH) risk is rated as moderate using World Bank's screening tool and additional assessment as the construction activities take place in urban settings and close to schools. Phased construction activities will further reduce disruptions to road users and businesses.

166. Water component activities are designed to avoid and minimize civil works. Activities include enhancing existing selected intake structures, water supply mains and transmission lines, as well as enhancing existing treatment plants to meet drinking water standards. These activities are not expected to require land acquisition or result in economic displacement. They are expected to result in positive environmental impacts by upgrading storm water drainage systems to prevent untreated wastewater from contaminating the river water resources. Communications outreach to communities and key stakeholders will foster a better understanding and garner public support for efficient use of water at the household level. The initiative aims to reduce daily consumption of water from 135 litres per person to 100 litres, leading to significant water savings.

167. As such, the project is assessed to be a Category B. To accurately assess the potential impacts, a comprehensive Environmental and Social Impact Assessment (ESIA), incorporating an Environmental and Social Management Plan (ESMP) has been developed for the transport component and an ESMP prepared for the water component. The ESMPs include mitigation measures to effectively avoid, minimize, and mitigate impacts during the construction and operation phases of the project, as well as implementation arrangements, including institutional capacity building and budget estimates.

168. In addition to this, a detailed Stakeholder Engagement Plan and Resettlement Action Plan have also been developed (see Appendices 1 and 2). The project has been screened and rated moderate for gender-based violence risk and prevention and management measures included in a Gender Action plan.

169. A project-specific grievance redress mechanism (GRM) will be established to receive, evaluate, and facilitate the resolution of affected persons concerns, complaints, and grievances about the social and environmental performance at the level of the project. The GRM will aim to provide a time-bound and transparent mechanism to voice and resolve social and environmental concerns linked to the project. The project will adopt a three-tier GRM in implementing the project. The GRM will include referral measures to address SEA/SH complaints associated with interactions between project workers and community. A public awareness campaign will be conducted to ensure that awareness of the project and its grievance redress procedures are shared with affected persons and other stakeholders. The campaign will ensure that the vulnerable groups are made aware of the need for and process in availing the GRM.

170. Labor Management Procedures (LMP) will address worker health and safety and conduct. Contractors will be supervised to prepare and implement management plans to address the range of environmental and social risks. Provisions will also be included for monitoring and evaluation, and further training and capacity building for environmental and social performance. SEA/SH Prevention and Response Action Plan has been developed to manage such risks.

G.2. Gender assessment and action plan (max. 500 words, approximately 1 page)

171. A Gender Assessment and a Gender Action Plan (GAP) were developed for LRCP following both the GCF's Gender Policy and its Gender Assessment and Action Plan Templates. These outputs were informed by a review of existing literature and secondary databases, analysis of primary data (collected through a dedicated project survey in 2022 and 2023), stakeholder consultations and expert input. In conducting the gender assessment, guidance was also sought from the World Bank's operational guidelines on mainstreaming gender in road transport and its toolkit for enabling gender-responsive urban mobility.

172. The assessment identified project opportunities for women and men, as well as other vulnerable groups like people with disability (PWD) to contribute to inclusive resilience building. These opportunities are translated into gendered actions that promote gender equality and reduce disparities in the sector, which are captured in a dedicated, project-specific GAP.

173. The Gender Assessment's national analysis on gender equality in Bhutan (context, instruments and stakeholders) highlighted that, despite Bhutan making significant progress in closing gender inequality gaps in recent decades through gender-sensitive legislation, policies and plans, inequalities persist due to deeply rooted traditional gender norms and values. As a result, the

transport and water sectors in Bhutan are not gender neutral. For instance, women typically have inferior access to public transport (compared to men) and this access is further influenced by their economic, social and livelihood status. Pedestrianization is also a critical form of mobility that has historically been overlooked from a gender-needs perspective in both Bhutan's urban and rural contexts. The safety of women and girls in Bhutan's public spaces, both as passengers on public transport (and related infrastructure, like at stations) and pedestrians, thus requires particular attention and must be tackled through a multipronged approach that considers infrastructural, operational, regulatory and outreach elements.

