



Executive Summary

Background

As a cornerstone of the country's Vision 2041, transport infrastructure is pivotal to the nation's development. Bangladesh, with its staggering population of approximately 170 million people and a land area of 148,000 sq. km, holds the distinction of being the world's most densely populated large country. Its unique riverine geography, defined by the Padma, Jamuna, and Meghna rivers, along with their numerous tributaries, segments the nation into a mosaic of islands and peninsulas. Given this complex geography, a robust bridge infrastructure network is paramount to bolster the road network and foster connectivity among various regions, and between socio-economic centres.

Dhaka, the capital city, is already a witness to burgeoning infrastructural developments. A gamut of megaprojects, including five MRT and two BRT lines, is being executed as a part of the Revised Strategic Transport Plan (RSTP) 2015. Additionally, TYP SA, along with its Joint Venture partner Padeco, was entrusted with conducting a feasibility study and preliminary design for the expansive Dhaka Subway project, spanning 238km.

In conclusion, achieving the milestones outlined in Bangladesh's Vision 2041 necessitates an unwavering focus on enhancing transport infrastructure, with bridges forming the backbone. The ongoing infrastructural initiatives in Dhaka set a precedent and a roadmap for nationwide efforts aimed at fortifying road networks and forging connectivity to stimulate economic growth and societal progress.

The assignment

In 2021, the JV Consultant (TYP SA, (BCL, DevCon, DDC, Nippon Koei and Dohwa), was tasked by the Bangladesh Bridge Authority to

develop a holistic Transport Master Plan for the period 2020-2050. This Master Plan is designed to effectively support Bangladesh's progress by meticulously identifying, assessing, prioritizing, and recommending infrastructure projects and public investments to be undertaken over the next 30 years, encompassing short-term to long-term initiatives.

The Master Plan is crafted with a keen eye on the future, ensuring that the proposed transport projects aptly address the burgeoning travel demands of a country poised to achieve high-income status by 2041. It incorporates a multimodal approach, which is vital in the contemporary transport landscape. The focus is not only on bolstering sustainable transportation modes within the major urban centres but also on amplifying the national transport network by integrating currently disjointed segments.

Integral to this Master Plan is its alignment with the national Vision 2041, which aspires to eliminate extreme poverty and propel Bangladesh to an upper middle-income country by 2030, ultimately achieving high-income status around 2041. This vision is underpinned by sustainable development and inclusive growth.

The Master Plan is a strategically designed blueprint that takes into consideration the multifaceted aspects of transportation. By fortifying the transport network, it aims to enhance connectivity, ensure sustainability, and foster economic development, thus making a pivotal contribution to the realization of Vision 2041's ambitious goals for the prosperity of Bangladesh. It should further be noted that it is essential the Master Plan to be periodically evaluated and updated, responding to changes in circumstances.

Analysis and Diagnosis

Bangladesh's transport sector, marked by intricate road, water, rail, and air networks, serves as the country's mobility spine. Despite these networks' extensive reach, their efficiency is impeded by numerous bottlenecks, leading to congestion, unequal regional development, and inadequate infrastructure. This report provides an incisive diagnostic of these pressing issues.

Dhaka, the central hub, suffers from urban congestion, particularly at specific intersections and areas. A similar predicament haunts the economically critical Dhaka-Chattogram corridor due to a dearth of long-span bridges and direct rail links. The Barishal Division faces connectivity challenges due to inadequate cross-river infrastructures, while inadequate infrastructure around the Chattogram and Mongla Ports generates substantial freight traffic bottlenecks.

In the Northern Divisions of Rajshahi and Rangpur, the reliance on the Bangabandhu Bridge for connectivity often leads to congestion. Sylhet's rural road network poor condition and the Haor region's monsoon-induced inaccessibility pose unique challenges to these regions. The Chattogram Hill Tracts' challenging terrain and the infrastructural inadequacy in South-Western Bangladesh further exacerbate the nation's transport woes.

Through the comprehensive National Road Transport Model, these bottlenecks are critically examined, providing the groundwork for targeted interventions. The model allows a dynamic analysis of the sector, presenting a multifaceted picture of the traffic patterns from 2022 to 2050.

