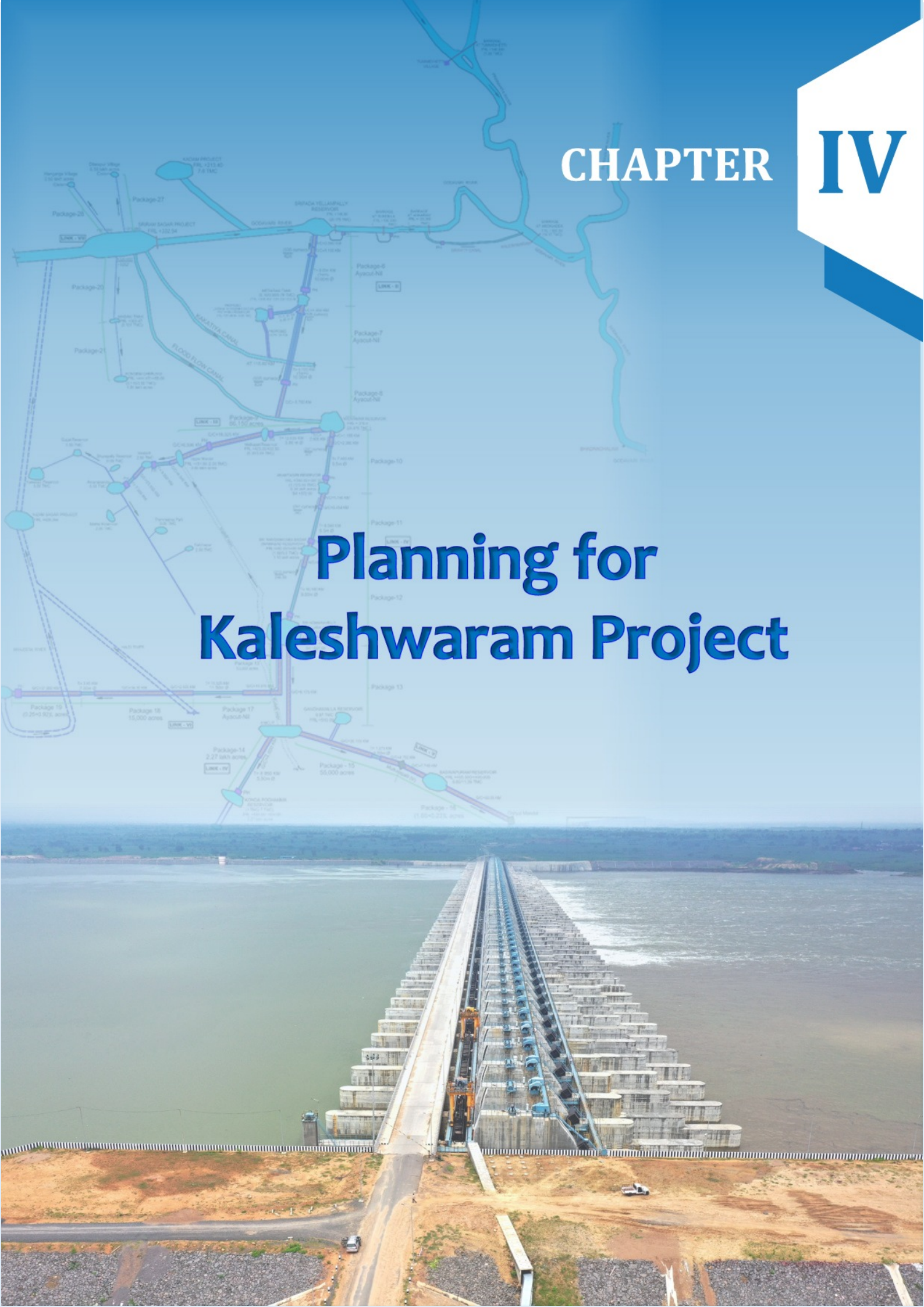


CHAPTER

IV

Planning for Kaleshwaram Project



Planning for Kaleshwaram Project

SUMMARY

The deficiencies noticed in the DPR of the PCSS project and the questions raised regarding its viability led to the re-engineering of the Project and the proposal for the Kaleshwaram Project. The DPR of the newly envisaged Kaleshwaram Project was also, however, entrusted to WAPCOS on nomination basis. The time given for preparation of the DPR was short, leaving little room for thorough survey and investigation. There appeared to be haste in planning the project with revised works being awarded even before the preparation and the approval of the DPR. Some of these items of work were unwarranted, or of doubtful utility, leading to a substantial increase in the project works/cost. The total energy requirement of the project will also put a strain on the State's resources. The peak power demand of the Kaleshwaram Project would be higher than the present average daily supply in the entire State.

In terms of the viability of the project, in the proposal submitted to CWC, the project costs were understated while the benefits were inflated. The cost of works currently underway have hiked to ₹1,02,267.99 crore as against the ₹63,352 crore projected in the DPR. The project cost is now likely to exceed ₹1,47,427.41 crore, as against the cost of ₹81,911.01 crore projected to the CWC. Further, the calculation of the returns on an inflated basis has resulted in the Benefit-Cost Ratio falling below the project viability benchmark of 'one' (1.00). To finance the project, the State Government depended mainly on the off-budget borrowings raised by the Kaleshwaram Irrigation Project Corporation Ltd. (KIPCL) based on the guarantees given by the State Government. As much as 72.82 per cent of the expenditure incurred since 2016-17 on the project was met from off-budget borrowings. Servicing this debt and meeting the high operational expenditure of project in the coming years will be a challenge to the State Government.

4.1 Planning and scoping of project works

As already stated, the re-engineering of PCSS project was necessitated due to the deficiencies noticed and questions raised on the viability of the project. It was a result of taking up the project works in a hasty manner without complete investigations and proper planning. Considering the huge scale of the project and the costs involved, prudence requires that detailed survey and investigations are conducted, and the scope and cost of the revised project (Kaleshwaram) are firmed up before taking decisions on further investments thereon. However, this was not the case, as discussed below.

4.1.1 Preparation of Detailed Project Report

The I&CAD Department entrusted the work of preparation of Detailed Project Report (DPR) in respect of Kaleshwaram Project to WAPCOS⁴³ in five agreements concluded during April 2015 to March 2016 for a total amount of ₹33.21 crore. Further, the Department had stipulated unduly short periods in the agreements concluded with WAPCOS for completion of DPR preparation work as shown in the Table 4.1 below:

Table 4.1 - Details of agreements concluded with WAPCOS for preparation of DPR for Kaleshwaram Project

S. No.	Details of scope of consultancy work	Agreement date (Time given to contractor)	Agreement value (payment) (₹ in crore)
1	Preparation of DPR for Kaleshwaram Project, Medigadda barrage and the lift/canal system from Medigadda to Mid Manair Reservoir (Link-I and II)	April 2015 (4 months)	6.78 (6.70)
2	Vetting of DPR for lift system from Mid Manair Reservoir to Tadkapally/ Pamulaparthi/Nizamsagar (Link-IV)	October 2015 (2 months)	2.85 (1.14)
3	Conducting Light Detection and Ranging (LiDAR) survey of additional 1900 Sq. Km covering Godavari river and also the water conductor system from Kondapochamma to Bhumpally and linking of Kaleshwaram Project with Kakatiya Canal of Sri Ram Sagar Project (SRSP). Preparation of DPR for diversion of 160 TMC of water by constructing barrage at river Godavari at Medigadda.	March 2016 (15 days)	7.90 (8.75)
4	Preparation of DPR for two barrages between Medigadda and Yellampally (i.e., Annaram and Sundilla barrages) (Link-I) and other reservoirs to increase storage capacity and their integration with Kaleshwaram Project	March 2016 (2 months)	12.96 (13.48)
5	Preparation of DPR for vetting of alignment from Sri Komaravelli Mallanna Sagar Reservoir to Singur Reservoir (Link-VI)	November 2016 (2 months)	2.72 (1.49)
Total			33.21 (31.56)

Source: Information furnished by I&CAD Department

As seen from the above table, the completion period stipulated in the agreements ranged between 15 days to 4 months which was impractical, considering the volume of work involved. Further, in respect of the first three works, the target date for completion of the work was on or before March 2016 and the fact that WAPCOS submitted the DPR to State Government in March 2016 indicates that the Department showed undue haste in getting the DPR prepared.

