

## Recent Video Highlights NHC's Involvement in Stabilizing the Lower Brahmaputra System in Bangladesh

The Brahmaputra River (known locally as the Jamuna) merges with the Ganges in Bangladesh to form the Padma River — the third largest river in the world in water discharge, and which carries one of the highest sediment loads of all major rivers of the world. In 1950, the Great Assam Earthquake in the upstream Himalayas dislodged 45 billion tons of sediment that systematically widened the river by an average of 50 percent. Today in Bangladesh, the Jamuna is 12 km wide. These conditions, along with unpredictable seasonal monsoon rains, have created a very unstable river environment that has converted densely populated, fertile floodplain lands into a multitude of unstable islands and infertile sandbars. This instability has increased poverty in the riverine population. From 1973-2014, more than 1,000 km<sup>2</sup> of floodplain were eroded, which would have provided living space to around 1.5 million people, at the current population density.

Since the early 2000s, Northwest Hydraulic Consultants (NHC) has been the lead consultant to develop a successful technology, incorporating sand-filled geotextile bags, to stabilize eroding riverbanks consisting of fine, unconsolidated sands (Oberhagemann, K.; Hossain, MM: Geotextile bag revetments for large rivers in Bangladesh, Geotextiles and Geomembranes, 2010). This technology has been introduced in a Guideline for Riverbank Protection, accepted by the Bangladesh Water Development Board (BWDB) for implementation in 2010. Since then, over 45 km of geotextile bag revetments have been built systematically. The relatively low cost for using geotextile bags allows the BWDB to protect longer stretches of bankline and thus, stabilize more river reaches.

In 2013, NHC prepared a phased project, with Asian Development Bank (ADB) financing, that moves riverbank protection one step further, into a systematic stabilization of the Jamuna and Padma Rivers along a narrowed meandering corridor (Figure 1). NHC was retained again in September 2015 to assist the BWDB to implement the first phase of this ten-year long program, termed Flood and Riverbank Erosion Risk Management Investment Program (FRERMIP) Project-1, which includes developing a river stabilization plan for the Jamuna and Padma Rivers in Bangladesh. In 2016, NHC developed a Strategic Framework to identify large-scale socio-economic and environmental values in the Jamuna and Padma Rivers and dependent areas (the North Central Zone - Figure 2), that would be enabled and catalyzed by River Stabilization. This strategy is river-centric rather than flood-centric, and relies on the latest, most cost-effective and environmentally friendly technologies for riverbank stabilization, such as geobags.

The Development Objectives are five in number: (i) Reduced flood and erosion risk, (ii) Reclamation of lost floodplain, (iii) Capture of developmental value in the Study Area resulting from the stabilized river environment, expressed in terms of poverty reduction, intensified agriculture, peri-urban industrial development, etc., (iv) Restored navigation, and (v) Restored riverine ecology.

The Strategic Framework emphasizes the need for adaptation and flexibility. It emphasizes “hard” interventions in the short term (to 2030) and capture of socio-economic value in the medium term (to 2040 and beyond). The Strategic Framework consists of seven Strategic Thrusts:

- 1) ***Stabilizing the River Corridor:*** The first intervention along the Main Jamuna – Padma River Course is designed to control riverbank erosion; it is riverbank erosion that makes the river unstable.

- 2) **Land Reclamation:** Land reclamation, through geobag erosion protection plus flood embankments, will result in 150,000 hectares of land being reclaimed, which is enough land to settle at least 1.8 million people.

