Chapter 8
Irrigation Planning

8.1 General

The proposed Pennar (Somasila) – Palar - Cauvery (Grand Anicut) link canal taking-off from the Somasila dam with full supply level of 95.420 m, diverts a total quantity of 8565 Mm^3 of water annually.

The link canal is aligned to run adjacent to the existing Kandaleru Flood Flow Canal which is on its left upto RD 10 km. The Pennar (Somasila) – Palar - Cauvery (Grand Anicut) link runs for a length of 529.190 km up to Cauvery River.

8.2 Water planning

The total diverted water of 8565 Mm^3 from the Somasila dam through the link is proposed to be utilised as follows.

Unit: Mm^3

1	Irrigation requirement of the proposed command area enroute the link in the basin areas between Pennar and Cauvery rivers	3048.00
2	Domestic requirement in the proposed command area & towns located 20 km right side of canal alignment	292.00
3	Domestic & industrial water requirement of Chennai city	813.00
4	Enroute transmission losses	557.00
5	Transfer to Cauvery	3855.00
	Total	8565.00

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

8.3 Existing Irrigation in the Proposed Command Area

The link canal in its course from Somasila dam to Grand anicut passes through the areas lying between the Pennar and Cauvery rivers, where the existing irrigation facilities are minimal and hence it is proposed to provide these areas falling in Nellore and Chittoor districts of Andhra Pradesh, Tiruvallur, Kancheepuram, Vellore, Tiruvannamalai, Villupuram

and Cuddalore districts of Tamil Nadu and Pondicherry (U.T) with irrigation from the water diverted through the link canal. The gross command area under the link canal has been identified to be 840218 ha excluding forest and land covered by water.

8.3.1 Existing Irrigation Facilities in the Command Area

The existing irrigation in the proposed command is about 55% of the gross cropped area, indicating that the agriculture in the area is almost equal through rain fed and irrigation. The existing sources of irrigation are mainly tanks and wells. There are about 22000 dug wells, 105000 tube wells and 2700 tanks in the proposed command area. Out of the total area presently being irrigated, 35% is by tanks and 62 % by wells and the remaining 3% by canals and other sources. The source-wise irrigation in the proposed command area during the year 2001-02 as assessed from taluk-wise statistics are presented in Table 8.1.

Table 8.1
Source-wise Irrigation in the Proposed Command Area during the Year 2001-02

Unit: ha

Sl. No.	District	Area irrigated by				Total
		Canals	Tanks	Wells	Others	
1.	Nellore	1623	4010	6302	198	12133
2.	Chittoor	267	3722	8391	0	12380
3.	Tiruvallur	0	2627	20147	7	22781
4.	Kancheepuram	285	52603	44734	1242	98864
5.	Vellore	0	3988	4875	0	8863
6.	Tiruvannamalai	22	48	3080	0	3150
7.	Villupuram	0	17866	37061	2	54929
8.	Cuddalore	5370	6614	39432	47	51463
9.	Pondicherry	0	0	4771	0	4771
	Total	**7567**	**91478**	**168793**	**1496**	**269334**

8.3.2 Current Agriculture Scenario and Existing Cropping Pattern

The total area available for cultivation in the proposed command area calculated based on the taluk wise statistics is 599010 ha and the net

area sown is 413414 ha. The gross area sown is 485298 ha, which is cultivated mostly during North - East monsoon only.

The principal crops grown in the area are paddy, jowar, maize, pulses, cotton, vegetables and chillies during the Kharif season and paddy, ragi and oilseeds during the Rabi season. Paddy, oil seeds and cotton are the main crops being cultivated in about 65% of the net sown area in the proposed command.

