

ANNEX 21

OPERATIONS MANUAL

Note: The Operations Manual will be developed by the Borrower as part of downstream implementation

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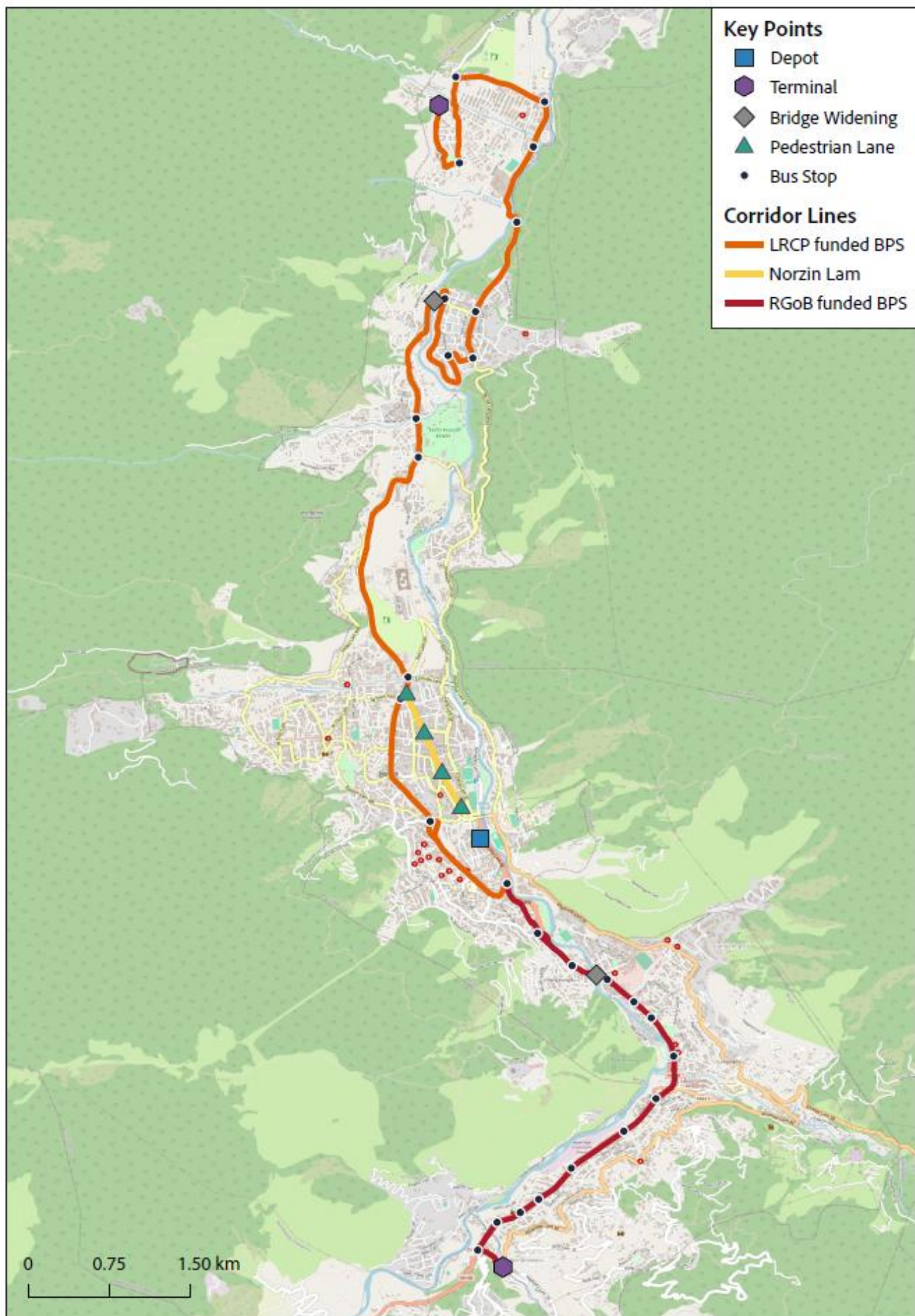
Executive Summary

As Thimphu's population grows larger and more urbanised, resilient urban water management is critical to ensuring it is a safe, healthy, and prosperous development in the face of an unpredictable and changing climate. Water resilience describes the capacity of a city to function in the face of water-related stresses so that those living and working within the city can survive and thrive. In Thimphu, there is an increasing need for improved urban water management that ensures consistent, adequate, and high-quality water services for all. Also, the proposed enhancements for Thimphu's City Bus Service (CBS) aim to revolutionize public transportation through a holistic approach. This comprehensive plan encompasses service plans, the development of schedules, performance targets, organizational structure, integrated requirements, condition assessment, traffic management, operations control, training programs, and visual aids. Each segment has been designed to ensure efficiency, sustainability, and passenger satisfaction.