The baseline scenario (i.e., 2022), which is illustrated below, provides an understanding of the mobility patterns in the country and the pinch points currently in the network.

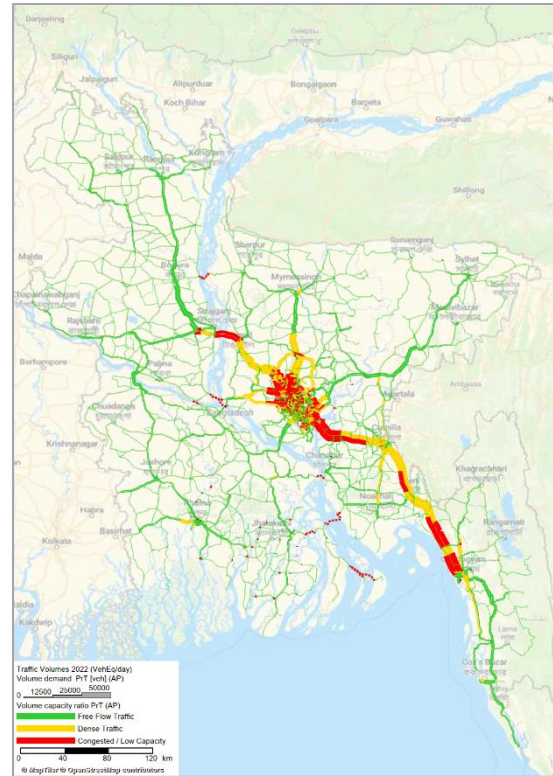


Figure 1. Traffic volumes in the base scenario.

Summing up, the crux of the matter is this - while Bangladesh's transport sector confronts numerous challenges, it also holds the key to sustainable economic growth. By prioritizing investments in long-span bridges, tunnels, and elevated expressways, the sector's potential can be unleashed. The pursuit of such infrastructural enhancements, in line with the nation's development strategy, promises to transform Bangladesh's mobility landscape into one that is accessible, resilient, and conducive to socio-economic growth.

Identification of Potential Projects for BBA

The JV Consultant undertook an in-depth analysis to identify potential projects for the Bangladesh Bridge Authority aimed at fortifying the country's transport infrastructure. The analysis was built on three core pillars, ensuring a robust and comprehensive approach.

- **Economic Corridors Analysis:** The first pillar entailed a thorough evaluation of Economic Corridors. These corridors are critical as they catalyse the movement of goods and services and contribute to regional economic development. The JV Consultant assessed the major corridors in Bangladesh and considered Economic Corridors established by international entities, acknowledging the significance of cross-national cooperation.
- **Alignment with Other Projects:** The second pillar focused on coordinating with pipeline projects from other statutory bodies such as RHD, LGED, and BR. This alignment is crucial for ensuring that projects complement each other, avoiding redundancy and optimizing resources. The JV Consultant collected data on various pipeline projects and incorporated them into the identification process.
- **Customized Modelling Tool:** The third pillar centered on the creation of a specialized transport modelling tool using EMME software. This tool facilitated a deeper understanding of mobility patterns within the country and the potential impacts of the identified projects.

Local expertise and knowledge were invaluable in this process, providing nuanced insights into the mobility needs and challenges across different regions of Bangladesh.

Through this methodology, 59 new projects were identified. Together with the 22 projects already identified by BBA, a portfolio of 81 projects was initially assembled. However, on a later stage four of these projects were dropped (ID58, ID65, ID78 and ID79), with the final list comprising of 77 projects. These projects are envisioned to shape the future transport networks essential for Bangladesh's development.

Furthermore, each identified project underwent a comprehensive analysis, encompassing background information, technical aspects, cost estimates, and environmental and social considerations. Summary sheets with key points and approximate locations were prepared for each project.

The JV Consultant's teams also conducted field visits to various regions in Bangladesh. These visits were critical in evaluating the existing conditions and obtaining a holistic perspective regarding the proposed projects.

