

Chapter 8

Water and irrigation planning

8.1 General

The link canal takes off from the right flank of the Inchampalli dam with FSL of 106.68 m and outfalls into the proposed Pulichintala reservoir with FSL of 55.442 m. The link canal on its en route will serve the proposed command under IRBC, and takeover the part command of existing NSRBC and NSLBC lying before and also after the Tammileru river. The main objective of the link canal to take over the part command of NSLBC and NSRBC of Nagarjunasagar project is to meet the deficit of water of Krishna basin upto Nagarjunasagar and take over Nagarjunasagar project command to maximum extent, so that an equivalent quantity could be diverted from the Nagarjunasagar through Nagarjunasagar – Somasila link to benefit the southern links. Such an arrangement will reduce the pumping cost on Inchampalli – Nagarjunasagar link project for further diversion of Godavari water towards south.

8.2 Water planning under the link canal

The total diverted water of 4370 Mm³ from the Inchampalli dam is proposed to be utilised as furnished in Table 8.1.

Table 8. 1
Utilisation for different uses (Unit: Mm³)

Sl.No.	Description	Utilisation
1.	Proposed command under IRBC	470
2.	Part command of NSLBC (gravity)	491
3.	Part command of NSLBC before Tammileru (lift)	891
4.	Part command of NSLBC after Tammileru (lift)	190
5.	Part command of NSRBC (lift)	1623
6.	Municipal & Industrial use of towns and villages en route	413
7.	Transmission losses	292
	Total	4370

The details of working of the above demands are discussed in the following sections.

8.3 Command area

The link canal, in all, would serve 445299 ha of CCA and irrigate to the tune of 613442 ha annually utilizing 3665 Mm³ of water. These areas are inclusive of the existing commands under NSLBC and NSRBC proposed to be taken over by the link canal. The description of these commands is furnished in the following paragraphs.

8.3.1 Command area under Inchampalli right bank canal

The culturable command area under Inchampalli right bank canal is 48230 ha as identified by the state of A.P and the same is considered for working out the irrigation demand. The command area is extending from Inchampalli dam to Muneru River at RD 167.15km.

Keeping in view, the general climate of the area, soil available, prevailing agricultural/irrigation practices and the commercial aspect of the project as a whole, the cropping pattern and the intensity of irrigation has been modified 150%. There are two IMD observatories at Hanmakonda and Khammam in the vicinity of the command area. Normal monthly values of potential evapotranspiration and rainfall of the two observatories are available in the IMD publication. The crop consumptive use coefficients are obtained for various crops from the FAO-24 publication. These have been used in computing the net irrigation requirements of different crops in the suggested cropping pattern. The gross irrigation requirements of the crops have been worked out by considering an irrigation efficiency of 55% for all crops except paddy for which the same is 65%. The annual utilization works out to 470 Mm³.

The command area is proposed to be served through five branch canals at RDs 43.00km, 77.00km, 125.00km, 141.00km, 158.60km and direct sluices for serving small isolated CCA patches. The distribution network will be designed while localizing the canal system.

8.3.2 Part command under NSLBC

The link canal crosses the existing NSLBC at about RD 200 km, immediately after the tunnel. In this reach, the NSLBC canal flows at higher elevation.

The command area of NSLBC that can be irrigated through this link is bifurcated on the basis of the geographical convenience. First part of 55725 ha, i.e. from the tunnel exit to the tail end along the link canal, comprises part block Nos. 20 & 21/5 and the full block Nos. 21/6, 21/7, 21/8, 21/9, 21/10A, 21/10B and 21/11. These blocks under NSLBC are taken over by the link canal and same is proposed to be irrigated by gravity through 3 existing branch canals namely Chennur, Rebbavaram and Banakallu and a new branch canal of NSLBC by gravity of 150 km length. The second part of 100975 ha is proposed to be irrigated by pumping of water from the link canal at RD 200 km into existing NSLBC, which runs upto Tammileru. Thus, total CCA proposed under NSLBC, works out to 156700 ha. The water requirements, considering 140% irrigation intensity and a delta of 0.63 m, works out to 491 Mm³ and 891 Mm³ respectively for the above two parts of the command totalling to 1382 Mm³.

8.3.3 Command area under NSLBC beyond Tammileru

The existing NSLBC, which runs upto Tammileru is proposed to be extended by another 25 km to bring more areas under irrigation. The command area to be covered under this extended reach would be 37000 ha. The area is proposed to be irrigated by pumping of the same system. This will make the total CCA proposed to be irrigated under NSLBC to 193700 ha including that mentioned in the preceding paragraph.

The prevailing cropping pattern in the region is judiciously adopted and the irrigation intensity is kept at 140%. The crop water requirements are worked out on climatological basis considering the IMD observatories at Khammam & Gannavaram. The crop consumptive use coefficients are obtained for various crops from the FAO-24 publication. These have been used in computing the net irrigation requirements of different crops in the suggested cropping pattern. The gross irrigation requirements of the crops have been worked out considering an irrigation efficiency of 55% for all crops except paddy for which the same is 65%. The annual utilisation

works out to 190 Mm³. The distribution network will be designed while localizing the canal system.