Service Plan

Bus Priority Service Route:

- The determination of the Bus Priority Service (BPS) route was guided by a comprehensive analysis aimed at enhancing public transport efficiency and accessibility in Thimphu. The selected route, spanning 18.9km, connects Ngabiphu and Dechencholing, serving major residential, commercial, and governmental areas.
- Key considerations in the route selection included traffic flow, environmental impact, and stakeholder feedback. The route features dedicated bus lanes during peak hours going through the city core area, designed to prioritize bus transit and improve the overall user experience.
- The implementation of the BPS along this route aligns with the goals of the CCAP and LETMP, promoting a shift towards sustainable and efficient urban mobility.



LRCP investments, World Bank Group, 2026

Figure 1 BPS Route Map

Concept of Operations:

- The Concept of Operations outlines the operational framework for the Bus Priority Service, emphasizing seamless integration, high service reliability, and passenger satisfaction. Central to this concept is the use of advanced traffic management systems, real-time data monitoring, and dynamic scheduling to adapt to varying traffic conditions and passenger volumes.
- Additionally, the plan incorporates robust training programs for staff, comprehensive maintenance routines for the fleet, and extensive stakeholder engagement strategies to support the system's efficacy and sustainability.

Enforcement Measures:

- To support the effective implementation of the BPS, a comprehensive set of enforcement measures has been established. These include the deployment of traffic cameras and on-street enforcement officers to ensure adherence to bus lane regulations. Penalties for violations are clearly defined to deter unauthorized use of bus lanes and ensure the smooth operation of bus services.
- Public awareness campaigns will inform residents about the new system and its benefits, encouraging voluntary compliance. Additionally, a grievance redressal mechanism will be established to address public concerns and feedback, ensuring continuous improvement of the BPS.

Post-Implementation Evaluation:

The operations plan includes a comprehensive post-implementation evaluation to assess the effectiveness and impact of the Bus Priority Service (BPS). This evaluation will measure key performance indicators (KPIs) such as ridership levels, travel time reductions, and public satisfaction.

Additionally, the evaluation will analyze environmental benefits, including reductions in greenhouse gas emissions. Feedback from the community and stakeholders will be integral to this process, enabling continuous refinement and optimization of the BPS. The findings will guide future enhancements and potential expansions of the service.

Development of Service Schedule

Route Rationalization: The plan optimizes bus routes for greater efficiency and responsiveness to demand. Adjustments will be made to address peak-hour imbalances, ensuring bidirectional service coverage is enhanced during these times.

Bus Frequency Determination: The frequency will be tailored based on projected passenger demand, with the number of buses and their intervals adjusted accordingly. The strategy aims to maintain efficient service levels during both peak and off-peak hours on the trunk route.

Timetabling: For 2029, the Bus Priority Service Route is projected to have a journey time of 46 minutes. A dynamic timetable will feature intervals ranging from 3 to 20 minutes, deploying 40 electric buses to achieve approximately 300 rounds daily on the BPL route, operating unidirectionally.

Table 1: Intervals by Hour (2029)
(Unit: Minutes)

06:00 ~	07:00 ~	07:30 ~	08:00 ~	09:00 ~	10:00 ~	11:00 ~	15:00 ~	16:00 ~	17:00 ~	18:00 ~	19:00 ~	20:00 ~
07:00	07:30	08:00	09:00	10:00	11:00	15:00	16:00	17:00	18:00	19:00	20:00	22:00
20	10	5	3	3	5	9	5	4	3	4	10	20

Subsidiary Route Integration: Evaluate current feeder routes for potential integration with BPL and trunk routes.

Incident Management for Schedule Recovery: Establish a structured incident management process for disruptions. Implement strategies for efficient schedule recovery post-incidents.

Performance Targets and Measures

Formal Agreement or Contract: Initiate a legally binding contract detailing roles, responsibilities, and performance benchmarks for City Bus Service (CBS).

Performance Targets and Indicators: Set explicit, quantifiable targets within a low-emission transport context to guide CBS operations.

Incentive and Penalty Systems: Introduce a transparent incentive framework to encourage CBS performance, paired with a penalty system for unmet targets, ensuring accountability.

Monitoring and Evaluation: Deploy a comprehensive framework for ongoing CBS performance review, supporting continuous improvement.

Regular Review Meetings: Facilitate consistent discussions between Thimphu Thromde and CBS to foster collaboration and address issues proactively.

Indicative Performance Targets for Bus Services in Thimphu City:

On-Time Performance: Aim for 90%

Minimum Service Frequency: Target 5/10 min on trunk routes and 15/30 min on feeder lines

Reliability: Maintain a 98% reliability and punctuality rate for scheduled services over each one-month period

Passenger Satisfaction: Achieve at least an 80% satisfaction level

Ridership Growth: Established in an annual business plan, and provided through improved bus services but also LETMP strategy implementation to which TT and MoIT are committed, which incorporates route planning and steps to address overcrowding if insufficient capacity is being provided, and addresses safety issues

Reporting and Quality Control

Reporting Templates: Implement quarterly surveys for passenger feedback, alongside monthly service quality and performance measure reports.