In summary, a portfolio of 77 priority projects has been assembled through rigorous analysis, fostering a promising pathway for the evolution of transport infrastructure in Bangladesh.

These projects, which align with other initiatives and leverage transport modelling tools, are expected to be central to the nation's socio-economic development.

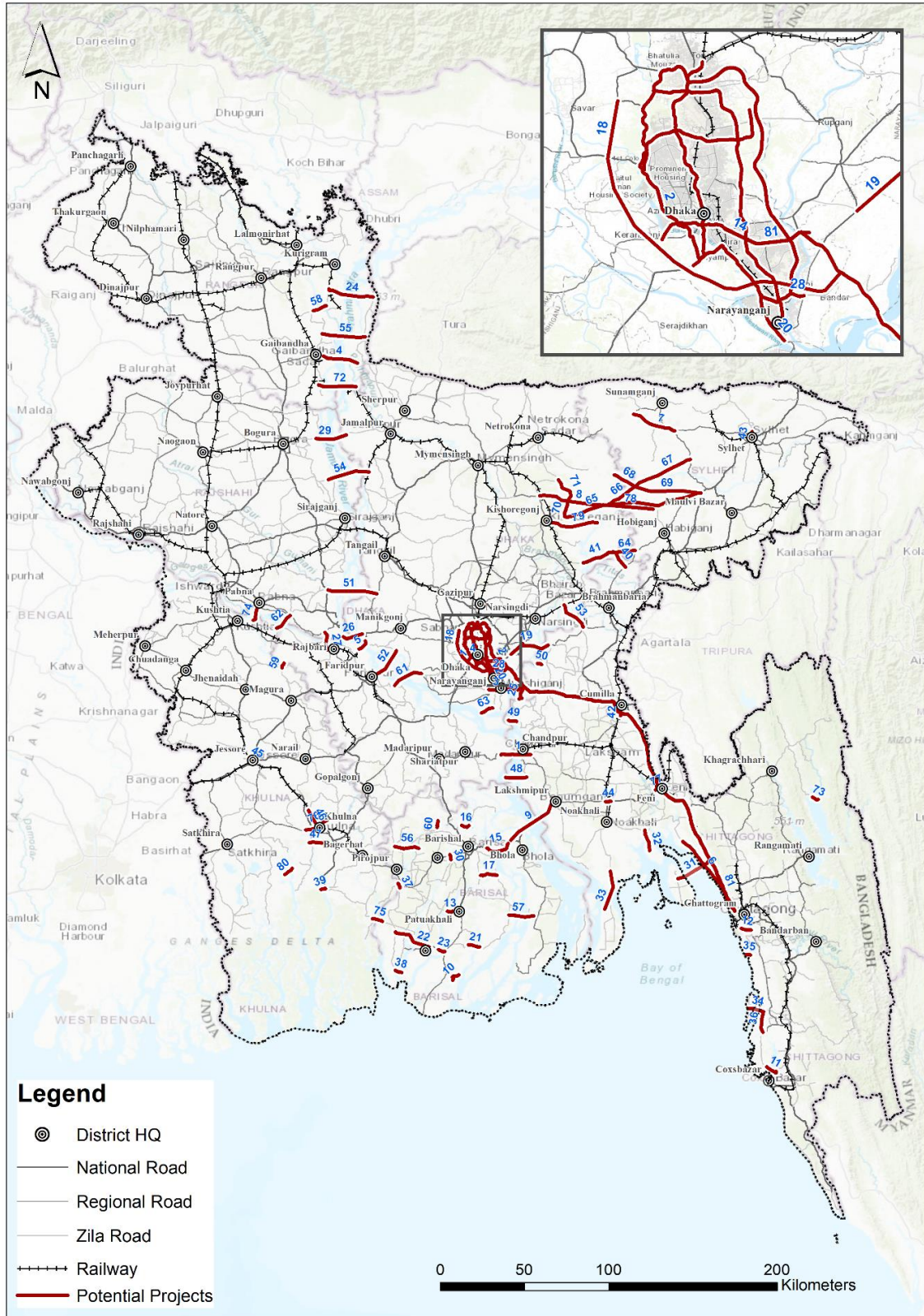


Figure 2. Location of identified potential projects (projects shown with their ID numbers).



