

Chapter 14

Revenues, Benefit Cost Ratio and IRR

14.1 Yearly development programme from the date of starting construction of the link project

The link project is scheduled to be completed in 5 years. Yearly programme of construction of the project has been discussed in detail in **Chapter 10: Construction programme, manpower deployment and plant planning.**

14.2 Sources of revenue

The proposed Godavari (Inchampalli) - Cauvery (Grand Anicut) link canal carries waters to irrigate needy areas in Godavari basin, Krishna basin, Pennar basin and Cauvery basins. The link canal is intended to supply water for irrigation of new areas and the areas under the existing commands of Nagarjunasagar and Grand Anicut projects. Further, it takes care of domestic and industrial needs of the command areas. Moreover, a part of water will always be in the reservoirs and ponds because of the regulated supply, thus giving scope for development of pisciculture. Also, there is a scope for power generation at the off take of the link canal from the Nagarjunasagar reservoir. There would also be revenue from plantation along the main and branch canals besides in the vicinity of the headworks. Thus, the benefits likely to be accrued from the link project are the following sectors.

- Irrigation
- Water charges (irrigation service fee)
- Domestic and industrial water supply
- Power generation
- Pisciculture
- Plantation on canal banks
- Animal husbandry
- Other intangible revenue

14.3 Direct benefits

The direct benefits include regular and expected net benefits due to implementation of the link project from irrigation, water charges, domestic and industrial water supply, pisciculture, plantations on canal banks and animal husbandry. The total benefit from the link project is assessed at **Rs. 1359789** lakh. The abstract of the benefits from the link project is given in **Annexure 14.1**.

14.3.1 Irrigation

The net value of produce before implementation of the link project is estimated. The probable net value of produce after the implementation of the link project is estimated. Thus, the net benefits from irrigation due to the link project are obtained.

The link canal will irrigate 944572 ha of area annually. The net benefits from irrigation are assessed from the estimated gross value of produce and the input cost of agriculture in pre-project and post-project conditions. The yield per hectare of land for different crops are obtained from concerned State authorities. The minimum supporting prices as declared by Govt of India for the year 2020-21 are considered for various crops. The gross value of produce in the Pre- & Post project scenarios is furnished in **Annexure 14.2.1**, while the input cost of agriculture is furnished in **Annexure 14.2.2**. The annual net benefits from irrigation are obtained as **Rs 641493** lakh at 2020-21 price level and the same are furnished in **Annexure 14.2.3**.

14.3.2 Water charges (Irrigation service fee)

The infrastructural network is being created in large scale for making water available in the proposed command area for irrigation and water supply purposes. Moreover, the water is brought from distant sources involving lift. Therefore, appropriate water pricing is quite necessary, so that the cost of operation and management of the project could be recovered

from the beneficiaries of the project upto some extent. Water charges shall be different for irrigation and non-irrigation uses.

The 12th Finance Commission recommended O&M cost norm of Rs. 600 per hectare for utilised potential and Rs. 300 per hectare for unutilised potential based on normative expenditure requirements for maintenance of irrigation works of major and medium irrigation projects. The 13th Finance Commission has adopted the norm of Rs. 1175 per hectare for the utilised potential and Rs. 588 per hectare for the unutilised potential for major and medium irrigation schemes respectively. After adjustment for inflation, with an annual growth of 5 per cent thereafter, these would reach the level of Rs. 1500 per hectare for utilised and Rs. 750 per hectare for unutilised potential in the current year (2018-19).

Keeping in view to sustain the O&M cost of project, Rs 1500 /ha as recommended by the 13th Finance Commission is considered for the water charges (Irrigation Service Fee) for this link project. The area likely to be benefitted by the link project is 944572 ha and the corresponding water charges @ **Rs 1500/ha** (Irrigation Service Fee) will be **Rs 14169 lakh**. The details are furnished in **Annexure 14.3**.

14.3.3 Domestic and industrial water supply

The rates for domestic and industrial water supply are considered as per the prevailing rates of Hyderabad Metropolitan Water Supply and Sewerage Board in **Table 14.1**.

Table-14.1 Tariff for domestic and industrial water supply

Sl.No.	Category	Rate/ kilolitre
1	Domestic	12
2	Industrial	72

The domestic water supply to command area is mostly covered by the gram panchayats and rarely by municipal councils. The domestic water requirement in the command area works out to 512 Mm³ and the corresponding net benefit to be accrued will be **Rs 14080 lakh**.

