

Chapter 12

Estimates

Estimate for the project is prepared as per the guidelines of Central Water Commission, Govt. of India, for preparation of project estimates for major irrigation and multipurpose projects.

12.1 Classification of units

The entire project is grouped into three units:

Unit I: Head works: Head works comprising the three reservoirs i.e Punnamedu (on Pamba Kal Ar), Achankovil Kal Ar (on Achankovil Kal Ar) and Achankovil pumped storage dam (on Achankovil river) are included under this unit. The tunnel connecting Pamba Kal Ar and Achankovil Kal Ar and Achankovil Kal Ar to the main canal on Tamil Nadu side are also considered under this unit.

Unit II: Main Canal: This unit includes the energy dissipation arrangements at the tunnel exit, canal on Tamil Nadu side beyond the tunnel exit, regulators, canal drops, cross masonry and cross drainage works.

Unit III: Hydro Electric installations: The following powerhouses are considered under this unit.

1.	At the inlet of interconnecting tunnel between Punnamedu and Achankovil Kal Ar reservoirs with installed capacity of 3 MW.
2.	At the toe of Achankovil Kal Ar dam with installed capacity of 500 MW.
3.	Downstream of Achankovil reservoir with installed capacity of 1.5 MW.
4.	Four power stations on the main canal at canal drops with a combined installed capacity of 3.87 MW.

12.2 Classification of minor heads / sub heads

Each unit has been divided in to the following minor heads and classified as direct and indirect charges.

12.2.1 Direct charges

- I Works
- II Establishment

- III Tools and plant
- IV Suspense
- V Receipts and recoveries on capital account

12.2.2 Indirect charges

- (a) Capitalized value of abatement of land revenue.
- (b) Audit and account charges.

12.2.3 The provisions under the minor head

All works have been further sub divided into various subheads as per the guidelines and are briefly explained in the subsequent paragraphs.

12.3 Requirements under different subheads

An abstract of estimates of works under Unit I, II and III are at Table 12.1.

Table 12.1
General Abstract of Cost

Sl. No.	Item	Amount (Rs. in lakhs)		
		Unit - I	Unit - II	Unit - III
DIRECT CHARGES				
I	Works	74710	24501	26398
II	Establishment	7265	2387	2640
III	Tools & Plants	726	239	264
IV	Suspense	Nil	Nil	Nil
V	Receipt and recoveries on capital accounts (-)	614	Nil	14
	Sub-total	82087	27127	29288
INDIRECT CHARGES				
I	Capitalised value of abatement of land revenue	3	31.80	0.30
II	Audit and account charges	744	245.01	263.98
	Sub-total	747	277	265
	Total	82834	27404	29553
	Grand Total	139791		
		Rs. 1397.91 crores		

The basis for the provisions made under various minor heads and sub-heads under Units I, II and III of the estimate are briefly explained below :

Unit I - Head Works

A - Preliminary: This sub head covers the expenditure on investigations so far done and yet to be conducted, design studies, publication of reports and fee of consultants etc. A provision of Rs. 1374 lakhs has been provided for the preliminary works at 2% of the cost of I – Works.

B - Land: The total extent of submergence is about 2004 ha including river portion at FRL condition. Out of this, reserved forest would comprise 1398 ha and forest plantation 587 ha.

The cost of cultivated lands has been worked out based on the local prevailing rates of Rs. 2.5 lakh / ha in the vicinity of the project. The reserved forest and forest plantation will be taken on lease from forest department for a period of 10 years as per the prevailing norm in Kerala. A provision of Rs. 250 / ha / annum is made towards lease charges of these land.

A part of Achankovil village will be coming under submergence displacing about 297 people. Necessary rehabilitation centres and amenities are proposed to be provided for the affected families. The estimated cost for rehabilitation component works out to Rs. 1957 lakhs. Total forest area that will be submerged under this project is 1985 ha including the area under plantation. No new land is indicated to be available for acquisition for afforestation and hence degraded forests if available with Forest Department is proposed to be made use of to an extent of double the area of forest coming under submergence for afforestation purposes. A rate of Rs. 30,000/- per ha as prevailing in the State is adopted for afforestation of about 3980 ha of degraded forest area and the same works out to Rs. 1194 lakhs. The total provision under B-Land would be Rs. 2064 lakhs.