Quality Control: The Quality Control Team will perform regular service and safety audits, monitor performance, ensure compliance, analyze feedback, and conduct quality assurance evaluations to uphold service standards.

Proposed Organizational Structure

. The City Bus Service (CBS) will create an effective organisational structure, including Administration, Finance, HR, Planning & Development, Operations, and Customer Service & Communications, Departments to ensure efficient and sustainable public transport operations.

Key Components:

- **CBS Organizational Structure:** A structured CBS organizational setup comprising various critical departments to streamline operations, service planning, customer service, and communications.
- **Staffing Plan:** Detailed staffing strategies for CBS encompass office staff, drivers, maintenance personnel, and terminal operations teams, supported by a clear pay grade system from top to staff-level roles.
- **Roles and Responsibilities:** From General Manager to operational staff, roles are distinctly defined to cover all aspects of CBS management, including strategic planning, daily operations, customer service, and technical maintenance.

Strategic Objectives:

- **Effective Management:** Establish a robust management structure to oversee the comprehensive operations of CBS, ensuring efficient service delivery and alignment with Bhutan's green transport objectives.
- **Staffing Efficiency:** Develop a staffing model that meets the operational demands of CBS, with emphasis on skill development, customer service, adequate staffing ratios for drivers and maintenance personnel, and enhanced terminal operations.
- **Operational Excellence:** Leverage the organizational structure to achieve high operational standards, focusing on safety, reliability, and customer satisfaction within the urban mobility framework.

Conclusion

The proposed organizational structure for CBS underpins the strategic direction for transforming Thimphu's public transport system. By aligning with the Bhutan Green Transport Project, it aims to modernize operations, improve service quality, and contribute to sustainable urban mobility. The detailed staffing plan and defined roles across departments ensure preparedness for the dynamic challenges of implementing a successful Bus Priority Service, marking a significant step toward achieving Thimphu's transportation and environmental goals.

Integrated Requirements and Capabilities for CBS Operations

- **Alignment with BLRC:** BPS and ITS initiatives are in strategic alignment with the Bhutan Liveable and Resilient Cities Project (LRCP), aiming to modernize public transportation and support sustainable transport goals.
- **Condition Assessment and Asset Management:** Implementation of standardized asset classification, utilization of efficient inventory tools, and a comprehensive condition assessment methodology for buses, infrastructure, and ITS components with budgetary provision for annual maintenance and software upgrades.

- **Recommendations:** Emphasize specialized maintenance for electric buses (E-buses), conduct regular cost-benefit analyses for enhancements, and adopt preventive maintenance schedules alongside continuous performance monitoring.

Traffic Management, Operations Control, and Enforcement Measures

- **Traffic Management Measures:** Implementation of manual traffic control, road markings, signage, and lane segregation, complemented by public awareness campaigns and an emergency response plan.
- **Operations Control Measures:** Establishment of a Bus Control Centre integrated with ITS, featuring a centralized control dashboard for real-time decision-making and incident management.
- **Bus Priority Service Rules:** Enforcement of safety rules, operational efficiency standards, and system reliability guidelines, including traffic signal compliance and adjustments to staffing and capacity as needed.
- **Recommendations:** Enhancement of traffic management and operations control measures, emphasizing the prioritization of LRCP guidelines to ensure a sustainable, efficient, and safe public transportation system.

Training

- **Overview:** A comprehensive two-day training program, and occasional refresher training, designed for CBS staff, bus operators, control centre personnel, maintenance staff, and city officials, covering public service ethos, BPS and ITS fundamentals, technical operations, maintenance, customer service, and safety protocols. This could be funded by Component 3: Institutional and Policy Strengthening
- **Modules:** Ten detailed training modules structured over two days, addressing key aspects of BPS and ITS operations, with provisions for coffee and lunch breaks to ensure an engaging learning environment. Key skills for drivers would be fuel/energy efficiency and obtaining optimal performance and battery life, especially for the e-buses.
- **Limitations and Recommendations:** Acknowledgement of the training program's duration, resource, and engagement challenges, with suggestions for extended training sessions, employment of specialized instructors, the inclusion of virtual training options, and the use of interactive methods for a more effective learning experience.
- **Technical Training Proposal:** Recognition of the need for specialized skills through a proposed six-day program that includes both in-house and external sessions on advanced topics in bus operations, ITS applications, maintenance best practices, and asset management strategies.
- **Partnerships and Collaborations:** Recommends partnerships with external organizations for advanced training resources. Training initiatives bridge knowledge gaps, enhance technical expertise, and prepare CBS staff for the complexities of BPS and ITS.