⁴³ M/s Water and Power Consultants Ltd. (WAPCOS) – a Public Sector Enterprise under the Union Ministry of Jal Shakti, Government of India

For example, in Sl. No. 2 of Table 4.1 above, in two months the work given to the contractor entailed the following:

- a) *Vetting of DPR for lift irrigation scheme from*
 - Mid Manair Reservoir to Tadkapally – Pamulaparthi,
 - Tadkapally - Gandhamalla - Baswapur,
 - Tadkapally – Nizamsagar, Pamulaparthi - Bhumpally.
- b) *Topographical survey of water conductor system from*
 - Mid Manair Reservoir to Tadkapally – Pamulaparthi,
 - Tadkapally - Gandhamalla - Baswapur,
 - Tadkapally – Nizamsagar,
 - Pamulaparthi - Bhumpally
- c) *Topographical surveys for the construction of barrage on Pranahitha at Tummidihetti with 152 m FRL submergence area*
- d) *Study of all engineering data of the project.*
- e) *Collection of data relating to the project from project authorities and other sources.*
- f) *Reconnaissance survey of project area.*
- g) *Conducting topographical survey using LiDAR, DGPS⁴⁴ and ETS⁴⁵.*
- h) *Geo technical investigation.*
- i) *Hydrological studies.*
- j) *Power and energy requirements studies.*
- k) *Design and preparation of drawings of various project components.*
- l) *Detailed project estimate.*
- m) *Economic and financial analysis.*

The above examples clearly show that the allotted time of two months given to the contractor was highly unrealistic and it was not practically feasible to complete the work in the stipulated time. The details of the works awarded as given in the Table 4.1 above are given in the **Appendix 4.1**.

As per the Government Order⁴⁶ (February 2014), procurement of works/materials costing ₹one lakh and above are required to be done by inviting tenders through e-procurement. Audit, however, observed that the entrustment of DPR works of Kaleshwaram Project was done on nomination basis without calling for tenders. Further, the decision was taken despite several deficiencies in the earlier work of WAPCOS in respect of the DPR of the PCSS project including incorrect assessment

⁴⁴ Differential Global Positioning System

⁴⁵ Electronic total station

⁴⁶ GO Ms. No.2 of Finance (Works & Projects – F7) Department, dated 03 February 2014

of water availability at source location, storage reservoirs proposed and submergence of villages in Maharashtra State, which had led to its re-engineering.

WAPCOS had submitted the DPR to the Department in March 2016. The Department submitted the DPR to the CWC in February 2017. The CWC approved the DPR in June 2018.

During the Exit Conference, the Government stated that WAPCOS has vast experience in this field and it being a Government agency, the DPR work can be given on nomination basis. However, the fact remains that there were several deficiencies in the earlier work of WAPCOS in the PCSS project. Further, the extant Government Orders did not mention that works can be entrusted to Government agencies on nomination basis.

In its written reply, the Government stated (May 2023) that the agency adopted the latest technology of Light Detection and Ranging (LiDAR) survey which does not require much time and hence the completion period stipulated was not impractical and that preparation of DPR was not done in haste. The Government further replied (November 2023) that the major hurdles in the PCSS Project were finalization of water availability by CWC and inter-state issues with Maharashtra which were rectified in re-engineering. It was also stated that the departmental engineers were constantly involved with WAPCOS in DPR preparation by duly verifying, correcting and supplementing the required information which resulted in quicker completion of DPR preparation.

Audit, however, noticed that during project execution, there were several cases of changes made in the scope of works, delays in finalising the scope of works and also grant of extension of time in the above works, confirming the fact that the DPR was prepared cursorily and in a hasty manner.

4.1.2 Award of works even before approval of DPR and subsequent major changes in the scope of project works

As was done in the case of the PCSS project, in Kaleshwaram Project also, the Department showed undue haste in award of works. The Department awarded 17 works costing ₹25,049.99 crore⁴⁷ before approval of the DPR by CWC.

While the CWC approved the DPR in June 2018, the Department had already awarded the works relating to the Medigadda, Annaram and Sundilla barrages and lifts during July-August 2016 while the works for Malkapet, Ranganayak Sagar, SKMS, Konda Pochamma Sagar, Gandhamalla and Baswapur reservoirs were entrusted during

⁴⁷ Details of works awarded before approval of DPR:

Nature of works	Cost involved (₹ in crore)
Barrage Works	4,550.40
Lift Works	6,232.90
Reservoir Works	11,853.16
PPIS Work	2,413.53
Total	25,049.99

September – December 2017. The supplemental/revised agreements for the revised scope of work (₹26,388.79 crore) in the already existing 12 contracts were also concluded during October 2016 to January 2018. Award of works even before approval of DPR (June 2018) indicates that the DPR process was treated as a mere paper formality rather than treating it as a vital process in the planning and designing of the project. This also undermined the prescribed mechanism of appraisal of projects with inter-state ramifications by the CWC.

The task of preparation of the DPR appears to have been done in a hasty manner without carrying out thorough survey and investigations for the project. This is evident from the fact that even after approval of the DPR, there have been several major changes in the project components and works initially awarded after re-engineering. The total cost of the civil works of the project presently stands at ₹1,02,267.99 crore (March 2022). The statement showing the cost of works initially awarded after re-engineering and the latest value of agreements/revised estimates is given in **Appendix 4.2**. Some of the major changes made post approval of DPR are discussed in the subsequent paragraphs (Paragraphs 4.1.2.1 and 4.1.2.2).

The Government replied (May 2023) that the DPR for PCSS Project was prepared and submitted to the CWC in 2010 itself and various remarks were also being attended to. The Department had also done detailed survey and investigation parallelly during the time of re-engineering to draft various alternative proposals as per necessity. Working in parallel with DPR preparation was the only methodology adopted for fixing the ECV which could save time and facilitate easy implementation of the project. The preparation of DPR and obtaining clearances was not done as a mere paper formality but was done on war-footing basis duly putting sincere efforts in all ways to obtain the clearances in record time. The Government further replied (November 2023) that major portions of the Kaleshwaram Project after re-engineering are the same as PCSS Project except the source location, water carrying capacity of conveyor system and capacities of reservoirs and therefore only slight modifications were required in most of the works. It was further stated that the works were awarded for quickening the process of investigation, designs, and execution of components which saved lot of time and facilitated easy implementation of the Project towards achieving the intended benefits. Regarding subsequent changes made in the project works, it was replied that in any project, the originally estimated provisions/components undergo revisions subsequently based on suitability of design parameters, site conditions encountered as per actual execution which may be due to inclusion/deletion/modification of certain items of works, change in specifications, *etc.*, depending on actual requirement during execution, various representations from local public as well as farmers, *etc.*

The reply is not tenable as in the DPR of Kaleshwaram Project, the total cost of project works was shown as ₹63,352 crore and the total cost of the new/revised works entrusted initially after re-engineering was ₹82,252.75 crore (*i.e.*, increase by ₹18,900.55 crore, or by 29.83 *per cent*) which has now further increased to ₹1,02,267.99 crore, as per the latest estimates (*i.e.*, a further increase by ₹20,015.24

crore, or by 24.33 *per cent*). Thus, the overall cost of works has increased from ₹63,352 crore to ₹1,02,267.99 crore *i.e.*, by ₹38,915.99 crore (or by 61.43 *per cent*) which cannot be considered as normal.

Further, Audit also observed that out of 17 works, only eight works have been completed, while eight are under progress and one has not even commenced (as of May 2023), indicating thereby that the undue haste shown by the Department was not subsequently reflected in the progress of work. Moreover, the works for distributary network for a CA of 3,43,148 acres were yet to be awarded, as of March 2022 (discussed in Paragraph 5.5.1).

4.1.2.1 Unwarranted increase in the pumping capacity of lifts

In the DPR submitted (February 2017) to the CWC, the water requirement of Kaleshwaram Project was projected as 235 TMC⁴⁸. It was proposed that this would be met by lifting 180 TMC of water from River Godavari, 20 TMC from Yellampally, 25 TMC from groundwater and 10 TMC from the yield of local tanks. As per the DPR, the 180 TMC of water was proposed to be lifted from Medigadda barrage in 90 days at the rate of 2 TMC per day and the cost of project works was accordingly computed considering the cost of pumps and motors with a total lifting capacity of 2 TMC per day. The scope of the lift works already entrusted (before approval of DPR) also stipulated lifting of 2 TMC of water per day from Medigadda to Yellampally and 1.9 TMC per day from Yellampally to Mid-Manair Reservoir.