Implementation Priority Assessment

The main aim of the implementation assessment is the evaluation of the performance of all the projects considered and the identification of the most critical ones.

It was therefore considered critical the analysis of several strategic objectives as well as the understanding of different stakeholders' objectives to identify the key criteria against which the projects should be evaluated. A holistic view was taken for the identification of the key criteria, with a variety of groups considered, such as financial, feasibility related, strategic and political, economic, social and environmental criteria.

Subsequently, all options (i.e., priority projects considered in the multicriteria analysis) were scored against the chosen criteria with a final ranking of the projects provided.

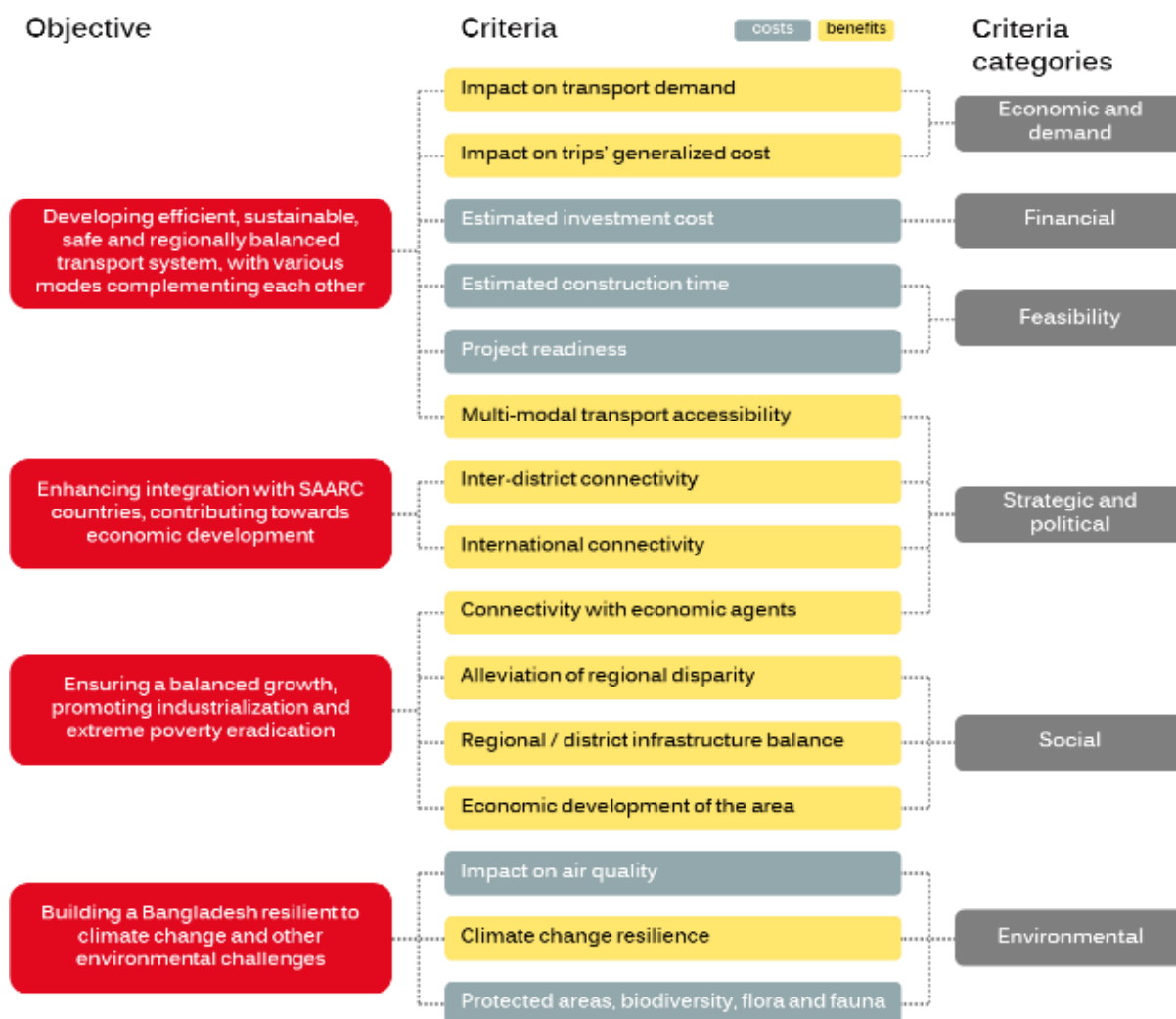


Figure 3. Objectives and criteria considered in the multicriteria analysis process.

The implementation plan, a significant part of the Master Plan, provides recommendations on the prioritization and timeline of project implementation. The selection of the most critical projects was determined using several complementary tools, which offered a holistic perspective of various vital factors.

- Analysis of modelling outputs: The National Model's results offer a deep understanding of future mobility patterns in Bangladesh. High demand projects, linked to economic, environmental, and other aspects, were chosen as critical due to their potential benefits.
- Multi-Criteria Analysis (MCA): As a key decision-making tool, MCA evaluates important factors and national goals. Projects that scored highly in MCA were selected as critical.
- Strategic interests of the country: In the rapidly developing context of Bangladesh, many local and international organizations are interested in project implementation. These interests were evaluated for their potential to optimize benefits in certain areas.
- Exceeding capacity points: Anticipated future demand revealed potential capacity issues for some projects. Additional projects were deemed necessary in pinch point locations to enhance capacity.

Traffic volumes of the critical path for 2050 are shown below:



Figure 4. Traffic volumes in the Critical Path 2050 scenario.

The priority assessment for implementation has been carried out to determine the critical path. The suggested critical path consists of 57 projects. The different periods analysed and modelled for the critical paths are: before 2030, between 2030 and 2035, between 2035 and 2040, and between 2040 and 2050. The table and a map with the 57 projects can be seen.

