

Ghaghara-Yamuna Link Canal – A river linking attempt in Uttar Pradesh

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Introduction

The National Perspective Plan (NPP) contemplates development and optimum utilisation of water resources of the country through detailed studies of the quantum of water available in various river systems, that can be transferred to other basins / states after meeting their reasonable needs in the foreseeable future. Surveys and investigations of the feasible storage sites and interconnecting links of Peninsular and Himalayan rivers have been entrusted to the National Water Development Agency (N.W.D.A.), an organisation under the Ministry of Water Resources of the Government of India.

Under the Himalayan River Development Component, the N.W.D.A. have already prepared the pre-feasibility report of the Ghaghara-Yamuna and the Sarda-Yamuna link schemes and the pre-feasibility studies are under way for the Gandak-Ganga link scheme. The geotechnical assessment of the interlinking projects of N.W.D.A. has been done by Geological Survey of India. The present short paper is an attempt to briefly outline the geotechnical highlights of the Ghaghara-Yamuna Link Canal Scheme (GYLC).

The Ghaghara-Yamuna Link Canal Scheme envisages diversion of about 28430 MCM surplus water of the Ghaghara river to the commands of the Sarda and the Lower Ganga canal systems and balance to the Yamuna river (Pipal and Srivastava,

2004). The total length of the link canal from its offtake, about 8 km downstream of Chispani Dam (Nepal), to the Yamuna river is about 430.50 km, out of which 112.5 km lies in Nepal and balance 318km in India.

The canal passes through the Upper Ganga Plain lying between the Peninsular-Shield in the south and the Himalaya in the north (Bisaria *et al*, 1996, Kumar, 2003; Fig.1). The 3 to 5 km wide area along the Yamuna river presents dissected topography due to gully erosion and ravine formation. The Ganga Plain of Uttar Pradesh comprises a thick pile of Post Siwalik Quaternary alluvial sediments, classified into Older Alluvium comprising Banda Alluvium and Varanasi Alluvium, and Newer Alluvium consisting of Fan Alluvium, Terrace Alluvium and Recent Alluvium. The area along the canal alignment lies between elevations 154 and 182 m above msl and is widely cultivated. Palaeo-channels are common features as found near villages Bahrauli, Tilmas, Gurgawan, Lambikhera, Bholapur and Purankhag in Bareilly District. The area falls in Zone III of Seismic Zoning Map of India with seismic events of the order of 5 to 6 on Richter scale.

The execution of the canal and its appurtenant structures will involve stratified sand, silt, clay and their hybrid variants, with low bearing capacity and highly varying permeability characteristics. Special design measures against seepage and pore pressures appear necessary for the proposed canal in the sections where it cuts

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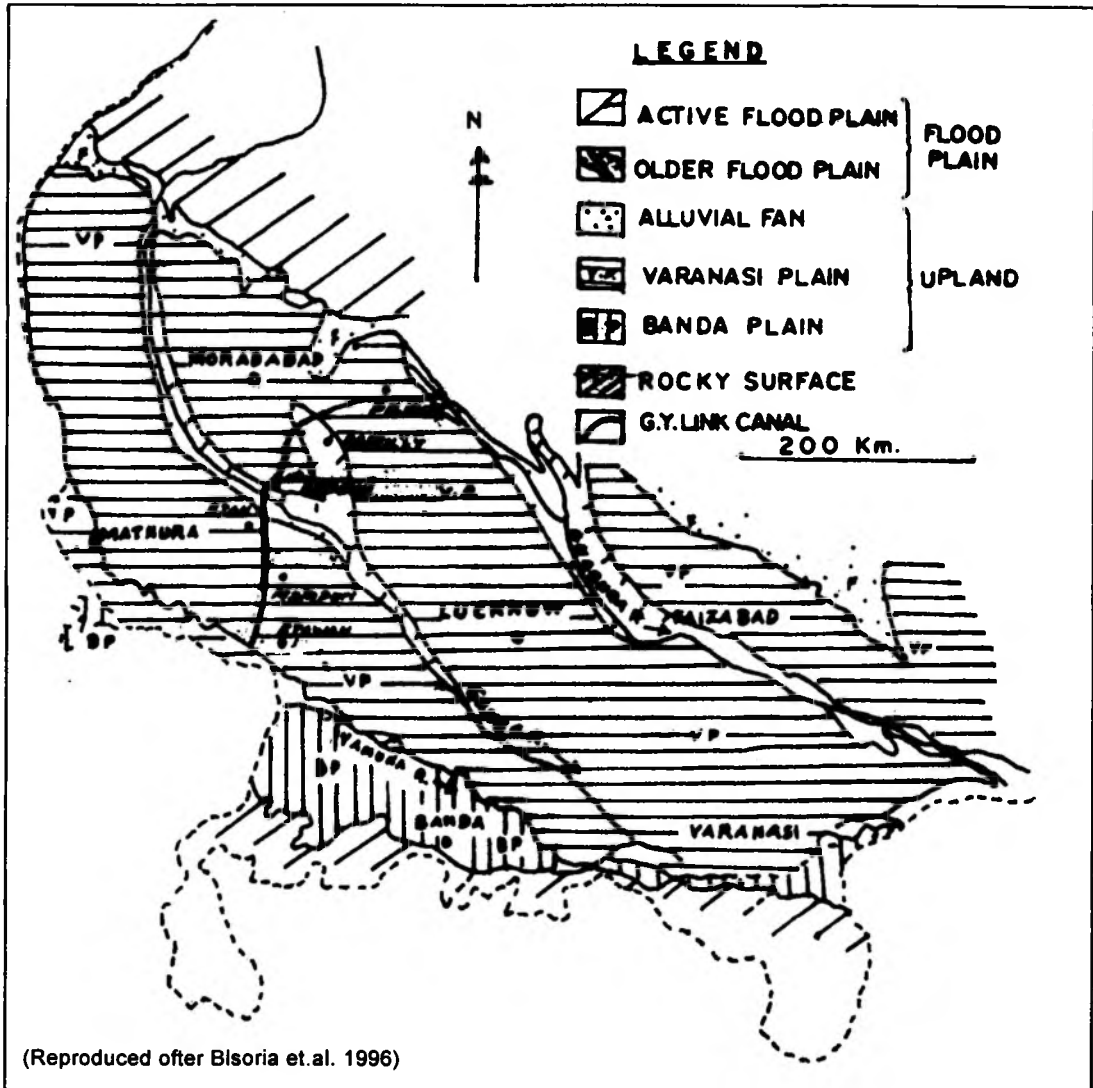


Fig. 1: Layout of the GYLC across Varanasi plain.

across palaeo-channels and waterlogged zones. About 70 cross drainage and level crossing structures like aqueduct, canal siphons, barrages, etc. are envisaged along the canal alignment.

In general, the cross drainage structures would be founded mostly on older and active flood plains, involving loosely consolidated sediments. The level crossing structures other than these, may mostly be founded over better consolidated beds belonging to Varanasi Alluvium. While deciding the

foundation grades of cross drainage structures below the obligatory 1.5 times of scour depth, in conjunction with bearing capacity test reports, geological investigation on availability of competent beds from lithologs may be a good guiding factor. Considering the magnitude of the size and water carrying capacity of the canal, appropriate seismic designing of the structures may be an important consideration. During DPR and construction stages, site specific detailed geotechnical

investigations would be required for deciding techno-economic designs of the structures. In this connection, it may be noted that many of the proposed sites for cross drainage structures have existing bridges. It would be worthwhile to collect the foundation grade geotechnical data like lithology and SPT/bearing capacity from owner agencies of the existing structures.

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