8.4 Proposed Irrigation in the Command Area

8.4.1 Soil and Land Irrigability Classification

Since no detailed thematic maps are readily available, the land irrigability classification of the proposed command area could not be ascertained. However, from the details furnished in the soil survey reports prepared by Soil Survey & Landuse Organisation, Department of Agriculture, Govt. of Tamil Nadu on the land irrigability, the characteristics of both soils and lands available in the proposed command area are furnished below:

1)	Area of land with moderate limitation for sustained use under irrigation	4.62 lakh ha.
2)	Area of land with moderate to severe limitation for sustained use under irrigation	3.44 lakh ha.
3)	Area of land with severe to very severe limitation sustained use under irrigation	0.34 lakh ha.
	Total	8.40 lakh ha.

Out of the above 8.40 lakh ha, an area of 4.912 lakh ha has been considered as command area, which could be provided with irrigation.

8.4.2 Layout of Direct Sluices, Branch Canals / Distributaries and their Commands

The 1: 50000 scale toposheets with contours at 20 m interval of the command area prepared and supplied by the Survey of India were used for the purpose. In the initial reach as the Kandaleru Flood Flow Canal is running closer to the proposed link canal, one branch canal is proposed at RD 25.000 km for irrigating Pennar Delta Sub-basin. Further, the Kandaleru – Poondi Canal is running close to the proposed canal alignment and hence, 6 direct sluices are provided in those areas for irrigating isolated patches between RD 50.090 km to RD 111.300 km. Considering the information on ground elevation available in these maps,

a net work of branch canals was drawn with the branch canals/distributaries aligned mostly along 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. The layout of the branch canals/distributaries so finalised was then transposed on to the land irrigability maps of the same area in 1:50000 scale. The CCA under each of the branch canals was planimetered and then worked out proportionately based on the land use statistics. The areas under each of the branches so measured were adjusted to match with the gross command area of 840218 ha after deducting the forestland. However, considering the culturable command area of 599010 ha and existing irrigation through surface water, an area of about 491200 ha is proposed for irrigation by the link canal.

In all, the total command area is divided into area under 6 direct sluices and 16 branch canals and branch-wise net irrigable areas are given in Table 8.2.

Table 8.2
Direct Sluices/ Branch Canals with their Irrigable Areas in the Command

Sl.No.	Name of the direct sluice/ branch canal	Irrigable area (ha) (CCA)
1	Chalapalle branch canal	26484
2.	Direct sluices No.1 to 5	4972
3	Inagaluru branch canal	7886
4	Pallamepeta branch canal	2395
5	Jagalapalli branch canal	2735
6	Direct sluice No.6	1696
7	Nindra branch canal	30721
8	Vaniyampettai branch canal	31911
9	Pudupakkam branch canal	28571
10	Sodiyampakkam branch canal	6949
11	Nallur branch canal	90977
12	Mettur branch canal	71591
13	Tiruvampattu branch canal	31564
14	Mettukuppam branch canal	17095
15	Kuvadu branch canal	4257
16	Ulundurpettai branch canal	113423
17.	Seppakkam branch canal	10687
18.	Veppur branch canal	7286
	Total	491200

8.4.3 Suggested Cropping Pattern

The cropping pattern suggested for future major projects in the preliminary water balance study reports of the basins lying between Pennar and Cauvery rivers prepared by NWDA has been adopted for the proposed command area under the link canal. This cropping pattern has been suggested taking into account the soils available in the basin area and prevailing agricultural/irrigation practices. The intensity of irrigation is considered as 100%. The proposed cropping pattern for irrigation of the command area enroute the link canal is given in Table 8.3.

Table 8.3
Proposed Cropping Pattern for Irrigation under the link canal (% of command area)

Crop	Pennar delta and Streams between Pennar and Palar basins	Palar basin	Streams between Palar and Cauvery basins
Kharif			
Paddy	19	19	13
Groundnut	9	8	0
Fodder	18	18	0
Cotton	14	13	0
Chillies	4	6	7
Maize	0	0	15
Rabi			
Paddy	0	5	0
Fodder	7	6	10
Groundnut	7	6	15
Jowar	7	9	10
Pulses	15	10	15
Ragi	0	0	5
Cotton	0	0	10
Total	**100**	**100**	**100**