While scrutinising the project proposal, the CWC stated (March 2018) that the yield from local tanks cannot be considered and directed that the water drawal from River Godavari be increased to 195 TMC instead of 180 TMC. Audit assessed that this additional 15 TMC could be drawn either by increasing the number of pumping days to 98 days instead of 90 days or by adding more pumps/motors with pumping capacity of 0.17 TMC per day. However, during June 2019 - February 2020, the Department decided to increase the pumping capacity of lifts and water conveyor system in Links-I, II and IV by one TMC per day at a total additional cost of ₹28,151 crore⁴⁹ and awarded the works. Audit observed that:

- No justification or scientific analysis about the need for this increase in the pumping capacity was available either in the estimates of these works or in the departmental records.
- Though the CWC had directed to increase the water drawal from River Godavari from 180 TMC to 195 TMC, it did not seek any revised DPR/project cost from the Department. This indicates that the CWC did not consider any necessity for increase in the pumping capacity or any additional works.
- Audit further observed that the agreements in respect of all the three the lifts/pumphouses in Link-I of the project (*viz.*, Medigadda, Annaram and

⁴⁸ including evaporation losses projected at 10 TMC

⁴⁹ These works involved increase in the size of the pump houses, installation of additional pumps and motors, increasing the capacity of the water conveyor system

Sundilla) were awarded on 27 August 2016 (*i.e.*, even before submission of DPR to CWC). As per the scope of work specified in these agreements, pumps and motors to lift 2 TMC of water per day were to be installed. However, within 19 days after concluding these agreements, the Department decided to revise the designs of civil works (*viz.*, pumphouses, approach channels, delivery mains, *etc.* in all the three lift works to accommodate increased discharge capacity of 3 TMC per day. Though this decision was taken in September 2016 itself, this fact was not disclosed in the DPR submitted later (in February 2017) to the CWC. This indicates that the Department did not wait for CWC approval and as such, getting the approval from CWC was reduced to a paper formality. Consequently, the Department gave the go-ahead for additional works without vetting by CWC.

- Increasing the capacity of the lifts and water conveyor system to 3 TMC per day has created a potential to draw more water (a total of 270 TMC of water can be drawn in 90 days at the rate of 3 TMC per day) from River Godavari as compared to 195 TMC approved by CWC.

Taking up of additional one TMC works at a huge cost of ₹28,151 crore was unwarranted and led to substantial increase in the cost of project works.

The Government replied (May 2023) that additional one TMC water has been proposed to lift the approved quantum of 195 TMC of water from Godavari River to SKMS reservoir, in order to meet the demand during crucial period when sufficient flood water is available in the river. The pumping is proposed for 82 days in a year to pump the water from Laxmi Barrage of Kaleshwaram Project. The number of days and quantity of water to be lifted were proposed duly considering 10 daily water availability series at Medigadda barrage site.

The reply of the Government is not tenable as analysis of 41 years 10 daily series of availability of water at Medigadda as conveyed by the CWC (while according Hydrological clearance in October 2017) revealed that average yield available during the July-October (first 10 days) of every year was more than 20 TMC per 10 days. Hence, 195 TMC of water could be lifted through the earlier developed infrastructure of 2 TMC/day.

Further, the CWC in its letter dated 05 September 2023, has questioned the justification given by the Department for taking up the additional one TMC works on the ground of filling the reservoirs at a quicker rate and stated that this will not increase the success rate of the project which is already assessed to be more than 75 *per cent.* Further, the CWC in its letter dated 21 June 2022 had also stated that on account of increased pumping capacity, there was a likelihood of diversion of more than the approved 195 TMC of water. Revised DPR which proposed to lift one additional TMC of water was yet to be approved by the CWC (November 2023).

Thus, creation of additional infrastructure despite availability of 2 TMC water for 98 days was unwarranted.

4.1.2.2 Adoption of Pressurized Piped Irrigation System

In the DPR of Kaleshwaram Project, the water requirement for irrigation was computed on the assumption that an extent of 73,885 Ha (*i.e.*, 1.83 lakh acres) would be brought under drip irrigation under the project. However, no provision was made in the project cost/package wise cost estimates in the DPR towards the cost of providing of drip irrigation.

As per the DPR, the Package-21 (under Link-VII) of the Project was to convey water from Masani tank to Padakanti, Manchippa and Kondemcheruvu tanks to irrigate 1.84 lakh acres through conventional open canal system. The estimated cost of the canal system was ₹940.14 crore. The Government later decided (October 2017) to implement Pressurized Piped Irrigation System (PPIS) at a cost of ₹2,248 crore to irrigate two lakh acres and awarded (April 2018) the work to a contractor under Package-21A.

(i) Costing of PPIS: Audit observed from the departmental records that the decision to implement PPIS was taken based on the assumption that a larger extent of area can be irrigated through PPIS as compared to the canal system and that though the initial cost of PPIS is more, the annual cost of PPIS would be less than that of open canal system. A cost-analysis made (July 2016) by the Commissioner, Planning and Development of Godavari Basin estimated that the cost of maintenance of PPIS would be ₹1,677 per acre per annum while the annual cost of open canal system would be ₹1,893 per acre per annum. These annual costs were computed considering the capital cost and life of the system and the annual maintenance costs.

Audit, however, observed that this estimation of annual costs was based on incorrect assumptions, as discussed below:

- The Department worked out the annual cost of PPIS considering an estimated capital cost of ₹2,040.2 crore. Though the operation of PPIS would require electricity supply arrangements, the Department did not include the cost of sub-stations in the capital cost of PPIS. As per the records, an amount of ₹72.61 crore was incurred on power supply arrangements. With this, the capital cost of PPIS works out to ₹2,112.81 crore.
- The annual costs of PPIS and open canal system were computed considering the life of both the systems as 50 years. As per the BCR calculations in the DPR of Kaleshwaram Project, the life of civil works was 100 years while the life of pipelines was 30 years. Thus, when the life of open canal system is taken as 100 years and that of PPIS as 30 years, the annual capital cost of open canal system would be far less and the annual cost of PPIS would be more than that worked out by the Department.
- Though the proposal was to provide irrigation to two lakh acres under PPIS, the Department worked out the annual cost per acre by considering 2.70 lakh acres of CA. This led to further under-assessment of annual cost of PPIS.

- While computing the annual maintenance cost of PPIS, the Department did not consider the cost of electricity required for operating the scheme. As per departmental records, 118.08 million units of power is required for operating the PPIS. The cost on electricity charges works out to ₹74.39 crore⁵⁰ per annum.

Considering the above, the actual annual cost of PPIS works out to ₹7,465.85 per acre per annum, while the annual cost of open canal system works out to ₹1,196.40 per acre per annum, as shown in Table 4.2 below:

Table 4.2 - Comparison of annual cost of PPIS vis-à-vis open canal system

S. No.	Description	PPIS		Open canals		Basis for audit calculations
		As per Department	As per Audit	As per Department	As per Audit	
1	Capital cost of the system	₹2,040.20 crore	₹2,112.81 crore	₹940.14 crore	₹940.14 crore	Cost of substations added to the capital cost of PPIS.
2	Extent of CA proposed	2.70 lakh acres	2 lakh acres	1.35 lakh acres	1.35 lakh acres	As per actual CA proposed
3	Life of the system	50 years	30 years	50 years	100 years	As per DPR guidelines
4	Capital cost per acre per annum	₹1,511	₹3,521.35	₹1,393	₹696.40	
5	Maintenance cost per acre per annum (without electricity charges)	₹166	₹166	₹500	₹500	As worked out by Department
6	Total electricity charges per annum	--	₹74.39 crore	Nil	Nil	--
7	Electricity charges per acre	--	₹3,719.50	Nil	Nil	--
8	Total cost per acre per annum	₹1,677	₹7,465.85	₹1,893	₹1,196.4	

(Source: As per the information collected from the records of the I&CAD Department)

As seen from the above table, while the capital cost of PPIS was more than double that of the open canal system, its annual cost was more than six times. This is contrary to the projection of the Department that the annual cost of PPIS was more economical than the open canal system.

Moreover, the Department had made the cost comparison by considering the estimated capital cost of PPIS as ₹2,040.20 crore. The work was entrusted (February 2018) to a contractor at an agreed value of ₹2,413.53 crore. However, as per the latest administrative approval given (September 2022) by Government, the cost of this PPIS work (including the cost of sub-stations and other provisions) has now increased to

⁵⁰ 118.08 million units X ₹6.30 per unit

₹3,321 crore⁵¹, though there is no increase in the targeted CA. This further increase in the capital cost makes the PPIS even more uneconomical. Thus, adoption of PPIS instead of conventional canal system resulted in an additional cost of ₹2,380.86 crore (₹3,321 crore *minus* ₹940.14 crore).

As per Government instructions⁵² any design which resulted in savings in capital cost but increase in Operation and Maintenance cost, should not be accepted. However, adoption of PPIS in Package-21A led to increase in both the initial capital cost and also the maintenance cost. In PPIS, the annual electricity charges alone works out to ₹3,719.50 per acre⁵³.

While accepting the fact of non-inclusion of cost of power supply arrangement in the costing of PPIS, Government stated (May 2023) that additional CA of 70,000 acres (taking the total CA to 2.70 lakh acres) was taken considering the savings of water due to adoption of PPIS. Further, it was also stated that the life of both the systems was taken as 50 years as per the IS Code and CWC guidelines on piped irrigation system. The Government has furnished (November 2023) a fresh calculation in an attempt to demonstrate that the per acre cost of PPIS is economical than that of open canal system.