174. The impacts of climate change also affect women more than men (for example, by increasing their workload – which is often unpaid) and can trigger shifts in settlement patterns with the migration of men to urban centres. This has implications on urban dynamics – in terms of population increases and composition, economic activity and skills, poverty levels, and urban sprawl – which in turn influence mobility patterns and needs in cities, like Thimphu where the LRCP is located.

175. The intersection of these mobility and climate considerations was explored in-depth through a project-specific gender assessment that used primary and secondary data to understand differences in existing patterns, needs, preferences, perceptions and barriers to use of public transport and pedestrianized areas for women, men and PWD. For example, personal safety and security are crucial factors for women when using public transport and pedestrianized areas, and the poor condition of bus shelters and lack of seating are key factors that disproportionately affect women with children, elderly people, and PWD.

176. These findings informed a series of activities, indicators and targets captured in the GAP. These are broadly focussed on (1) Developing gender-sensitive and disability-inclusive transport and pedestrian infrastructure; (2) Improving city bus services for women and persons with special needs through standardized operational efficiency and effective management; (3) Promoting sensitization and community engagement to prevent sexual harassment and advocate for the rights of PWD to bring positive behaviour changes in public spaces and transport.

177. The project also aims to address the concerns of women and children, who are disproportionately impacted by poor water services. By focusing on water quality, supply hours, reliability, and improved resilience, the project seeks to alleviate these issues.

178. To ensure inclusive decision-making, the project will actively involve women's groups and marginalized communities, understanding their specific needs and concerns. Infrastructure designs will consider the unique requirements of women, aiming to reduce drudgery and save time. Additionally, the project will promote the participation of women in the implementation and service delivery processes. For example, the Thimphu Thromde water division will be encouraged to maintain a considerable number of women within their workforce, ensuring that female perspectives and expertise are integrated into water management and service strategies.

G.3. Financial management and procurement (max. 500 words, approximately 1 page)

179. GCF grant disbursements will be held in a separate Trust Fund by the World Bank. GCF funds will be channeled to Royal Government of Bhutan in a segregated Designated Account maintained in Royal Monetary Authority (RMA) by Ministry of Finance (MoF). To receive GCF funds from the World Bank, disbursements will be made to the Designated Account (DA) maintained by Ministry of Finance in RMA based on Interim Unaudited Financial Reports (IUFRs) that includes forecasts for the next two quarters and report expenditures for the previous two quarters. The fund flow will take place through a government Budget Fund Account (BFA), where funds disbursed by the World Bank into DA of the MoF will be released to the EEs based on funds requirement in Annual Work Plan submitted to the World Bank by EEs. All use of funds under the Project, including grant and loan proceeds, and disbursements to implementing agencies will be subject to an annual independent audit, and the procurement of goods and services under the project will also follow the World Bank's fiduciary requirements, including the Procurement Regulations.

180. Procurement will be carried out in accordance with the World Bank Procurement Regulations for IPF Borrowers, Sixth Edition, February 2025 ("Procurement Regulations") and the provisions

stipulated in the Project Procurement Strategy for Development (PPSD) and the procurement plan that may be updated from time to time with the World Bank's approval. The project will be subject to the World Bank's Anticorruption Guidelines, dated October 15, 2006, and revised in January 2011 and July 2016. The project will use the World Bank's Systematic Tracking of Exchanges in Procurement (STEP) to plan, record, and track procurement transactions. Procurement activities will be undertaken by the PMU to be set up under DHS, MoIT and PIU under Thimphu Thromde. The risks identified during the assessment will be mitigated through capacity building and TA, deployment of experienced procurement officers, hiring additional procurement consultants, submission of quarterly procurement progress monitoring reports by the PMU. The procurement officers will complete relevant procurement training. The World Bank will also provide training in procurement and STEP. The World Bank's procurement supervision will include prior and post review of the contracts. Procurement post review by the World Bank will be conducted on an annual basis or more frequently as needed.

