EXECUTIVE SUMMARY

This Feasibility Report deals with the Mahanadi (Barmul) – Godavari (Dowlaiswaram) link project (M - G link project), which is an integral part of the Mahanadi - Godavari - Krishna - Pennar – Cauvery - Vaigai - Gundar peninsular rivers link system formulated for inter-basin transfer of water from surplus river basins to deficit basins.

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 Jal Shakti) 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. The National Institute of Hydrology, Roorkee has carried out "Hydrological Studies and Multi- Reservoir Simulation for the proposed Mahanadi-Godavari link" using latest techniques and submitted the report to NWDA during April-2018.

In this study, the water availability analysis at various projects has been carried out using the observed flow series as well as the water utilization by upstream projects, regenerations from these utilizations and minor utilizations in the project catchments. The proposed Barmul project is to be constructed downstream of the Tikarpara gauging site of CWC on Mahanadi River. The total flow at Tikarpara site is to be divided into the following components:

1. Contribution from the Mahanadi Sub-basin up to Hirakud dam.
2. Contribution from Ong river,
3. Contribution from Tel river, and
4. Contribution from Middle Mahanadi sub-basin including the Salki river.

Based on these studies, NWDA has now prepared the Feasibility Report for diversion of 10105 MCM of water annually from Mahanadi through Mahanadi (Barmul) – Godavari (Dowlaiswaram) link canal.

The Mahanadi (Barmul) – Godavari (Dowlaiswaram) link canal runs as a contour canal from the off-take point with a FSL of 75.06 m at proposed Barmul reservoir, for a total distance of 844.595 km in Odisha and Andhra Pradesh States and out falls into the Godavari river at a distance of about 15 km upstream of the existing Dowlaiswaram barrage with a FSL of 14.505 m.

The link canal traverses through the Nayagarh, Khurda, Ganjam, Gajapati districts of Odisha State and Srikakulam, Vizianagaram, Visakhapatnam and East Godavari districts of Andhra Pradesh. The link canal enters Andhra Pradesh State at RD 333.200 km.

The total culturable command area under the link is 363959 ha providing irrigation to an area of 442894 ha in the districts of Nayagarh, Khurda, Cuttack, Puri, Ganjam, and Gajapati districts of Odisha and Srikakulam, Vizianagaram and Visakhapatnam districts of Andhra Pradesh. For identifying the culturable area and ascertaining the irrigability of the land, the maps prepared by National Bureau of Soil Survey and Land Use Planning are used. The intensity of irrigation is proposed to be 85% for the new areas proposed under the link canal. However, for the Manibhadra command proposed by the State Government, 150% intensity is proposed. A cropping pattern appropriate to the command area has been proposed by NWDA. The irrigation water requirement under the link canal is estimated to be 3790 MCM.

Apart from irrigation, it is also proposed to provide for future domestic and industrial water requirements in the command area. Domestic and Industrial requirements projected to 2050 AD are estimated to be 700 MCM.

The hydrological study of Mahanadi river at Barmul site has been carried out by NWDA through National Institute of Hydrology (NIH), Roorkee and assessed the yield availability at Barmul dam site by using latest scientific methods for planning further diversion through Mahanadi (Barmul) -Godavari (Dowlaiswaram) Link. The study by NIH reveals that the net water balance at 75% dependability is 6794 MCM at Barmul site (NIH revised Report-April 2018). As per the simulation study conducted by the NIH, the estimated annual demand of link canal is 10105 MCM and average annual spills are 28486 MCM. The annual average link diversion is 9434 MCM. In their report, water balance at Barmul site has been worked out considering only one year data ie, 75% dependable year. However, the simulation has been done by NIH, Roorkee considering the data of 40 years from 1973 to 2012. Government of Odisha submitted their observations on NIH revised Report-April 2018 and expressed that after considering all the latest demands of Odisha and Chhattisgarh States, there is a deficit of 18718 MCM of water at Barmul site on Mahanadi river at 75% dependability. NWDA duly considering their enhanced demands for irrigation and guidelines of TAC of NWDA for assessment of water requirement for various purposes including Environmental and Ecological requirements and regeneration had modified the surface water balance at 75% dependability and assessed a surplus of 3417

MCM of water at Barmul on Mahanadi river. The total diversion into link canal has been assessed to 10105 MCM taking all the demands of link canal. With 77.5% of success failing in 9 years and success in 31 years out of 40 years. Results provided by National Institute of Hydrology have been considered in the present Feasibility report of Mahanadi (Barmul) – Godavari (Dowlaiswaram) link project.

Transmission losses in the link canal are estimated to be 569 MCM. It is envisaged that after meeting the above requirements, out of a total diversion of 10105 MCM, a quantum of 5046 MCM would be finally transferred to the Godavari river through the link canal. However as per the original proposal of Mahanadi-Godavari link, 6500 MCM has been ensured to reach Godavari through M-G link, and the shortage of 1454 MCM will be supplemented to M-G link from the contribution of Manas-Sankosh-Tista-Ganga link reaching Mahanadi through G-D-S and S-M links.

Six dam projects at Salki and Ong in Ong sub-basin, Uttei Roul Integrated Project, Khadago, Udanti and Tel Integrated Project in Tel sub-basin in Mahanadi basin proposed by Government of Odisha upstream of proposed Barmul dam site will be integrated to Mahanadi (Barmul) – Godavari (Dowlaiswaram) link Project. It is proposed to provide irrigation to an area of 1.82 lakh ha in Odisha State through these six dams in addition to Power generation in the order of 240 MW and domestic water supply of 125 MCM as per NIH Report (April, 2018).

The link canal is designed as a lined canal with trapezoidal shape. The maximum carrying capacity of the canal is 763.48 cumec with the corresponding cross section of 69.0 m of bed width and 7m of full supply depth. The link canal passes through two tunnels of 0.75 km and 5.4 km long at RD 24.475 km and RD 634.050 km respectively.

Direct net benefits per annum from the link project due to irrigation, domestic and industrial water supplies and power generation in the canal are estimated to be Rs. 6058 crore. The total cost of the link canal project is estimated to be Rs. 54019 crore at 2018-19 price level. Based on the quantity of water consumed enroute of the link canal, apportioned cost for enroute water diversion is worked out to be Rs. 25659 crore and the annual cost to be Rs. 2909 crore. The Benefit Cost Ratio works out to 2.08 and the Internal rate of return works out to 15.60 %.