The justification given by Government for taking additional CA of 70,000 acres on the ground that the saved water could be utilised in Package 21/21A is not acceptable, as the Government had issued orders (March 2018) for utilising the saved water by enhancing the contemplated CA under Package-22 by 44,000 acres which involves increase in the scope of work of Package-22 and consequent capital cost which is yet to be worked out by the Department. As regards the life of the canal and piped irrigation systems, Audit had adopted the same criteria which was stipulated in the DPR guidelines issued by the CWC which was adopted by the Department also in the BCR calculations in the DPR of Kaleshwaram Project. Further, in the latest calculations furnished by Government, the Department updated the capital cost of canal system to ₹1,289.47 crore but ignored the fact that as per the latest estimate prepared by it, the cost of PPIS has now increased to ₹3,321 crore. Moreover, even as per the incorrect revised calculations furnished by Government, the combined annual capital and maintenance costs of PPIS (₹5,425 per acre) was much higher than that of open canal system (₹2,410 per acre). In case the latest estimated cost of PPIS and the cost of drip irrigation system to be installed by the farmers in their fields are also considered, the annual cost of PPIS would be even higher.

(ii) Doubtful utility of PPIS: The scope of PPIS work being executed under Package-21A involved providing pressurized pipelines up to certain designated outlets of the CA. To actually achieve the irrigation benefits to the targeted CA, drip irrigation

⁵¹ The total revised estimated cost was ₹3,653.98 crore, which included ₹332.95 crore towards the cost Kondemcheruvu reservoir

⁵² Memo no. 28569/M&MI(T-IV)/2012-1 dated 20 December 2012

⁵³ Total electricity charges for the entire PPIS for 2 lakh acres: ₹74.39 crore. Electricity charges per acre: ₹74.39 crore/2 lakh acres = ₹3,719.50

pipelines from the given outlets to the fields of farmers were required. Further, the PPIS work was devised on the assumption that only Irrigation Dry (ID) crops⁵⁴ would be sown in the CA. Thus, the success of the PPIS depends on (i) willingness of farmers to opt for ID crops, (ii) laying of drip irrigation lines from the PPIS outlets into the fields of farmers, and (iii) willingness and capacity of farmers to invest money for providing drip irrigation system in their fields.

However, laying of drip irrigation lines was not included in the scope of PPIS works being executed now. No action plan for laying of drip irrigation system and the funding of the cost thereof were found in the departmental records. There was also no evidence to show that the farmers in the area were taken into confidence and the willingness of farmers to opt for ID crops and to invest money on providing drip irrigation system in their fields was obtained before deciding to install PPIS in the area. As such, the success of PPIS, being executed at a cost of ₹3,321 crore is not assured.

The Government replied (November 2023) that water has been delivered to 3,000 acres in Bheemgal and Velpur Mandals of Nizamabad District and another 3,000 acres in Jakranpally Mandal would be provided water shortly. It further stated that the farmers may adopt micro irrigation system either individually or with financial support from the State/Central Government and some farmers have already adopted micro irrigation system in their fields.

The Government reply addresses CA of only 6,000 acres as against the two lakh acres of CA targeted under PPIS. The reply also failed to clarify whether the farmers had actually installed micro irrigation systems in their fields in these 6,000 acres. The reply is also silent on the issue of non-preparation of action plan for laying of drip irrigation system and whether the farmers in the area were taken into confidence and their willingness for drip irrigation was obtained before deciding to install PPIS in the area.

4.1.2.3 Additional financial burden due to opting for costlier work

The works of Packages-10, 11 and 12 which were taken up under the earlier PCSS project now form part of Link-IV of the Kaleshwaram Project. These works, which involved installation of lifts and water conveyor system to convey water from Mid-Manair Reservoir (MMR) to Sri Komaravelli Mallanna Sagar (SKMS) Reservoir and creation of a new CA of 2.65 lakh acres, were ongoing.

After re-engineering, as part of the additional TMC works (discussed in Paragraph 4.1.2.1), the Department decided (April 2019) to increase the carrying capacity of the lifts and water conveyor system from MMR to SKMS reservoir by 333 cumecs to accommodate the water requirements of the project. The Department proposed to achieve this through a separate parallel conveyor system consisting of lifts, canals, pressure mains for a length of 5.90 Km and tunnels for a length of 35.55 Km. The Government approved (April 2019) the proposal which was estimated to cost ₹12,594.78 crore. Subsequently, however, with the stated aim of reducing both the

⁵⁴ ID crops are the crops which require less water for cultivation (Eg.:- Groundnut, maize, cotton, pulses, etc.)

project execution time and the extent of land needed to be acquired, the Department revised the proposal. Within two months, based on the revised proposal submitted by the Department, the Government accorded (June 2019) revised administrative approvals for ₹14,402 crore for this work. The cost increase due to the revision was ₹1,807.22 crore. This was due to replacing the tunnels with pressure mains and change in alignment of the water conveyer system.

Audit observed that the Department justified the revised proposal on certain assumptions which turned out to be unrealistic:

- In the revised proposal, the Department stated that the works as per revised proposals would be completed within 15 to 18 months. However, though the Government approved the proposal in June 2019, the work was divided into four packages (Packages-I to IV) and were awarded after one year in June 2020, that too, with a stipulation to complete in 24 months (*i.e.*, by June 2022). Further, the financial progress of works as of March 2022 (*i.e.*, 21 months since award of works) ranged from 30 *per cent* to 45 *per cent* only in three works. In one work (Package-III), the execution commenced only after March 2021 and the financial progress was nil as of March 2022.
- In its proposal, the Department stated that only 1,059 acres of land would be required for the revised proposal as against the 1,835 acres required for tunnels. However, as of March 2022, the Department had already sent land acquisition indents for a total extent of 1,955 acres.

In addition to the above, the decision to opt for pressure mains instead of tunnels was injudicious for the following reasons.

- As seen from the departmental estimates, the cost of tunnel ranged from ₹86 crore to ₹91 crore per Km whereas, the cost of pressure mains was far higher ranging from ₹225 crore to ₹251 crore per Km.
- The life of a concrete lined tunnel would be 100 years while the life of pressure mains is treated as only 30 years (as per DPR guidelines issued by CWC).
- The administratively approved cost of the revised proposal was ₹14,402 crore. In this, the estimated cost of the works was ₹11,710.7 crore. These works were awarded at a total agreed value of ₹11,975.89 crore. However, due to further increases in work quantities, the cost of works has further increased to ₹13,895.58 crore (*i.e.*, by ₹1,919.69 crore) as per the latest estimates.

Thus, opting for pressure mains instead of tunnels has resulted in additional financial burden of ₹3,726.91 crore⁵⁵ while no additional benefit was achieved from it. There was also no saving of land and time as had been projected by the Department while submitting the revised proposal.

⁵⁵ Increase in cost between first and second administrative approvals: ₹1807.22 crore
Increase in cost after award of works : ₹1919.69 crore
Total increase: ₹3726.91 crore

The Government replied (May 2023) that construction of underground tunnel with intermediate adits and other ancillary works of underground surge pool and pump house complexes, *etc.*, involved unknown factors during course of execution such as weak geological formations, uncertainties of the underground strata, intermittent dewatering, *etc.*, leading to frequent interruption of work. It was further replied that the pressure pipeline proposal has the advantages of speedy completion and early irrigation benefits can be realized by curtailing the completion time. The Government also added that with improved laying practices, considerably higher life span of pressure pipes can be achieved and that the periodical maintenance of pipelines can also be taken up easily.

The contention of Government that early benefits could be reaped with adoption of pressure mains stands defeated as the works relating to the pressure mains and also the distributary work were still in progress. Moreover, contention of higher life span and ease of periodical maintenance of pipelines in comparison to tunnels is based on assumption and not backed by any documentation/ guidelines. Hence, adoption of pressure main in lieu of tunnels resulted in additional burden to the Government.

The Government further replied (November 2023) that had the tunnel and pumphouses option been adopted instead of pressure mains, they would have to be taken up parallelly within the vicinity of the existing pumphouses and tunnels of Packages-10, 11 and 12 and that excavation of tunnels involves heavy drilling and blasting which would damage the existing tunnels and pumphouses.

The reply is not acceptable, since the Department was aware of these factors while submitting the proposals for underground tunnels to Government and obtaining administrative approval in April 2019.