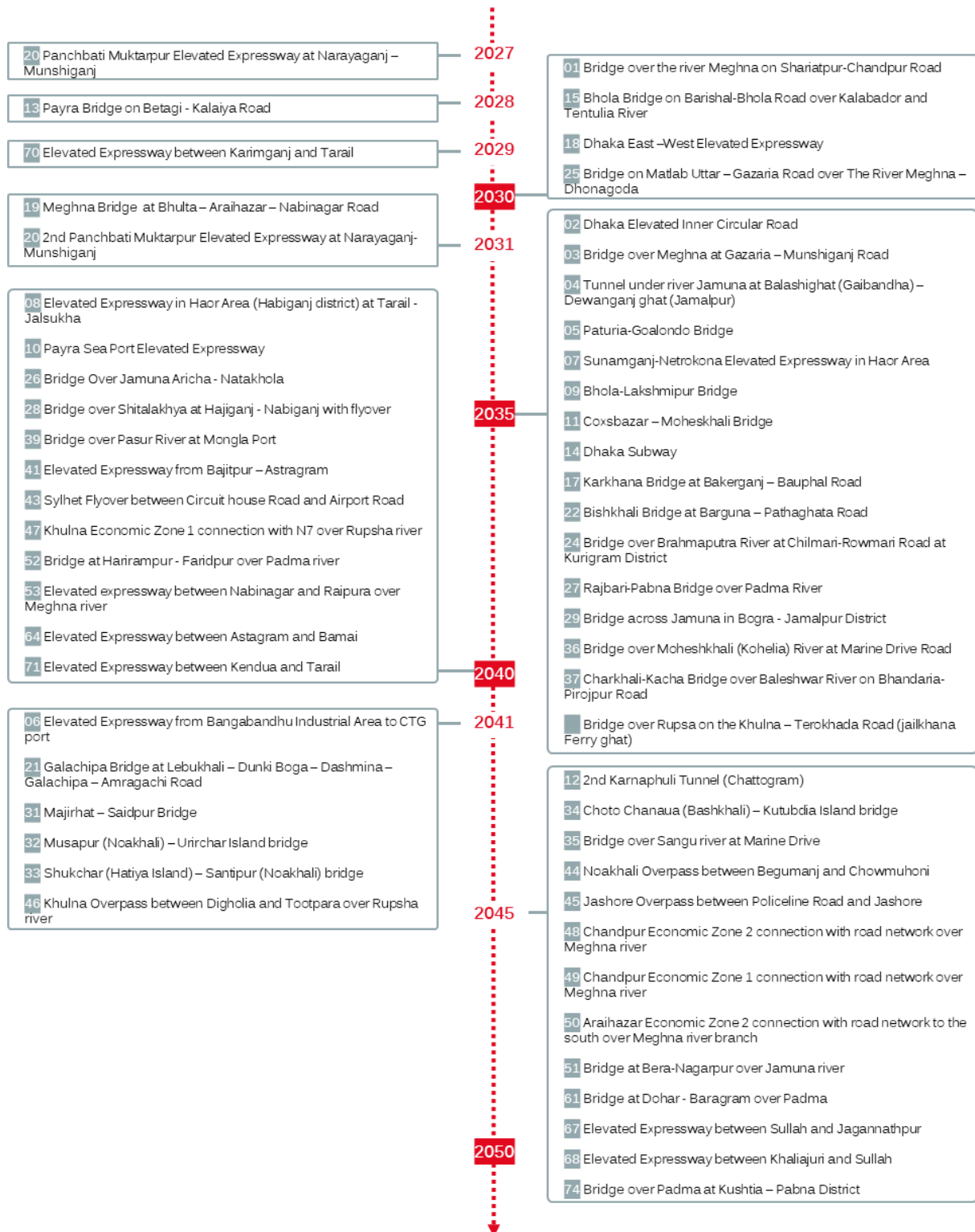


Figure 5. Projects considered in each phase of the Critical Path

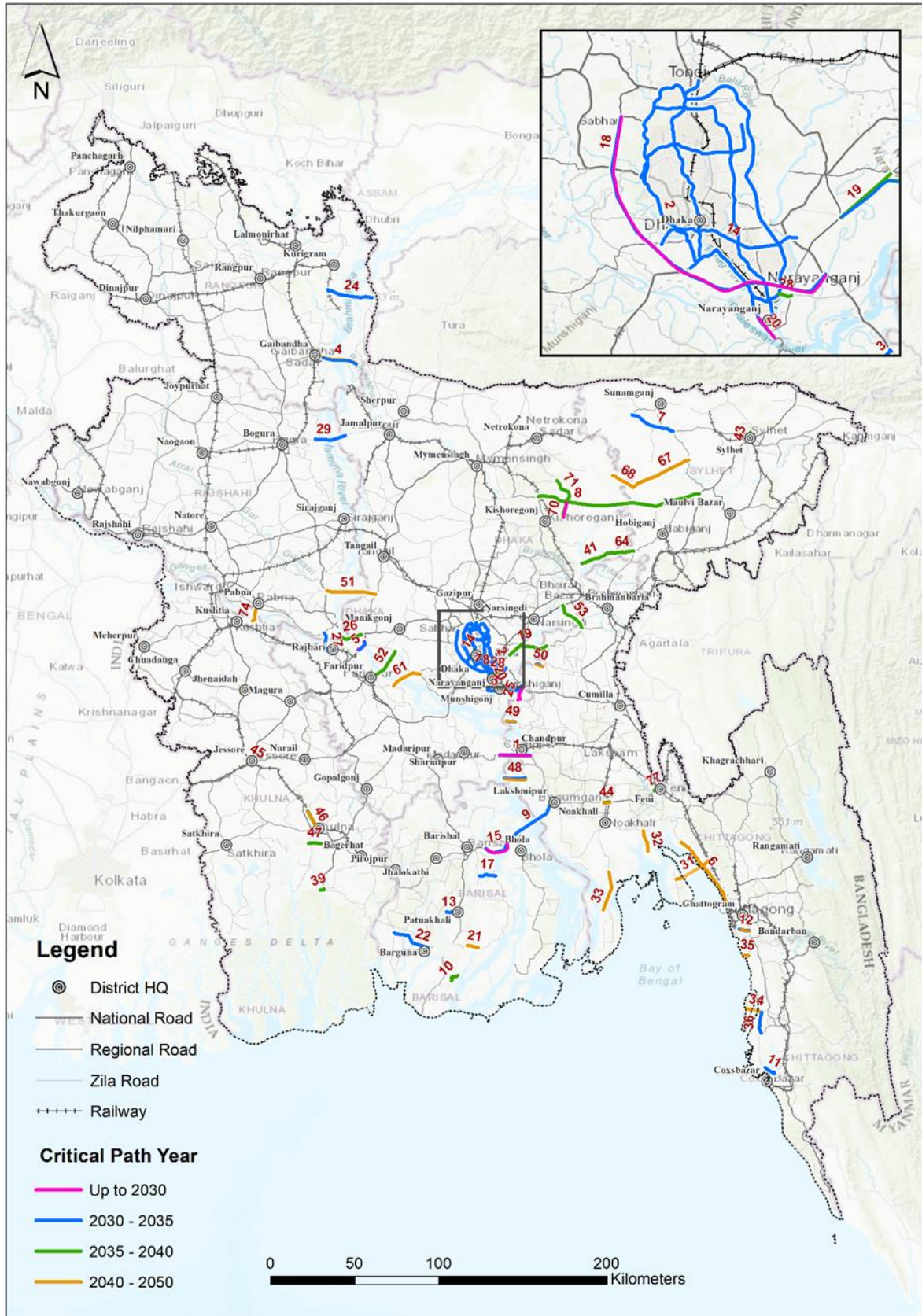


Figure 6. Location of the projects considered in each scenario of the Critical Path

As a result, the Consultant concludes that the projects for which a pre-feasibility study is suggested are the following:

- Sunamganj - Netrokona Elevated Expressway in Haor Area (*Priority Project ID 7*).
- Bhola - Lakshmipur Bridge (*Priority Project ID 9*).
- Coxsbazar - Moheshkhali Bridge (*Priority Project ID 11*).
- Rajbari-Pabna Bridge over Padma River (*Priority Project ID 27*).

Capacity Enhancement for BBA

The JV Consultant, cognizant of Bangladesh's ambitious vision for the future, acknowledges the vital role the Bangladesh Bridge Authority plays in actualizing this vision by driving the planning and construction of critical transportation infrastructure.