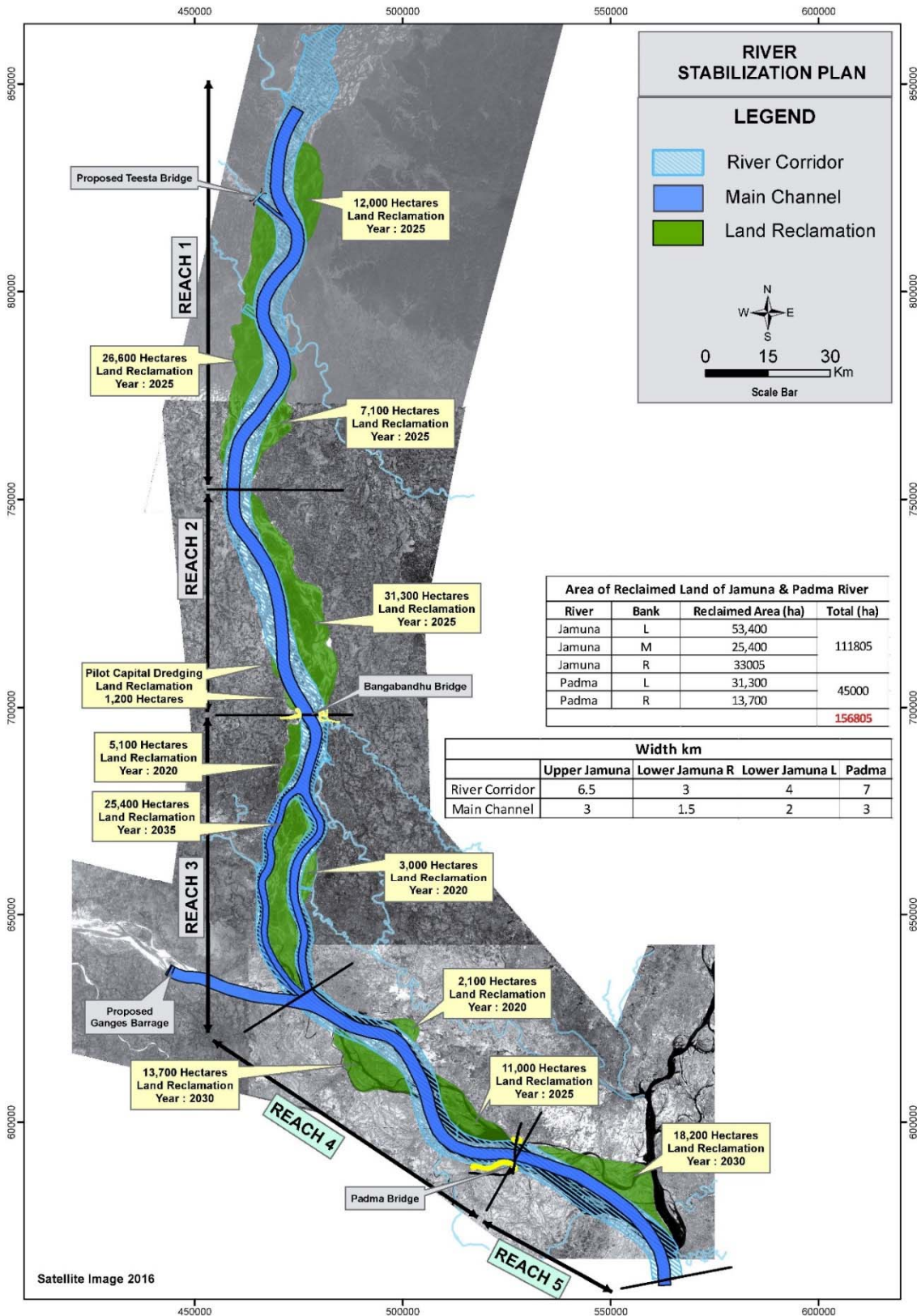


Figure 1 The proposed river corridor for the downstream Brahmaputra and Padma Rivers