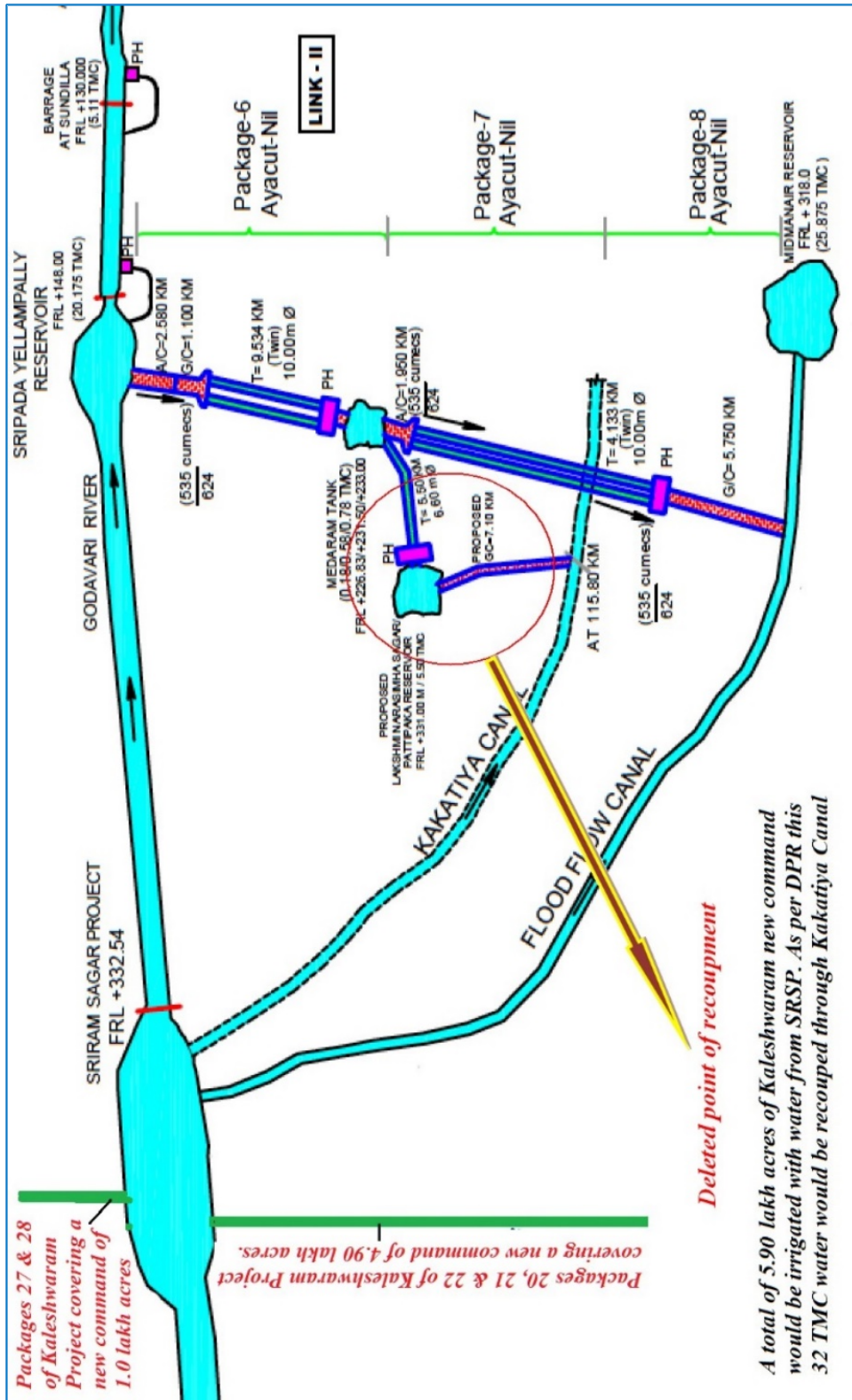
4.1.2.4 Reverse pumping of water to SRSP without justification

Sriram Sagar Project (SRSP) is an already existing project. The source of water for this project is the SRSP reservoir having a live capacity of 90.58 TMC across River Godavari (on the upstream side of Kaleshwaram). The project has a total CA of 13.67 lakh acres, out of which major portion (13.05 lakh acres) is served through the 346 Km long Kakatiya Canal⁵⁶.

The Kaleshwaram Project contemplated creation of a new command area of 5.90 lakh acres (under Link-VII) by utilising 32 TMC of water from the SRSP reservoir on loan basis. The DPR of Kaleshwaram Project proposed to recoup this loan by dropping 32 TMC of water into the Kakatiya Canal of SRSP (in Link-II of the project *i.e.*, the water conveyor system from Yellampally reservoir to Mid-Manair reservoir), as shown in Figure-4.1. However, Audit observed that the planned recoupment of water into Kakatiya Canal was dropped in June 2016. Instead, the Link-II of the project was designed and constructed to carry water beyond the Kakatiya Canal and to drop the water into the Flood Flow Canal of SRSP. The reasons for this change were not on record.

⁵⁶ Stage-I: 284 Km (Km 0 to Km 284) and Stage-II: 62 Km (*i.e.*, Km 284 to Km 346)

Figure 4.1 – Deleted proposal for recoupment of water in Kakatiya Canal of SRSP

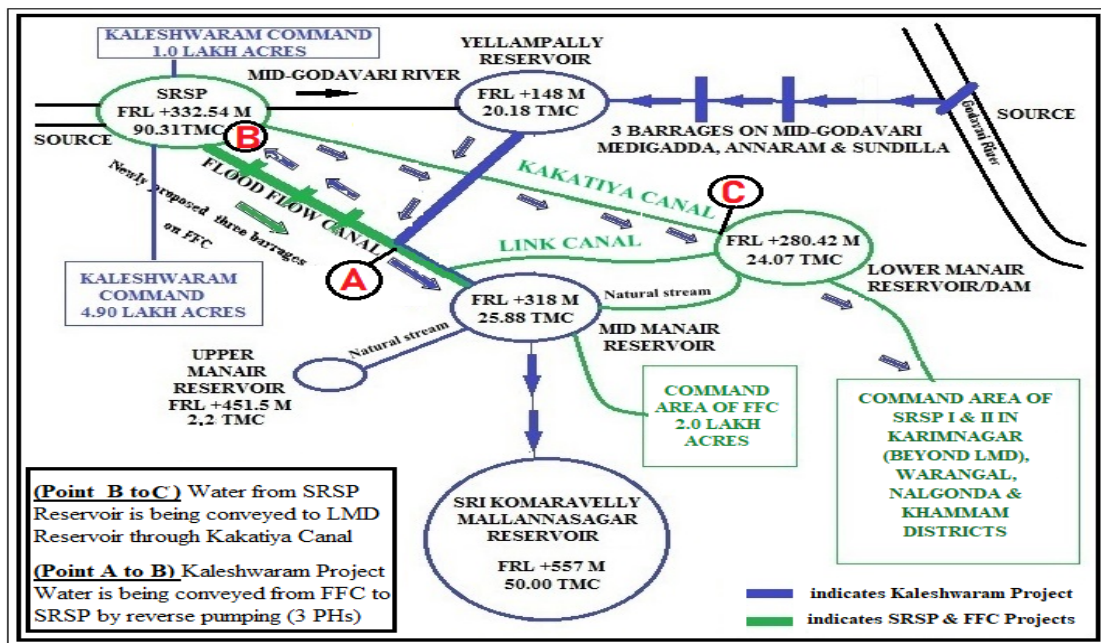


Source: Records of the I&CAD Department

As per the DPR, in addition to create new CA of 18.26 lakh acres, the Kaleshwaram Project also proposed to supplement water to four existing projects⁵⁷, including the SRSP, which were facing water deficit. The DPR, however, did not discuss the quantum of deficit faced in each of these four projects and just stated that 34.5 TMC of water is allocated for supplementation to these four projects, considering an overall deficit of 25 per cent. Considering the total CA under these projects, the water allocated for supplementation to SRSP and Flood Flow Canal (FFC)⁵⁸ of SRSP works out to about 29.5 TMC. However, the DPR did not specifically discuss as to how the water would be supplemented to SRSP and FFC.

In June 2017, the Government approved a proposal for lifting of one TMC of water per day for 60 days from the FFC to the SRSP reservoir. Under this lift system, the water dropped into the FFC in Link-II of Kaleshwaram Project would be lifted through three-stage lifting (reverse pumping against the original flow of FFC). As per the revised administrative approval accorded (August 2021) by Government, this work was estimated to cost ₹1,999.56 crore and an expenditure of ₹1,817.27 crore had been incurred on the work, as of June 2022. In the estimate prepared for this work, the Department stated that the reverse pumping in FFC was necessitated as the SRSP was facing shortage of water in the last 20 years while the demand for water on SRSP increased due to taking up various schemes including the water required for Link-VII of Kaleshwaram Project.

Figure 4.2 - Flow of water from Kaleshwaram Project to SRSP project (Revised proposal)



Source: Diagram prepared by Audit based on information collected from the records of the I&CAD Department

⁵⁷ Sri Ram Sagar Project (SRSP) Stage-I (9,68,640 acres) and Stage-II (4,40,000 acres), Nizam Sagar Project (2,34,330 acres), Singur Project (40,000 acres) and Flood Flow Canal of SRSP (2,00,000 acres)

⁵⁸ Indiramma Flood Flow Canal (FFC) is a 122 Km long canal built to draw 20 TMC of surplus/flood water from SRSP reservoir and to provide irrigation to 2.2 lakh acres of CA. The Mid-Manair Reservoir is a part of FFC project

Audit observed that 65.76 *per cent* of CA of SRSP lies on the downstream of Lower-Manair reservoir which can be supplemented from Mid-Manair reservoir under Link-II of Kaleshwaram Project⁵⁹. Hence, recoupment/supplementation of water to SRSP can be done by dropping water into the Kakatiya Canal or the FFC (in Link-II) and the CA of SRSP served on the downstream in a more cost-effective manner. However, the Department proposed pumping of water in FFC upto SRSP reservoir at a cost of ₹1,999.56 crore which appears to be unjustified. Moreover, pumping of water into SRSP reservoir instead of dropping in Kakatiya canal entails increased cost of electricity charges for lifting of 60 TMC of water to a higher location up to FFC and from FFC to SRSP reservoir. The additional electricity charges for reverse pumping of water from FFC to SRSP reservoir alone works out to ₹141.52 crore⁶⁰ per annum.