C - Works: The cost of Punnamedu dam, Achankovil Kal Ar dam and Achankovil dam has been estimated which works out to Rs. 55067 lakhs. This includes clearing the site, construction of cofferdam, preparation of foundation and concreting of dam and spillway. The cost of the interlinking tunnel and the diversion tunnel is estimated to be Rs. 3124 lakhs and Rs. 4856 lakhs respectively and also included under this head. These costs include clearing the site, excavation of tunnel and providing and placing of precast R.C.C. slabs along with permanent steel supports. The overall provision under this head works out to Rs. 63047 lakhs. The standard schedule of rates of Kerala for the year 1992 has been adopted for estimating the cost of the works.

K - Buildings: A sum of Rs. 1291 lakhs is provided under this sub head.

The prevailing plinth area rates of Rs. 1500/- per m² for permanent buildings and Rs. 855/- per m² for temporary buildings are adopted and the cost works out to Rs. 1291 lakhs.

While working out the provision under this sub-head, cost for land development, colony roads, fencing and service connection for water supply, sewerage and electricity is also accounted.

M - Plantations: A lumpsum provision of Rs. 10 lakhs has been made towards plantation of avenue trees, horticulture etc., required for beautification at the downstream of the dam, around power houses and at other important structures. The provision includes maintenance and protection for 2-3 years.

O - Miscellaneous: A provision of Rs. 2803 lakhs has been made to cover the capital cost of electrification, water supply, sewerage, telephone, medical equipments, recreation facilities, etc., and their maintenance. The provision made is 4% of the cost of I – Works.

P - Maintenance: A provision of Rs. 692 lakhs has been made to cover the cost of maintenance of building, roads and other structures during the period of construction. The provision made is 1% of the cost of I – Works excluding A – Preliminary, B – Land and Q – special T&P and covers maintenance of all works during the construction period.

Q – Special T & P: A provision of Rs. 3058 lakhs is made for purchasing earth moving machinery and other ancillary machinery and equipment. A provision of Rs. 180 lakhs is made for the purchase of inspection and transport vehicles. 75% cost of Rs. 3058 lakhs provided under machinery is assumed to be recovered on works. Hence the net amount charged to 'Q' special T&P is only 25% of the capital cost of machinery and it works out to Rs. 720 lakhs. The entire capital cost of inspection and transport vehicles are chargeable to T & P. Thus, a provision of Rs. 900 lakhs is made under this sub head.

R - Communication: A provision of Rs. 2005 lakhs is made under this subhead towards the following works:

(i)	Formation of new roads of 12 km length and widening and improving of 40 km length of existing roads, making approach road to the Achankovil Kal Ar dam from Punalur.
(ii)	Improving the existing approach road to Punnamedu dam site from Konni.
(iii)	Construction of quarry roads and temporary roads in the work area.

S – Power Plant: A provision of Rs. 349 lakhs has been made for providing Power Plant and electrical system. The amount worked out is 0.5% of the cost of I-Works less cost of A, B and Q.

Y – Losses on Stock: A provision of Rs. 175 lakhs is made at 0.25% of cost of I-Works less cost of A-Preliminary, B-Land and Q-special T&P towards losses on stock of material due to natural causes.

II Establishment

An amount of Rs. 7265 lakhs at 10% of the cost of I-Works less B-Land is provided under this subhead for establishment including leave and pensionery charges.

III Tools & Plants (ordinary)

A provision of Rs. 726 lakhs is made under this subhead to cover Survey instruments, Camp equipment, Office equipment and other Small tools. The provision made is 1% of I-Works less B-Land.

IV Receipts and recoveries

The resale value of the machinery is taken as 75% of the amount (Rs. 720 lakhs) chargeable to special T & P and 20% of the capital cost of inspection and transport vehicles (Rs. 180 lakhs). 15% of the cost of temporary buildings are also been considered as available as resale value. The total resale value thus works out to Rs. 575.63 lakhs.

Indirect Charges

A provision of Rs. 744 lakhs at 1% of I-works is made towards audit and accounts charges and Rs. 3 lakh towards abatements of land revenue on culturable land going under submergence.

