

## Executive Summary

Long distance inter-basin transfer of water from surplus basins to water deficit basins has been mooted in our country in order to reduce the imbalance in the water availability between various regions. A National Perspective Plan (NPP) was formulated in the year 1980 by the Union Ministry of Irrigation (now Ministry of Water Resources) and the Central Water Commission identifying a number of inter-basin water transfer links in respect of both Peninsular rivers and Himalayan rivers of the country. The Peninsular Rivers Development and the Himalayan Rivers Development Components put together were expected to create an additional irrigation potential of 35 million hectares besides hydropower potential and other benefits.

The Peninsular Rivers Development component of the National Perspective Plan for Water Resources Development, formulated in the year 1980 by the erstwhile Union Ministry of Irrigation (now Ministry of Water Resources) and Central Water Commission, envisaged diversion of surplus flows of the Mahanadi basin and the Godavari basin to the water short Krishna, Pennar, Cauvery and Vaigai basins in the South. The National Water Development Agency (NWDA) has assessed the water balance position in various peninsular river basins keeping in view the ultimate development scenario in these basins. Based on these studies NWDA has formulated proposals for diversion of 11176 Mm<sup>3</sup> of water annually from Mahanadi through Mahanadi-Godavari link canal. From Godavari, a quantity of 26122 Mm<sup>3</sup> of water (including waters brought from Mahanadi) is envisaged to be diverted to Krishna River through three links viz. Inchampalli-Nagarjunasagar, Inchampalli-Pulichintala and Polavaram-Vijayawada. Out of these waters brought from Godavari, a quantity of 14080 Mm<sup>3</sup> is envisaged to be diverted from Krishna to Pennar through three link canals viz. Almatti-Pennar, Srisaïlam-Pennar and Nagarjunasagar-Somasila. From Pennar, a quantity of 8343 Mm<sup>3</sup> of water is proposed to be diverted to the Cauvery River through Somasila - Grand Anicut. Further down south, Cauvery - Vaigai - Gundar link canal is proposed to divert a quantity of 2252 Mm<sup>3</sup> of water to meet the demands in Vaigai and Gundar basins.

This Feasibility Report deals with the Krishna (Nagarjunasagar) – Pennar (Somasila) link project. The objective of preparation of the feasibility report is to facilitate firming up of the proposals and for discussions among the concerned States to arrive at broad agreements on the quantum of diversions, sharing of costs etc.

The Krishna (Nagarjunasagar) – Pennar (Somasila) link project envisages diversion of 12146 Mm<sup>3</sup> of water from Nagarjunasagar, part of it (8167 Mm<sup>3</sup>) through the link canal and the balance through the existing Nagarjunasagar Right Bank Canal (NSRBC). Out of the 3979 Mm<sup>3</sup> diverted through NSRBC, 2356 Mm<sup>3</sup> would be to meet part demand of the existing command area of NSRBC. The remaining part of the demand (1623 Mm<sup>3</sup>) is proposed to be met from the Godavari (Inchampalli) - Krishna (Pulichintala) link canal.

The total length of Krishna (Nagarjunasagar) - Pennar (Somasila) link canal is 393.02 km. The canal will run parallel and adjacent to the existing NSRBC upto the tail end of NSRBC at 202.75 km and then traverse a distance of 190.27 km before joining Somasila reservoir on Pennar. The balance quantity of 1623 Mm<sup>3</sup> available in NSRBC after meeting the demands of NSRBC is proposed to be transferred from NSRBC to the link canal at the tail end of NSRBC. Thus a total quantity of 9790 Mm<sup>3</sup> would flow through the link canal after the tail end of NSRBC.

The link canal traverses through Guntur, Nellore and Prakasam districts of Andhra Pradesh passing through the river basins of Krishna, Gundlakamma, Streams between Gundlakamma and Pennar, and Pennar. The existing reservoirs at Nagarjunasagar, at the off take point, and Somasila, at the tail end, are proposed to be utilised for the intended diversion, without any change in their storage capacities. The monthly simulation studies of the Nagarjunasagar reservoir carried out, and incorporated in this report, show that the quantity of 12146 Mm<sup>3</sup> of water could be diverted annually at a success rate of 80%.

The link canal will provide irrigation to an area of 168017 ha in the districts of Prakasam and Nellore. For identifying the culturable area and ascertaining the irrigability of the land, satellite remote sensing techniques were made use of through consultancy services offered by National Remote Sensing Agency (NRSA). The intensity of irrigation is proposed to be 100%. A cropping pattern has been suggested taking into account the soils available in the command area and prevailing agricultural/irrigation practices. The irrigation water requirement is estimated to be 908 Mm<sup>3</sup>.

Apart from irrigation, it is also proposed to provide for future domestic and industrial water requirements in the command area. Additional

domestic and industrial requirements, projected to 2050 AD, are estimated to be 55 Mm<sup>3</sup> and 69 Mm<sup>3</sup> respectively.

Transmission loss in the link canal is estimated to be 332 Mm<sup>3</sup>. It is envisaged that after meeting the above requirements, a quantum of 8426 Mm<sup>3</sup> would be finally transferred to the Somasila reservoir.

The link project envisages construction of a canal head powerhouse at the head of the link canal. The powerhouse will have an installed capacity of 90 MW with three units of 30 MW each and one standby unit of the same capacity.

The link canal is designed as a lined canal with trapezoidal shape. The maximum carrying capacity of the canal is 565 cumec with corresponding cross section of 67.5 m of bed width and 6m of full supply depth. In the initial reaches the link canal passes through a tunnel of 1.265 km length. The canal passes mostly through agricultural fields except for a few minor reaches through forest area.

As no new reservoir or additional storage is envisaged in this proposal, any adverse environmental impact is not anticipated. Suitable provision under R&R component to take care of the proposed measures of rehabilitation due to alignment of link canal has been made in the estimate for construction of the link canal.

Direct benefits per annum from the link project due to irrigation, domestic and industrial water supplies are estimated to be Rs. 18529 lakh. The capital cost of the link canal is estimated to be Rs. 632054 lakh at 1998-99 price level. Based on the quantity of water consumed enroute the link canal, apportioned capital cost is worked out to be Rs. 88061 lakhs and the annual cost to be Rs. 9938 lakh. The Benefit Cost Ratio works out to 1.86. The B.C. ratio may undergo a change if the cost of transferring surplus waters from the upstream link canals is also considered.