Further, though the benefits likely to be accrued from supplementation to these projects were taken into account in the annual benefits for the purpose of calculating the BC Ratio of Kaleshwaram Project, the cost of reverse pumping through FFC was not considered in the project cost/BCR calculations.

The Government replied (November 2023) that the water requirement of SRSP⁶¹ on the upstream of Lower-Manair Dam (LMD) was 107.60 TMC but the water flows observed in the last 20 years was only 54 TMC which is not sufficient to meet the demand up to LMD itself. Hence, it was proposed to lift water into SRSP to meet the deficit of 53.60 TMC. The Government further replied that the water requirement for the CA of 9,34,750 acres below LMD was 93.47 TMC, which would be met from the Kaleshwaram Project on need basis.

The reply that the water flows in SRSP was only 54 TMC and that there is a deficit of 53.60 TMC (which works out to 49.81 *per cent* of the requirement of 107.60 TMC up to LMD) in the last 20 years is contradictory to the fact that the DPR of Kaleshwaram Project prepared in the year 2017 considered only 25 *per cent* water deficit which was to be supplemented for SRSP. This indicates that the balance 75 *per cent* water was available in SRSP.

4.1.2.5 Wasteful expenditure on temporary feeder channel

The work of formation of Sri Komaravelli Mallanna Sagar (SKMS) Reservoir in Link-IV of the project was divided into four packages and awarded (October – December 2017) to four contractors with a stipulation to complete by October-December 2020. The SKMS Reservoir was to receive water from Mid-Manair Reservoir through the water conveyor system (under Packages-10, 11 and 12) and supply water to the

⁵⁹ As per the information furnished by the CE (Irrigation), Jagtial, the total CA of SRSP is 13,66,589 acres. Out of this, 8,98,679 acres of CA is below Lower Manair Dam

⁶⁰ Total capacity of the lifts on FFC: 156 MW. Number of days of reverse pumping proposed: 60 days. Likely electricity charges for reverse pumping in FFC = 156 MW X 1,000 X 24 hours X 60 days X ₹6.30 per unit = ₹141.52 crore

⁶¹ for Saraswathi Canal, Lakshmi Canal, Kakatiya Canal upto Lower-Manair Dam, lift irrigation schemes, drinking water requirement and for the Link-VII of Kaleshwaram Project

downstream packages under Links-IV, V and VI. Audit observed that pending completion of the construction of SKMS Reservoir, the Department awarded (July 2018) another work of excavation of a temporary feeder channel to connect the water conveyor system of Package-12 with the main canal of Packages-13 and 14 at an agreed value of ₹44.42 crore with a stipulation to complete the work by November 2018. The stated intention of this feeder channel was to supply water to fill the Konda Pochamma Sagar reservoir in the downstream of SKMS reservoir. Extension of time was granted five times and the work was finally completed in March 2020 at a cost of ₹60.22 crore. In addition, an amount of ₹2.83 crore was also spent for construction of Ogee Weir⁶² under Package-12 to release water into the feeder channel.

Figure 4.3 - Construction of Ogee Weir on SKMS Reservoir



Source: Photograph taken by Audit during joint site visit on 10 February 2022

Audit observed that the SKMS reservoir was completed, the initial filling of water in the reservoir started in August 2021 and the entire feeder channel came under submergence of SKMS Reservoir.

⁶² Ogee weir is a special type of curved structure provided for spillway of a dam/reservoir. In the instant case, an Ogee weir was constructed to negotiate the level difference between the delivery cistern of SKMS reservoir and the sill level of the feeder channel

Figure 4.4 - Submerged Feeder Channel inside SKMS Reservoir



Source: Photograph taken by Audit during joint site visit on 02 February 2022

Further, the feeder channel constructed at a total cost of ₹63.05 crore did not serve any purpose as not a single acre of new CA was created on the downstream of SKMS reservoir. Thus, the entire expenditure of ₹63.05 crore incurred on the temporary feeder channel was rendered wasteful.

The Government replied (May 2023) that the feeder channel served the CA under Kondapochamma Sagar and Sri Komaravelli Mallanna Sagar for two years before the completion of Sri Komaravelli Mallanna Sagar Reservoir and yielded a gross income of ₹340.23 crore against the expenditure incurred. Hence, the total benefit was worked out to ₹266.16 crore. Hence, it is not wasteful expenditure and the Kaleshwaram Project water is utilized efficiently.

The reply is in contradiction with the records available with Audit. The period of difference between release of water through feeder channel and through SKMS reservoir is only 15 months (June 2020 to August 2021). However, the Government claims that the feeder channel served the CA for two years. It was stated that nearly 11 TMC of water was utilized for the CA of MI tanks and besides these 33 check dams and CA of Upper Manair Dam were also fed two times through feeder channel. However, as per the records obtained by Audit only 13.66 TMC of water was released in the feeder channel during May 2020 to July 2021 before it got submerged (October 2021) under SKMS. Out of the 13.66 TMC of water released through feeder channel, nearly 10 TMC was considered as initial filling into the KPS reservoir to check the strength of the newly formed bund. Further the Department claims that 2.84 TMC of water was utilized under the CA of Package-12 canal, however, feeder channel was sanctioned only to the off-take of Packages-13 and 14 from the delivery cistern of Package-12. Further, the Government/Department in its reply to the Paragraph 4.1.2.2 stated that the Package 21-A work could not be completed during the last two years

owing to heavy rainfall in the CA. Thus, the benefit of entire increase in yield in the CA could not be exclusively attributed to water supply through feeder channel. It is also evident from the reply that only CA of MI tanks and other projects (stabilization) were served which was not an immediate need. The distributary system of new CA proposed under this Project is still in progress.

4.1.3 Deletion of CA of PCSS

The earlier PCSS project envisaged creation of new CA of 16.4 lakh acres in seven districts. Out of this, new CA of 56,500 acres of the erstwhile Adilabad district was proposed to be covered under the Pranahitha project, after re-engineering.

Out of the remaining CA of 15,83,500 acres proposed under the PCSS project, an extent of 2.47 lakh acres of CA was to be created in 283 villages in the erstwhile Rangareddy District. However, though the new CA proposed under Kaleshwaram Project was increased to 18.26 lakh acres after re-engineering, the CA proposed in Rangareddy District was reduced to 50,000 acres in the DPR, while the CA proposed in other districts was increased, as shown in Table 4.3 below:

Table 4.3– CA proposed in Kaleshwaram Project vis-à-vis the earlier PCSS project

S. No.	District	As per DPR of PCSS project		As per DPR of Kaleshwaram Project		Difference in CA (acres)
		No. of Villages	CA (acres)	No. of Villages	CA (acres)	
1	Adilabad	179	99,996	161	1,00,000	4
2	Karimnagar	157	1,71,450	157	2,07,599	36,149
3	Medak	539	5,19,157	806	7,30,646	2,11,489
4	Nalgonda	171	2,29,828	171	2,62,360	32,532
5	Rangareddy	283	2,46,705	Not identified	50,000	(-)1,96,705
6	Warangal	11	11,861	11	20,595	8,734
7	Nizamabad	275	3,04,501	275	4,54,500	1,49,999
		1615	15,83,498	1581	18,25,700	2,42,202