The water supply to industrial use is regulated either from the canal directly or from the reservoirs on the enroute and a rate of Rs 72 per m³ of water is considered as benefit from the industrial water supply. The industrial water requirement of the command area is estimated at 944 Mm³ and the corresponding benefit accrued will be **Rs 592360** lakh. The details are furnished in **Annexure 14.4**.

14.3.4 Power generation

The canal power house proposed at the offtake of the link canal at Musi and Nagarjunasagar reservoirs with a fall in head of 9.7 m and 20 m will generate 146 MU and 220 MU respectively. The installed capacity of these powerhouses are 60 MW and 120 MW. The annual power benefits would be about Rs. 14640 lakh at the rate of Rs. 4/- per unit.

14.3.5 Pisciculture

The reservoirs offer great potential for fisheries development. These form one of the most important untapped fisheries resources. The area for pisciculture is bound to increase with commissioning of new projects over time. Further, the link canal will augment the storages at Nagarjunasagar and Somasila and the water levels in these reservoirs will be maintained at higher elevation for considerable period of time during the year. The proposed Inchampalli barrage has a submergence of 9306 ha and live storage of 380 Mm³ offers a great scope for development of fisheries. Hence, there is scope for development of pisciculture in these ponds and reservoirs. The small reservoirs have the potential to yield 500 kg/ha/year. The fisheries development of reservoirs requires proper documentation of area under reservoirs, assessment of their production potential, introduction of improved technology and strengthening the infrastructural, institutional support and HRD programmes.

Considering the rate of Rs 300/kg, the lease amount likely to be received by irrigation department is **Rs 53385** lakh. The details are shown in **Annexure 14.5**.

14.3.6 Animal husbandry

The availability of fodder crops would increase substantially on introduction of irrigation in the command area. The agricultural industry shall get boost due to increase in farm produce. There is scope for additional revenue in dairy development and poultry. It is considered that mini dairy units can be established by the farmers in addition to farming to generate additional revenue. The revenue likely to be generated from animal husbandry is **Rs 10637** lakh and the details are shown in **Annexure: 14.6**.

14.3.7 Canal bank plantations

The length of the canal excluding length of tunnels will be about 1211km. Plantations can be grown all along the link canal banks on both sides within the canal way. It is proposed to opt for different types of tree species in the following order of priority viz. fruits and nuts, round wood species and plywood, non-timber forest products and oil seeds, paper and pulpwood, forage and fuel wood. The revenue likely to be generated from canal bank plantations is **Rs 18425** lakh and the details are shown in **Annexure: 14.7**.

14.3.8 Other benefits

Tourism activities will also increase in the project area due to formation of water bodies. The benefits from these activities however have not been quantified and considered in the benefit-cost analysis of the project.

14.4 Indirect benefits

Apart from the direct benefits, many indirect benefits would also accrue from the link project leading to significant improvement in all the socio - economic indicators in the region. These indirect benefits could be visualized or indicated in broad perspective only. Some of the likely indirect benefits are listed below.

- (1) Assured irrigation in the enroute region, which is hitherto devoid of any significant irrigation facilities, will create direct employment opportunities for the agricultural labour and for other professionals in this sector and several job opportunities would become available for the local people during the construction of the project and thereafter.
- (2) With the implementation of the scheme, living standards of the local farmers, in general, would improve because of better yield from their fields and hence higher returns for their work.
- (3) Once the irrigation facilities are developed, agro – based industries, dairy farms, poultry farms, marketing facilities for the agricultural inputs like pesticides and fertilizers etc are likely come up in the region, leading to general prosperity and economic uplift of the people of the towns and villages in the en route area.
- (4) The ground water availability in the command area would get enhanced on account of increased recharge to the ground water as a part of the water applied for irrigation gets percolated into ground.
- (5) Better communication facilities would become available resulting in better connectivity among the villages.
- (6) Infrastructural facilities would improve due to increased industrial and marketing activity in the region.
- (7) Plantation along the canal banks and the proposed afforestation of the surrounding areas would enhance environmental status of the region.

14.5 Concession in water rates

Water is a precious commodity and more so in the present case as it is diverted from long distance. Hence, it should be used judiciously. In order to curb the wastage of water, no concession of the rates in the project command is considered.

14.6 Administrative charges for water supply and revenue collection

Suitable provision has been made for operation and maintenance of the canals, which include administrative charges for supply of water.