Unit – II Main canal, branch canal and distributaries

This unit covers main canals, branches, distributaries, channels inclusive of all pucca works, flood embankments, drainage works etc. Works relating to powerhouses at four canal drops on the main canal is also included under this unit. This unit is located in Tirunelveli, Virudhunagar, and Tuticorin districts of Tamil Nadu. From the standard schedule of rates of these three districts average rates are worked out for different items of works and the same is adopted to work out the cost estimate. This unit is sub divided into different heads/subheads and the provisions made under each head/subhead is described below:

A – Preliminaries: This subhead covers the expenditure on investigations already done and studies yet to be conducted such as soil surveys, investigation of foundation of C.D and C.M works, preliminary soil tests and establishing laboratories etc. An amount of Rs. 465.43 lakhs at 2% on cost of I-works of Unit II has been provided under this subhead.

B - Land: A provision of Rs. 636.00 lakhs has been made towards the cost of land acquisition along the canal alignment and at the cross drainage works. The rates adopted are varying from Rs. 1.25 lakhs to 0.20 lakhs / ha as per the rates collected from the sub-registrar office of different districts. In addition to cost of land acquisition, 25% of cost of land is considered towards the increase in payment due to delay in acquisition of land and payment of compensation. 1% cost of land is considered as the cost of land acquisition and demarcation.

C – Works: A provision of Rs. 9.5 lakhs has been made under this subhead for providing energy dissipation arrangements at the tunnel exit.

D – Regulator: Two cross regulators are proposed along the length of main canal and one head regulator is proposed on branch canal for which a provision of Rs. 71.85 lakhs has been made in the estimate. The provision made is inclusive of the cost of the canal sluice of branch canal.

E – Falls: There are four canal drops on the main canal. Hydropower generation is proposed at these drops, but the cost of power component is not included under this head, which is considered under Unit-III, Hydroelectric installations. The cost of the canal drops is worked out using the cost curves of canal drops of Bargi Diversion project of Madhya Pradesh. The total provision under this sub-head is Rs. 107.30 lakhs.

F - Cross drainage works: Total 25 cross drainage works are to be provided on the main canal and 10 CD works are to be provided on the branch canal. Adopting the rate analysis for each item of work the cost of the cross drainage works is worked out. The total cost under this sub head works out to Rs. 633.74 lakhs.

G – Bridges: The total number of road bridges proposed are 27, out of which 25 are on the main canal and 2 are on the branch canal. In addition, one railway bridge is also proposed on the main canal. Adopting the rate analysis for each item the entire cost of bridges is estimated which works out to Rs. 181.11 lakhs.

L - Earth work and lining: An amount of Rs. 2836.10 lakhs is provided for earth work, which includes excavation of cutting, filling and embankments. The main canal and the branch canal are proposed to be lined for 10 cm thickness. A provision of Rs. 1368.69 lakhs has been made towards this. The rates are based on Rate Analysis and the Schedule of Rates.

M – Plantation: A provision of Rs. 33.19 lakhs has been made on the basis of rate per km of plantation for the total length of the canal. The rate per km adopted is same as that being adopted by the Tamil Nadu PWD. The rate includes cost of maintenance and protection for 2/3 years.

O – Miscellaneous: An amount of Rs. 474.74 lakhs, i.e. 2% of cost of I-works is provided under this subhead.

P – Maintenance: A provision of Rs. 231.10 lakhs has been made towards maintenance of canal and canal structures at the rate of 1% of the cost of I-works less A - Preliminary and B - Land.

R – Communication: The provision made under this sub-head is Rs. 104.42 lakhs, for laying inspection roads along both the main and branch canals.

U – Distributaries: A provision of Rs. 13862.26 lakhs has been made towards cost of distributaries and minors which includes cost of land acquisition, earth work excavation, lining, cross drainage and cross masonry works. A rate of Rs. 13650/- per ha is adopted for this item as per the rate obtained from results of detailed sample survey carried out for an area of 15,000 ha under the project command.

V – On farm development and water courses: A provision of Rs. 3046.65 lakhs has been made under this subhead at the rate of Rs. 3000/- per ha of

cultivable command area as adopted in the Parambikulam - Aliyar project in Tamil Nadu.