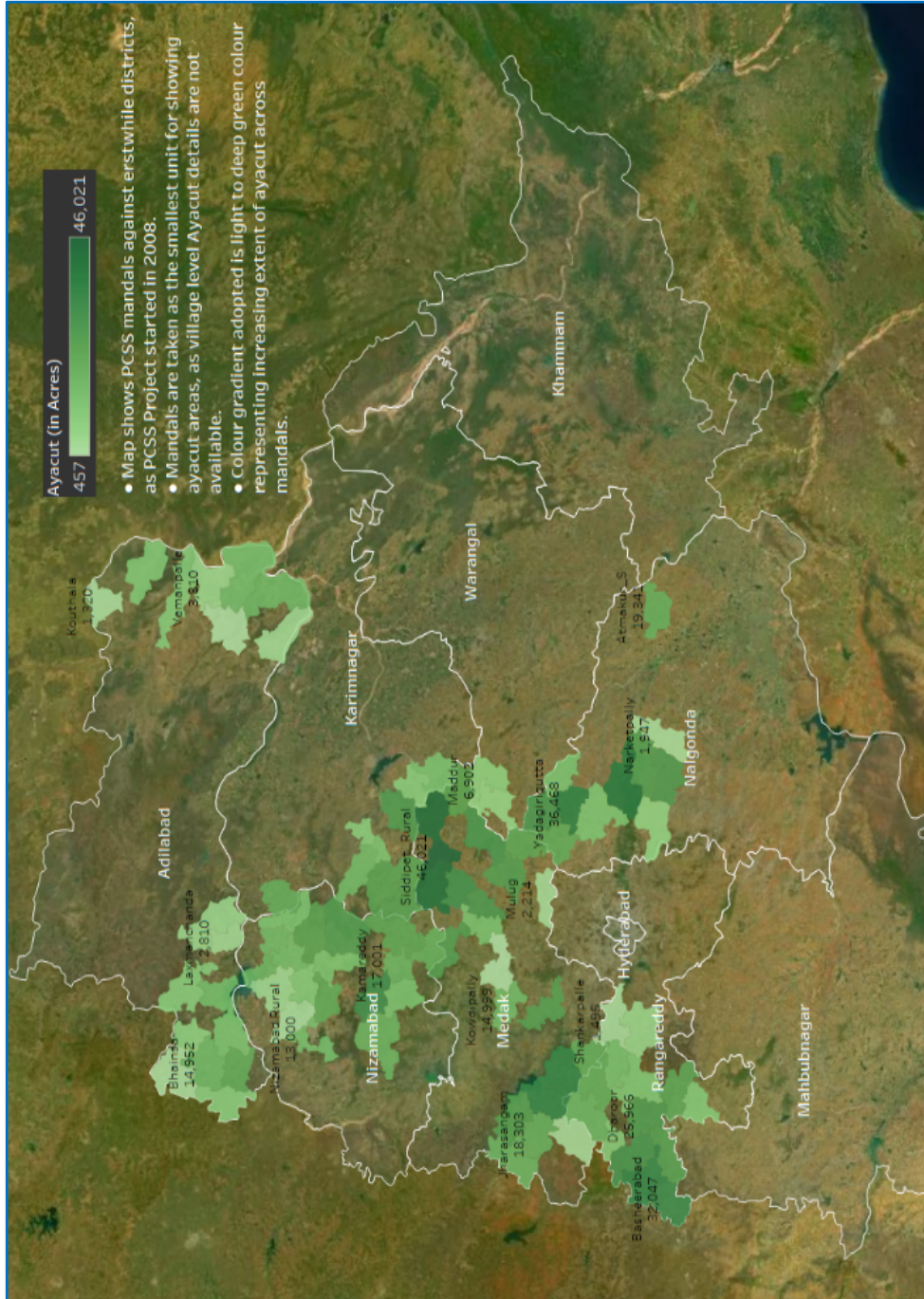
Source: DPRs of the PCSS and the Kaleshwaram Projects

Thus, the farmers of the remaining 1.97 lakh acres in Rangareddy District were denied irrigation benefits as was envisaged in the Project. The DPR did not provide any justification for deletion of this CA. The DPR also did not mention the mandals/villages in which the 50,000 acres of CA was proposed to be created. This indicates that preparation of the DPR was deficient.

The Government replied (May 2023) that the entire contemplated new CA of 18.26 lakh acres will be served through Kaleshwaram Project. Though certain portion of the CA is proposed to be deleted, the CA is considered to be under Kaleshwaram Project. The CA will be irrigated under Kaleshwaram Project by alternate means. Thus, there is no deletion of any CA from total contemplated CA of 18.26 lakh acres of new CA. The total cost towards development of distributary network system for the entire CA has been included in the total approved project cost of ₹80,190.46 crore. The Palamuru Rangareddy Lift Irrigation Scheme (PRLIS) has been designed to serve the CA under Rangareddy District.

The reply of the Government is not relevant as Audit did not question about the non-serving of contemplated CA of 18.26 lakh acre. The farmers of 283 villages of 4 mandals of erstwhile Rangareddy District were denied irrigation benefits to an extent of 2.47 lakh acres. This CA was to be created under PCSS but could not find place in the re-engineered Kaleshwaram Project. Though the DPR of the Kaleshwaram Project included the CA of 50,000 acres in Rangareddy District, it did not specify the mandal/villages in which CA would be served. Further, it was replied that Palamuru Rangareddy Lift Irrigation Scheme (PRLIS) has been designed to serve the CA under Rangareddy district which leads to the conclusion that the ignored CA under Rangareddy District would not be served through this Project.

Figure 4.5 - PCSS Project mandal wise Command Area (old districts) Year: 2008



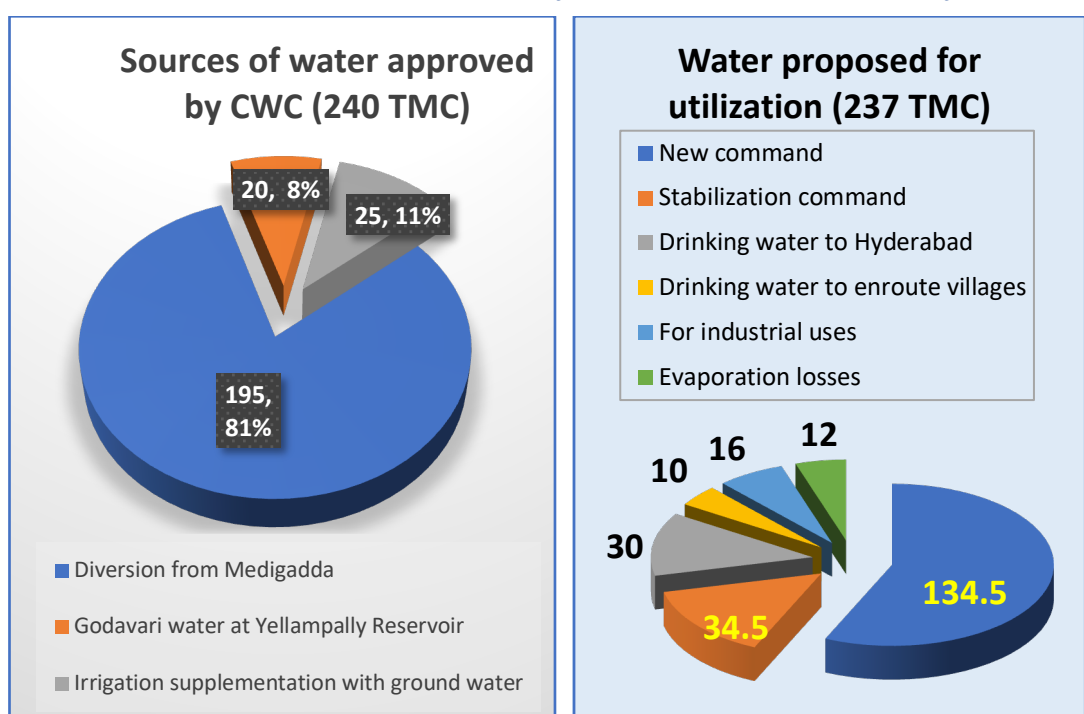
Source: Map prepared by Audit based on the information in the DPR of PCSS Project

4.2 Irrigation Planning

As per the clearance given (June 2018) by the CWC, the Kaleshwaram Project proposes to utilize 240 TMC of water of which 195 TMC was proposed to be lifted from River Godavari. As mentioned earlier, the Kaleshwaram Project envisages to provide irrigation facilities to 18.26 lakh acres of new CA apart from stabilisation of 4.71 lakh acres of CA (*i.e.*, 25 per cent of the total CA of 18.83 lakh acres⁶³) already created under four other existing projects. The project also aims to provide drinking water facilities to *en-route* villages and twin cities of Hyderabad and Secunderabad, apart from providing water for industrial use.

The sources of water for Kaleshwaram Project and utilisation avenues are shown in the Chart 4.1 below:

Chart 4.1 – Sources and utilisation of water under Kaleshwaram Project



Source: DPR of the Kaleshwaram Project

Out of the total of 240 TMC water available, 169 TMC of water was proposed to be utilised for irrigation purposes. Of this, 134.5 TMC was proposed for irrigating the new CA of 18,25,700 acres and 34.5 TMC was proposed for stabilisation of 4,70,750 acres of CA (*i.e.*, 25 per cent of the total CA of 18.83 lakh acres) under other projects.