G.4. Disclosure of funding proposal

Note: The Information Disclosure Policy (IDP) provides that the GCF will apply a presumption in favour of disclosure for all information and documents relating to the GCF and its funding activities. Under the IDP, project and programme funding proposals will be disclosed on the GCF website, simultaneous with the submission to the Board, subject to the redaction of any information that may not be disclosed pursuant to the IDP. Information provided in confidence is one of the exceptions, but this exception should not be applied broadly to an entire document if the document contains specific, segregable portions that can be disclosed without prejudice or harm.
Indicate below whether or not the funding proposal includes confidential information.

☐ No confidential information: The accredited entity confirms that the funding proposal, including its annexes, may be disclosed in full by the GCF, as no information is being provided in confidence.

☒ With confidential information: The accredited entity declares that the funding proposal, including its annexes, may not be disclosed in full by the GCF, as certain information is being provided in confidence. Accordingly, the accredited entity is providing to the Secretariat the following two copies of the funding proposal, including all annexes:

- full copy for internal use of the GCF in which the confidential portions are marked accordingly, together with an explanatory note regarding the said portions and the corresponding reason for confidentiality under the accredited entity's disclosure policy, and
- redacted copy for disclosure on the GCF website.

The funding proposal can only be processed upon receipt of the two copies above if containing confidential information.

ANNEXES

H.1. Mandatory annexes

☒	Annex 1	NDA no-objection letter(s) **(template provided)**
☒	Annex 2	Feasibility study - and a market study, if applicable
☒	Annex 3	Economic and/or financial analyses in spreadsheet format
☒	Annex 4	Detailed budget plan **(template provided)**
☒	Annex 5	Implementation timetable including key project/programme milestones **(template provided)**
☒	Annex 6	E&S document corresponding to the E&S category (A, B or C; or I1, I2 or I3): **(ESS disclosure form provided)** ☒ Environmental and Social Impact Assessment (ESIA) or ☒ Environmental and Social Management Plan (ESMP) or ☐ Environmental and Social Management System (ESMS) ☐ Others (please specify – e.g. Resettlement Action Plan, Resettlement Policy Framework, Indigenous People's Plan, Land Acquisition Plan, etc.)
☒	Annex 7	Summary of consultations and stakeholder engagement plan
☒	Annex 8	Gender assessment and project/programme-level action plan **(template provided)**
☒	Annex 9	Legal due diligence (regulation, taxation and insurance)
☒	Annex 10	Procurement plan **(template provided)**
☒	Annex 11	Monitoring and evaluation plan **(template provided)**

H.2. Other annexes as applicable

☒	Annex 12	AE fee request **(template provided)**
☒	Annex 13	Co-financing commitment letter, if applicable **(template provided)**
☒	Annex 14	Term sheet including a detailed disbursement schedule and, if applicable, repayment schedule
☐	Annex 15	Evidence of internal approval **(template provided)**
☒	Annex 16	Map(s) indicating the location of proposed interventions
☐	Annex 17	Multi-country project/programme information **(template provided)**
☐	Annex 18	Appraisal, due diligence or evaluation report for proposals based on up-scaling or replicating a pilot project
☐	Annex 19	Procedures for controlling procurement by third parties or executing entities undertaking projects financed by the entity
☐	Annex 20	First level AML/CFT (KYC) assessment
☒	Annex 21	Operations manual (Operations and maintenance)
☒	Annex 22	Assessment of GHG emission reductions and their monitoring and reporting (for mitigation and cross cutting-projects)[45]
☒		Other references

[45] Annex 22 is mandatory for mitigation and cross-cutting projects.

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** Please note that a funding proposal will be considered complete only upon receipt of all the applicable supporting documents.*