8.3.4 Command area under NSRBC (Proposed under PRBC)

The yield available at Pulichintala from the intermediate catchment of the Krishna basin between Nagarjunasagar and Pulichintala is to be regulated for Krishna delta through Pulichintala reservoir as proposed by Andhra Pradesh Government. The diverted waters of Godavari through the link canal are planned to be utilized to irrigate a part command of the NSRBC through the proposed Pulichintala right bank canal (PRBC) utilizing the Pulichintala reservoir as balancing reservoir. The studies on 1:50000 toposheets reveal that the canal with FSL of 53.34m, from Pulichintla reservoir can be extended upto river Musi through the ayacut blocks of 8,9,10,11,19,21 & 22. The command area of NSRBC that can be served under this canal system i.e. through PRBC is 203369 ha and it is proposed to be irrigated by pumping. The cropping pattern adopted for NSRBC is considered for this part of the command. The water requirement of these areas is 1623 Mm³ considering 140% irrigation intensity and irrigation delta of 0.57m. The above-required quantity is proposed to be let into Pulichintla from tail end and picked through PRBC.

8.4 Layout of branch canals / distributaries and their commands

Considering the information of ground elevation available on the maps, the branch canal network was drawn. These branch canals/distributaries mostly run on the ridges between the local streams, with their commands on both the sides extending upto the streams, which in turn form the exterior boundaries of the command under each of the branches. However, these branch canals may not cover entire command area and hence wherever possible canal majors are also identified along the link canal to serve the isolated patches of CCA. The information on the branch canals provided along the link canal and the areas served by each branch canal is furnished in Table 8.2.

Table 8.2
Branch canals and respective command areas

Sl. No.	RD Km	Name of the branch canal	CCA (ha)	Command served
1.	43.00	Eturunagaram branch canal	3293	Inchampalli right bank canal
2.	77.00	Domeda branch canal	11234	Inchampalli right bank canal
3.	125.00	Aswapuram branch canal	5287	Inchampalli right bank canal
4.	141.00	Borgampad branch canal	11895	Inchampalli right bank canal
5.	158.60	Palvancha branch canal	16521	Inchampalli right bank canal
6.	200.00	NSLBC	137975	NSLBC lift upto & beyond Tammileru
7.	205.00	Chennur branch canal	4600	NSLBC gravity
8.	217.00	Rebbavaram branch canal	2300	NSLBC gravity
9.	237.00	NSLBC gravity canal	4600	NSLBC gravity
10.	263.00	Vallabhi branch canal	66515	NSLBC gravity
11.	312.20	PRBC	203369	NSRBC lift from Pulichintala
		Total	445299	

8.5 Municipal & industrial water requirements of the proposed command area

The requirement of water for domestic consumption in the rural and urban areas and for livestock has been computed by projecting the rural and urban human population and livestock population of the proposed command area (towns situated on the right of the link canal, within a distance of 20 km and not involving lifts more than 100 m, from link) to 2050AD and by considering the per capita daily requirement of 70, 200 and 50 litres for the rural, urban and livestock population respectively.

The rural and urban population of the command area for the year 2001 has been estimated on proportionate area basis from the mandal-wise census data of 2001. The total population of the command area in 2001 was 3272110 and the same has been projected to 2050 AD using

compound growth rates as suggested by UNO in the year 1994 publication. Out of the total projected population, 60.7% is taken as urban population and remaining as rural population.

The existing urban population is deducted from the projected urban population presuming that its domestic requirement is already being met by existing sources and the remaining urban population is considered for working out the urban domestic requirement to be provided by the link canal.

The total livestock in the command area as estimated on proportionate area basis from census data of 1999 is 1148993 and it is projected to 2050 AD assuming an annual compound growth rate of 1%.

The water requirement for the entire urban and 50% of the rural population is proposed to be met from the surface water resources, which work out to 176 Mm³.

In absence of relevant data on industrial water needs, the industrial water requirement has been assumed to be the same as the domestic water requirement, i.e. total of urban, rural and livestock requirements, which works out to 237 Mm³. Thus the total domestic and industrial water requirement of the en route area to be supplied from the Inchampalli - Pulichintala link canal is estimated to be 413 Mm³.

8.6 Transmission losses

The transmission or conveyance losses i.e. the amount of water lost through evaporation and seepage in the link canal in its course from Inchampalli to Pulichintala have been estimated month wise, considering 0.6 cumec per million square metre of wetted area of the canal as per the Bureau of Indian Standard Code. The annual losses on this count work out to 292 Mm³.

8.7 Month-wise distribution pattern of water for various demands from the link canal

The water requirements for various uses are spread over all the twelve months. However, the pumping too required to be spread over entire year, though the power requirements are meager in the Rabi months. The

maximum quantity of water that is required to be transferred through the link canal is 739 Mm³ (August) and that of the minimum is 53 Mm³ (May).