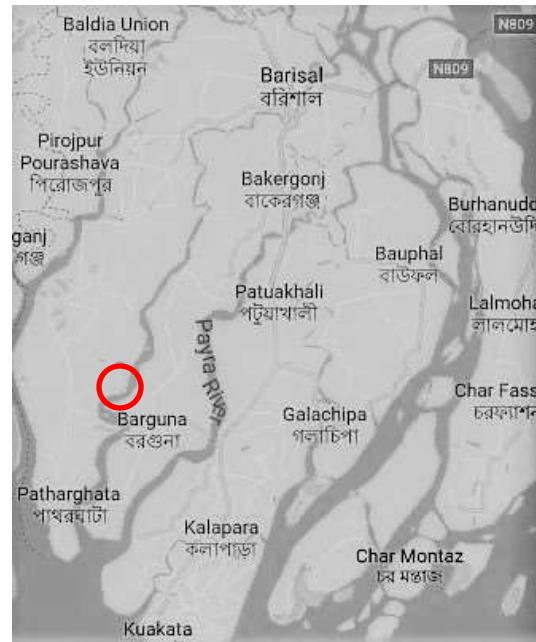


## EXECUTIVE SUMMARY

### 1. BACKGROUND INFORMATION AND PROJECT BRIEF

The southern part of Barisal division is crisscrossed by a number of large and small meandering streams. They put a large number of interruptions in the road transportation network affecting the economic and social development of the region. A number of medium and small bridges have been built in the recent years alleviating the problem to some extent in the local level. Bangladesh Bridge Authority (BBA) has decided to prepare a concept design for construction of a four-lane bridge across Bishkhali River at around the current Ferry Crossing location on the Patuakhali-Amtali-Barguna-Kakchira (R-880) road. This bridge together with another bridge over Paira River currently under construction at Lebukhali and a proposed bridge over Paira at Amtoli will provide a direct vehicular connection of whole of Barguna district with Barisal and Patuakhali. With the completion of Padma Bridge, this bridge will directly connect Barguna district with central part of the country including capital city Dhaka. This Bridge along with planned bridges over Paira River and Baleswar River will connect Mongla Port with proposed deep sea Paira Port in future. This feasibility report presents the outcome of the study that has been carried out by the Consultants. The assignment has been carried out following the scope as provided by BBA in the Terms of Reference (ToR).



### 2. STUDY APPROACH AND TECHNICAL STANDARDS

The Consultants have carried out the assignment in accordance with International practice and procedures. However, reference was made to practices followed in Bangladesh and the established standards and procedures of Roads and Highways Department (RHD). The principal International and RHD standards adopted are:

- AASHTO LRFD 2014 specifications for Highway Bridges. This is currently being followed in Bangladesh. The bridge loading standard includes HL-93 trailer truck.
- Geometric Design Standard for Bridges and Approaches and Bridge Design Standard by RHD
- Material Standards – as per AASHTO LRFD 2014 Highway Bridge Design specification
- EuroCode 1990-1999 has also been used as reference, wherever found necessary.

### 3. STUDIES UNDERTAKEN

The Consultants have conducted the following Surveys, Investigation activity:

Extensive **Reconnaissance Survey** by the Consultants team to identify a suitable alignment of the bridge as well as approach roads. It included field trip, collection and study of available secondary data, consultation with local officials and general public.

Carry out detailed **Hydrological and Morphological** Investigation by appointing specialized agency. The agency, Institute of Water and Flood Modelling (IWFM) carried out field investigation including

discharge, velocity and water level measurement. With the help of historical satellite images, IWM studied the potential stability of river banks at the proposed alignment. IWFM also established the hydraulic design parameters by Mathematical Modelling. The Design Discharge of Bishkhali River at the proposed bridge location has been estimated as 18765 cuM/sec.

**Topographic Survey** of the proposed bridge and the approach road alignments were carried out.

Preliminary **Geotechnical Investigation** at the proposed bridge location and approach road alignment was carried out.

Traffic Survey was undertaken to carry out Traffic Forecast Study.

**Environmental Impact Study.** The project falls under RED category.

Survey and study undertaken for preparation of Preliminary Land **Acquisition** and **Resettlement Plan**.

## 4. FINDINGS

### 4.1. Bridge Location and Approach Road Alignment

Based on reconnaissance survey, hydrological and morphological study, discussions with BBA officials, the bridge alignment was fixed at a right crossing about at approximately 2km downstream of Phuljhuri Launch Ghat which is about 5km upstream of the Boroitala-Beinchotki Ferry Ghat. The proposed location is close to a node of the meandering Bishkhali River and therefore expected to experience minor bank shifting effect and associated bank protection work. Approach roads have been laid to connect the bridge to the nearest feasible location on R-880.

### 4.2. Main Bridge

A number of bridge options were examined. Each option has its advantage and difficulties besides cost. It was recognized that keeping the number of foundations within the river to minimum will greatly reduce the risks of uncertainty associated with pile installation. On the other hand, longer span bridges will be difficult to build as well as costlier. The following option was finally selected.

**200m span Extradosed Concrete Box Girder Bridge** with a span arrangement of 120m + 6x200m + 120m

The foundation will consist of 2.5m/ 3m diameter bored cast-in-situ RCC piles of approximately 120m length. The piles will be base grouted. The option of driving steel tubes can also be examined at the time of execution design after carrying out detailed geotechnical investigation.

The approach bridges on either bank will be almost half a kilometre long as 18.3m navigational clearance will have to be provided under the main bridge portion. It has been proposed to adopt precast pre-tensioned U type girders of 38m span to make up that portion of the bridge, which will be supported on RCC piers and bored cast-in-situ pile foundation.

The Bank Protection Work has been designed by IWFM following the standards of BWDB.

### 4.3. Approach Road and Structures

The approach road has been designed as per RHD standard for four lane Highway. The associated minor bridges and culverts have been designed to AASHTO LRFD 2014 specification in compliance with RHD standards for Bridges.

#### **4.4. Traffic Forecast**

The projected traffic (Motorised Traffic per Day), without considering the connectivity of Paira Port and Mongla Port, forecasted are as follows:

Year	Traffic Volume
2018	6,027
2033	16,628
2053	64,344

#### **4.5. Estimated Project Cost**

As the types of bridge elements proposed are uncommon to Bangladesh, the project cost has been estimated based on International prices of similar projects rationally scaled to Bangladeshi condition.

The estimated project cost worked out to 5453.31 Cr BDT which is equivalent to 649.20 Million US\$ (based on 1 US\$ = 84 BDT)

#### **4.6. Economic Analysis and Justification**

The economic analysis showed an EIRR of 12.8% with BCR of 1.09.

However, a Financial Analysis based on Tolling for 25 years where the toll rates are fixed on the basis of current Ferry Charges, showed the project to be unviable.

### **5. CONCLUSION**

From the Techno-Economic analysis, it is observed that the EIRR value exceeds 12.8% for the 2504m long four lane bridge. The BBA officials have accepted the bridge configuration proposed by the Consultants. It is recommended that 200m Span Concrete Extradosed Box Girder Bridge be selected for Design and Construction for the Bishkhali crossing at downstream of Phuljhuri Launch Ghat and construct short approach roads to connect it to Patuakhali-Amtali-Barguna-Kakchira Road (R-880).