In line with this role, a thorough review of BBA's current organizational structure, training needs, and potential gaps was conducted. This review illuminated areas of improvement to optimize efficiency and effectiveness. A significant recommendation is the establishment of a dedicated project implementation department and the unambiguous distribution of roles within the organization. The organizational restructuring, coupled with comprehensive training programs, is projected to streamline processes, improve decision-making capabilities, and foster a robust and dynamic organization.

BBA's capacity enhancement also necessitates adopting innovative tools like the Visum software and the macroscopic road transport model. When integrated into targeted training schemes, these resources ensure

BBA's competencies align with the evolving infrastructure development landscape.

In summary, the JV Consultant underscores that adopting a proactive approach, fostering a culture of continuous introspection, collaboration, and strategic evolution will empower BBA to adeptly navigate the complexities of infrastructure development. By implementing these recommendations, BBA stands to augment its efficiency and effectiveness, driving transformative growth and guiding Bangladesh towards its aspiration of a sustainable, connected future.

To ensure a comprehensive understanding of the existing scenario and alignment with future directions, it is advised to conduct extensive consultations with key stakeholders. This approach facilitates a holistic analysis of the current status, identification of potential improvements, and confirmation of the need for recommended changes.

The JV Consultant recommends a continuous analysis of the objectives achieved, as well as periodic reviews of the present Master Plan.

These reviews (which could take place every 5 years and could be carried out by the BBA, together with external support), aim to assess the level of implementation of the MP, as well as to make the necessary updates in order to face the specific challenges at any given time.