14.7 Redress of scarcity

The main aim of the link project is to provide irrigation in the needy areas of Godavari basin, water short Krishna basin and Cauvery basin besides other intermittent small basins. Hence, the purpose of redressal of the scarcity areas is served with the link project.

14.8 Commencement of realisation of the revenue

The construction of project is scheduled to be completed in 5 years. The irrigation development in all the commands is also expected to be completed by then. Revenue from irrigation is expected to start accruing in full from beginning of 6th year i.e. after completion of the project.

14.9 Total Income from various sources

The total revenue from various sources at 2020-21 price level will be Rs. 1359189 lakh. The details are furnished in **Table 14.2**.

Table-14.2 Annual revenue generation (Lakh) from the link project

Source of revenue	Revenue
Irrigation	641493
Domestic water supply	14080
Industrial water supply	592360
Power	14640
Irrigation cess	14169

Pisciculture and lease amount	53385
Animal husbandry	10637
Canal plantation	18425
Total	1359189

14.10 Manpower for collection of revenue

The revenue will be collected by the district / tehsil administration through their existing system / staff. Hence, no separate provision for the same has been made.

14.11 Annual costs

The cost of this link project is estimated under five main components viz. Unit I: Head works, Unit II: Conveyance system, Unit III: Power/Pump house, Unit IV: Lifting arrangements and Unit V: Onfarm development. The total project cost is estimated to be Rs 8596236 lakh at 2020-21 price level.

The annual cost of the link project is estimated considering 10% interest and 1% depreciation on the capital cost, annual O & M charges for the project @ Rs 1750/- per ha, maintenance of head works @1% of the cost of head works, depreciation cost for pumping system and energy charges. The details are shown in **Table 14.3**.

Table-14.3 Annual cost of the link project

Sl. no	Component	Annual cost (Rs in lakh)
1	Interest on capital @ 10 % (Estimated total cost of the project including cost of land development)	859514
2	Depreciation of the project	85793
3	Depreciation of the pumping system @ 8.33% (12 years)	55066
4	Power charges at Rs 2 per unit for (3845 MU)	76900
5	Maintenance of head works @ 1 %	3921
6	Annual operation and maintenance charges at Rs. 1750/- per ha for 887022 ha (CCA)	15523
	Total annual cost (1 to 6)	1096827

14.12 Benefit cost ratio (BCR)

The BCR of the Godavari (Inchampalli) - Cauvery (Grand Anicut) link is worked out considering the annual cost of the link project and the annual likely benefits from the link project at 2020-21 price level. The BCR is a helpful tool to get an idea about the worth of the project while comparing the annual benefits with annual costs.

The benefit cost ratio (BCR) is found to be 1.24. The details of computation of BCR are shown in **Annexure 14.8**. The BCR would have further improved, had the size of the canal between Nagarjunasagar and Grand Anicut been not designed for larger quantity keeping in view the ultimate inter- basin water transfer under peninsular component.

14.13 Internal rate of return (IRR)

The internal rate of return is that rate of discount at which the net present value of the project is equal to the net present benefit. For working out the IRR, the capital cost of the project has been distributed over 5 years as yearly cost. The cost of replacing the electrical and mechanical equipments, and the pipeline & rising mains have been accounted at interval of 12 years and 36 years respectively. The annual maintenance cost of head works, canal and command area has been taken from 3rd year onwards. The full annual benefits will accrue partly from 3rd year and in full from 6th year onwards. The internal rate of return is found to be 11.9 %. The details are furnished in **Annexure 14.9**.

14.14 Benefit cost ratio for flood control component

There is no flood control component involved as only a barrage is proposed on Godavari.

14.15 Role of the link project in the overall development of the region

The project will go a long way in enhancing the socio-economic status of the people of the area. It would provide the impetus to industrialization and overall economic development of the region. In

addition to above benefits, lot of employment will be generated during construction period which will enhance the socio-economic conditions of the people living in the vicinity. As a corollary, many new secondary and tertiary economic activities will be generated in the region due to coming up of this project, which will lead to overall development of the area.

In addition, the following recreational facilities will also be available on completion of the project.

- Parks/gardens in downstream of barrage.
- Children parks in the townships.
- Tourist spots with boating facilities.
- Guest house, inspection bungalow and dormitory accommodation.

These facilities will boost tourism development in the area.