8.4.4 Crop Water Requirement

The proposed command area is falling in the basins of i) Pennar ii) Streams between Pennar and Palar iii) Palar and iv) Streams between Palar and Cauvery. The crop water requirement has been computed using climatological approach. There are five IMD observatories located at Nellore, Vellore, Chennai, Cuddalore and Kallakurichchi which are

adjacent to the proposed command area. Normal monthly values of potential evapotranspiration and rainfall data of all the observatories are available in the IMD publication. These have been used in computing the net irrigation requirements of different crops as per the suggested cropping pattern. The gross irrigation requirements of the crops have been worked out considering an irrigation efficiency of 55% for the crops under major schemes except paddy for which 65% is considered. Considering the gross water requirement for the each crop as computed above and the extent of irrigable areas for different crops in each of the direct sluices and branch canals, the month-wise and branch-wise water requirements are computed. The annual water requirement for enroute irrigation is estimated to be 3048 Mm^3.

8.5 Domestic and Industrial Requirements of the Proposed Command Area

The requirement of water for domestic consumption in the rural and urban areas within the command has been computed by projecting the rural and urban human population of the proposed command area to 2050 AD. It is also proposed to meet the domestic requirement of the towns situated to the right side of the link canal alignment, within a distance of 20 km and involving lifts not more than 100 m from link and the domestic & industrial requirement of Chennai city by considering the per capita daily requirement of 70 and 200 litres for the rural, urban population respectively.

The rural and urban population of the command area for the year 2001 has been estimated on proportionate area basis from the taluk wise census data of 2001. The total population of the command area in 2001 was 50.39 lakhs and has been projected to 2050 AD using compound growth rates as suggested by UNO in their publication, “World Population Prospects- 1994” (Revised). From the total projected population, urban population is considered as 63% and rural population as 37%.

The domestic water requirement of the projected population in the command is worked out for full urban population @ 200 lpcd and 50% of the rural population @ 70 lpcd. The domestic requirement to be met by the link canal is arrived by deducting the requirement of existing total population by considering 50 lpcd for both urban and rural population being met by existing sources. In case of requirement of the towns situated to the right side of link canal alignment, the existing demand

met is deducted @ 200 lpcd to arrive at the domestic requirement to be provided through the link canal.

The water requirement for the entire urban and 50% of the rural population is proposed to be met from the surface water resources, which works out to 605 Mm^3.

No industrial requirement has been considered for the command areas. However, a quantity of 500 Mm^3 has been considered towards the industrial requirement of Chennai city. Thus, the total domestic and industrial water requirement of the enroute area to be supplied from the Pennar (Somasila) – Palar - Cauvery (Grand Anicut) link canal is estimated to be 1105 Mm^3.

8.6 Transmission losses

The transmission or conveyance losses i.e. the amount of water lost through evaporation and seepage in the link canal during its course from the Somasila dam to Grand Anicut, have been estimated month-wise considering 0.60 cumec per million square metre of wetted area of the canal as per Bureau of Indian Standard Code and the annual losses on this account works out to 557 Mm^3.

8.7 Month-wise Distribution Pattern of Water for various demands from the Link

The month-wise water requirement for various demands to be met from the Pennar (Somasila)-Palar-Cauvery (Grand anicut) link is shown in Table 8.4.

Table 8.4
Month-wise Distribution Pattern of Water for Various Demands From the Link

Unit: Mm^3

Month	Proposed command		Trans-mission loss	Total	
	Irrigation use	Domestic and Industrial uses		Transfer to Cauvery	Total
Jun.	126	15	42	68	251
Jul.	419	169	54	445	1087
Aug.	385	168	61	854	1468
Sep.	430	170	59	764	1423
Oct.	154	168	56	630	1008
Nov.	159	129	49	381	718
Dec.	207	29	49	336	621
Jan.	197	39	49	377	662
Feb.	278	68	33	0	379
Mar.	442	68	38	0	548
Apr.	185	68	34	0	287
May	66	14	33	0	113
Total	3048	1105	557	3855	8565