W – Drainage: A provision of Rs. 380.83 lakhs has been made towards cost of providing drainage network in the command area. The rate as adopted by the State Govt. at Rs. 375/- per ha is considered.

Y – Losses on Stock: A provision of Rs. 58.35 lakhs is made towards losses on stock, at 0.25% of cost of I-works less A-Preliminary and B-Land.

II Establishment.

A provision of 10% on I-works less B-Land is made under this head which works out to Rs. 2386.53 lakhs.

III Tools and Plants (ordinary)

A provision at 1% on cost of I-Works less B-Land is made under this head, which works out to Rs. 238.65 lakhs.

Indirect Charges

A provision of Rs. 31.80 lakhs is made towards capitalized value of abatement of land revenue and Rs. 245.01 lakhs is provided towards audit and accounts charges. The capitalized value of abatement of land revenue is assumed as 5% of cost of land acquired and the audit and accounts charges as 1% of cost of I-Works.

Unit III Hydro-electric installation

This unit covers the power component of the project, comprising a total of seven powerhouses. The main powerhouse is located at Achankovil Kal Ar dam with an installed capacity of 500 MW. Two mini power houses are proposed, one at the inlet of Punnamedu-Achankovil Kal Ar interconnecting tunnel with installed capacity of 3 MW and the other at the down stream of Achankovil pumped storage scheme with installed capacity of 1.50 MW. Further four power stations are proposed at the canal drops, out of which two are of 1125 kW installed capacity and the other two are of 810 kW installed capacity. The provisions made under each subhead are as follows:

A – Preliminary: A provision of Rs. 512 lakhs has been made at 2% of the cost of I - Works.

B – Land: The land required for power installation in the Kerala State is 5 ha and is proposed to be taken on lease from the Forest Department, for a period of 10 years at the prevailing lease rate of Rs. 250/- per ha / annum. The rent works out to Rs. 0.13 lakhs. The power installation at the canal drops necessitates acquisition of land to an extent of 2.4 ha. Adopting the prevailing rate of Rs. 25,000/- per ha the cost of land acquisition works out to Rs. 0.60 lakhs. In addition Rs. 0.96 lakhs is provided for land acquisition and demarcation works. The total provision under this subhead works out to Rs. 2 lakhs.

C – Works: A provision of Rs. 4824 lakhs has been made for all the civil works involved in the installation of power plants. The rates adopted for Nagarjunasagar Hydro-electric scheme has been considered for working out the cost estimate.

S – Power plant and electrical system: A provision of Rs. 20721 lakhs has been made towards installation of power plants at all the powerhouses. The cost of each item involved in power plant installation is based on the cost of similar items adopted for the Nagarjunasagar Hydro-Electric Scheme.

P – Maintenance: A provision of Rs. 256 lakhs has been made towards cost of maintenance of power installation at 1% of the cost of I-Works less the cost of A-Preliminaries, B-Land and Q-special T&P.

Q – Special T& P: Total cost of the special T&P required for power installation is Rs. 73 lakhs, 75% of which is assumed to be recovered from works. The net provision towards special T&P works out to Rs. 18.25 lakhs and is taken as Rs. 19 lakhs.

Y – Loss on stock: A provision of Rs. 64 lakhs has been made towards losses on stock which is at 0.25% of the cost of I-works less A-Preliminary, B-Land and Q-Special T&P.

II Establishment

A provision of Rs. 2640 lakhs has been made towards establishment charges, which is 10% of I-Works less B-Land.

III Ordinary tools and plants

A provision of Rs. 264 lakhs has been made towards procurement of ordinary tools & plants which is 1% of I-Works less B-Land.

IV Receipts and Recoveries on Capital Account

The estimated recoveries by way of resale of T&P would be of the order of Rs. 14 lakhs.

Indirect Charges

A provision of Rs. 0.30 lakhs has been made towards capitalized value of abatement of land revenue and Rs. 263.98 lakhs is provided towards audit and account charges, which is assumed as 1% of the I-Works. The total provision under the head indirect charges works out to Rs. 264.28 lakhs and is taken as Rs. 265 lakhs.