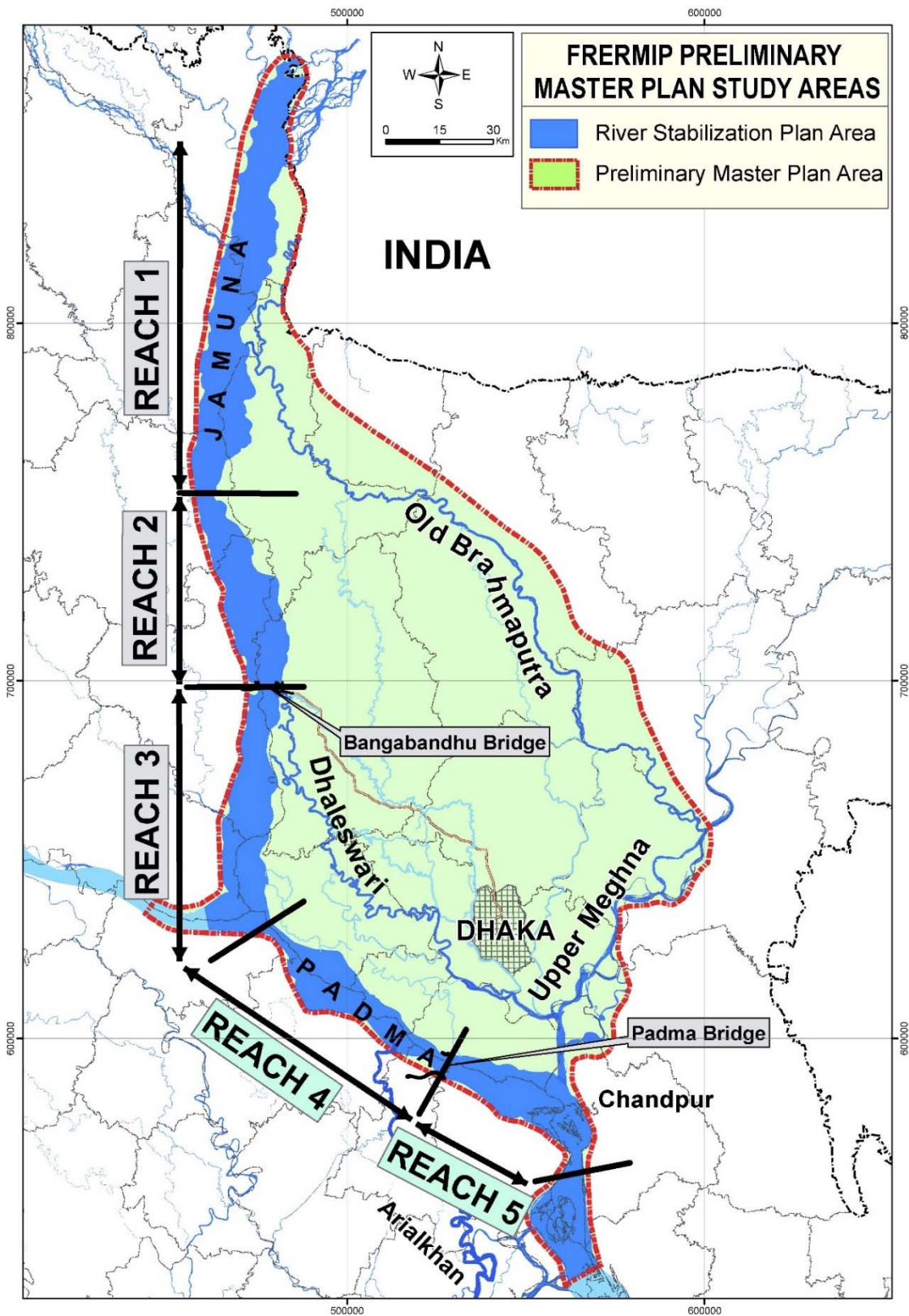


Figure 2 River Stabilization Plan for the Jamuna and Padma Rivers and initial Master Plan area for Bangladesh's North-central Zone

- 3) **Flood Risk Reduction:** Flood risk reduction through the construction of flood embankments will protect livelihoods, provide levees for improved road accessibility, incentivize more intensive agriculture, and enable urbanization.
- 4) **Distributaries Restoration:** Distributaries will be stabilized by the construction of off-takes for dry season inflow using Flood Barriers, which will improve the reliability of the water quantity and quality year-round in the Study Area, including the Dhaka Capital Region.
- 5) **Navigation Restoration:** Navigation will be restored on the Study Area rivers by establishing and maintaining safe navigation channels during low flow periods, utilizing low spurs, without significantly restricting the cross-sectional area of the river during flood discharges.
- 6) **Increased Land-Based Productivity:** The prime benefit of the Strategic Framework would be to enable high value economic activity, and commensurate human development on the reclaimed land, through intensified agriculture and, very importantly, by enabling an industrial peri-urban area to be developed south of Dhaka, employing up to a million workers in manufacturing, with the aim of helping to propel Bangladesh to middle income status.
- 7) **Environmental Enhancement:** Environmental Protection Zones will be designated along the river courses, enabling environmental restoration and providing habitat for flora and fauna.

If the strategy is implemented successfully, the socio-economic and environmental situation in the Study Area will be dramatically improved by the year 2045. Large-scale benefits will include: (i) Decreased poverty levels, (ii) Enhanced agricultural productivity, (iii) Industrialization with large-scale employment creation, (iv) Population migration to areas, which should provide higher standards and quality of life, (v) Restored navigation supporting container barges, feeder vessels, and tourist cruise-boat traffic, and (vi) Restored riverine ecology.