The extent of new CA proposed to be irrigated during Kharif and Rabi seasons and the crop water requirement (CWR) projected in the DPR are shown in Table 4.4 below:

⁶³ Please refer to Footnote-1

Table 4.4 – Proposed CA and the Crop Water Requirement under Kaleshwaram Project

S. No.	Season	CA (in acres)	Proposed water utilisation (in TMC)	Area proposed to be irrigated with one TMC of water (in acres)
1	New CA			
	Kharif	18,25,700	104.18	17,524
	Rabi	5,50,160	30.29	18,163
	Total		134.47	17,668
2	Supplementation CA	4,70,750	34.50	13,644
	Total (New + Supplementation)		168.97	

Source: DPR of the Kaleshwaram Project

Note: In Pages I-4 and IX-10 of the DPR (Volume I), the crop water requirement of Kharif and Rabi seasons was shown as 71.37 TMC and 63.10 TMC, respectively. This appears to be a clerical error. The detailed tables given in Annexures 9.1 A and 9.2 A of the DPR (Volume I) show that the crop water requirement for Kharif and Rabi was assessed at 104.18 TMC and 30.29 TMC, respectively. Audit has taken these figures for analysis.

(i) Irrigation water requirement: As can be seen from Table 4.4, the Kaleshwaram Project envisages providing irrigation to a total CA of 23.76 lakh acres in Kharif and Rabi seasons by utilizing 134.47 TMC of water which works out to an average of 17,668 acres per one TMC of water. The assumption that one TMC of water would serve 17,668 acres appears to be highly unrealistic as discussed below:-

- Under the same project, the Department proposed to supplement water to 4,70,750 acres (*i.e.*, 25 per cent of the total CA of 18.83 lakh acres) of existing CA under other projects. The water requirement for this supplementation was projected as 34.5 TMC. This means that each TMC of water was proposed to serve an average of 13,644 acres in other projects whereas the average CA per one TMC of water proposed for the new CA under the Kaleshwaram Project was kept far higher at 17,668 acres per TMC.
- Even in the Pranahitha Project, which is the other offspring of the earlier PCSS project after re-engineering, the Department proposed to irrigate a total CA of two lakh acres by utilising 20 TMC of water (to be drawn from Tummidihetti), which works out to 10,000 acres per one TMC of water.
- Audit obtained the details of water utilised and the extent of CA served under some of the major irrigation projects in Telangana during 2016-17 to 2019-20 from the respective project authorities. As per this information, the average CA served per TMC of water under these projects is as shown in Table 4.5 below.

Table 4.5 – Average water utilized and CA served in other irrigation projects in Telangana during 2016-17 to 2019-20

S. No.	Project	Water allocation for irrigation as per DPR of the project			Water utilised for irrigation and CA served during 2016-20		
		Water allocated (in TMC)	CA proposed (in acres)	Average CA per TMC (in acres)	Total water utilised (in TMC)	Total CA served (in acres)	Average CA per TMC (in acres)
1	Mahatma Gandhi Kalwakurthy LIS	40	4,24,816	10,604	98.9168	10,27,297	10,385
2	Jawahar Nettempadu LIS	20	2,00,000	10,000	31.79	3,28,278	10,326
3	Rajiv Bhima LIS	16.942	2,07,000	12,218	46.04	3,58,358	7,784
4	Sri Ram Sagar Project	161.06	13,66,589	8,485	345.67	33,85,844	9,795

Source: Information obtained from the respective project authorities in I&CAD Department

As can be seen from the above, the extent of CA that was irrigated in these projects ranged from 7,784 acres to 10,385 acres per each TMC of water.

- Audit also observed that in the justification note for implementation of Pressurized Piped Irrigation System (PPIS) under Package-21A of the project, the Commissioner, Planning & Development of Godavari Basin stated (July 2016) that on the basis of experience in various other projects, the open canal system was able to irrigate about maximum of 10,000 acres of dry crops per TMC of water.

Thus, considering the experience in other projects in the State, it is unlikely that one TMC of water can serve an average CA of 17,668 acres as projected in the DPR.

(ii) Water requirement for irrigation in Rabi season: As seen from Table 4.4, the DPR projected that an average of 17,524 acres per one TMC of water in Kharif season and 18,163 acres per one TMC of water in Rabi season would be served.

In Kharif season, the requirement of irrigation water would be less as the crops also receive water from natural rainfall in monsoon season. Therefore, larger area can be irrigated with one TMC of water. On the contrary, in Rabi season, the irrigation water requirement would be more in the absence of rainfall. As such, far lesser area can be irrigated with each TMC of water in Rabi as compared to Kharif season. For example, under Sri Ram Sagar Project (SRSP), an average CA of 10,842 acres was served with each TMC of water in Kharif seasons during 2016-17 to 2019-20 whereas a lesser area of only 9,341 acres was irrigated with each TMC in Rabi seasons⁶⁴.

⁶⁴ as per the information furnished by the Chief Engineer (Irrigation), Jagital

Thus, the projection in the DPR of Kaleshwaram Project that 18,163 acres (which is more than that of Kharif) would be irrigated with each TMC of water in Rabi season appears to be on the higher side.

(iii) Water requirement for Kharif season: Considering the experience in SRSP, where an average of 10,842 acres was irrigated with each TMC of water in Kharif season, the estimates for the total water required for irrigation under Kaleshwaram Project in Kharif season alone (18,25,700 acres of new CA and 4,70,750 acres of stabilisation CA. Total: 22,96,450 acres) works out to 211.81 TMC⁶⁵. The Kharif water requirement for the new CA of 18,25,700 acres alone works out to 168.39 TMC⁶⁶. Thus, the 169 TMC of water allocated (as per the DPR approved by CWC) for irrigation under the project (134.5 TMC for new CA and 34.5 TMC for stabilisation) is likely to be sufficient only for the new CA, that too for Kharif season only. In such a situation, there is a significant risk that there may not be any water left for irrigation in Rabi season and for supplementation of the CA of other projects.

As shown in Table 4.5 above, the open canal system in various other projects was able to irrigate about a maximum of 10,000 acres of irrigation dry crops per one TMC of water. Even when it is considered that additional 25 per cent of CA i.e., 12,500 acres could be covered with one TMC of water, the estimated total water required for Kharif would be 184 TMC which would be higher than the entire water available (169 TMC) for both Kharif and Rabi put together under the project.

Thus, it is clear from the above that the total water available (169 TMC) is not likely to be sufficient for Kharif crop alone and in case the entire 169 TMC of water is utilised for Kharif irrigation, and there is a significant risk that it would not be possible to provide irrigation water in Rabi season without compromising on the water supply for drinking and industrial uses.

Thus, it is highly unlikely that the project will be able to deliver the irrigation benefits as projected in the DPR, let alone supply water for drinking and industrial uses. This will also adversely impact the economic viability of the project (as discussed in Paragraph 4.5).

The Government replied (May 2023) that the crop water requirements of different crops are calculated by adopting scientific procedures. The number of acres irrigated by one TMC of water is different for each crop in different seasons and different regions. This is because the total water requirement at plant root is different for different crops as per the Penman-Montieth Standard procedure. The value of acres per TMC cannot be averaged for all the proposed crops. Therefore, the number of acres irrigated per TMC of water, as arrived by Audit on pro-rata basis and based on statistical data, is not correct.

However, despite adopting scientific methods to arrive at crop water requirements, most of the completed projects in State are in need of additional water to stabilise their

⁶⁵ 22,96,450 acres ÷ 10,842 acres per TMC = 211.81 TMC

⁶⁶ 18,25,700 acres ÷ 10,842 acres per TMC = 168.39 TMC

existing CA. Hence, Audit considered the average serving area per TMC of Projects located in Telangana State to arrive at crop water requirement. Further, while including PPIS under this project, Commissioner, Godavari Basin, Hyderabad, had also confirmed that based on past experience, 10,000 acres could only be irrigated with one TMC of water.

4.3 Planning in providing power for the project

Lift irrigation schemes (LISs) require electricity for running the motors and pumps to lift water from source to upland areas and provide irrigation to the targeted CA. Therefore, assured availability of adequate power is vital for the success of any LIS.

The Kaleshwaram Project, as being executed now, has 31 lifts with an aggregate capacity of 8,459.10 MW. These lifts are proposed to be operated for a period of 90 to 120 days during the pumping (monsoon) season. The Project is now scheduled to be completed in all respects by June 2024. The Kaleshwaram Project requires a total of 14,344.39 million units (MU) of power during pumping season⁶⁷ every year. Audit observed the following issues in planning for providing power for the project:

- The I&CAD Department had obtained (April 2017) assurance from the Transmission Corporation of Telangana Ltd. (TSTRANSCO) for 4,627 MW of power as per the assessment made in the DPR. Though the Department later added more lifts under the project taking the total capacity of lifts to 8,459.10 MW, it did not obtain any assurance from TSTRANSCO for this revised requirement.

Comparison with the State's installed capacity

- As of March 2022, the Telangana State has a total installed power generating capacity of 18,069.04 MW⁶⁸ (including central and private sectors). As compared to this, the power requirement of Kaleshwaram Project alone (8,459.10 MW) works out to 46.82 *per cent* of the total installed capacity in the State. The DPR did not provide any analysis regarding the power availability in the State and the sources from which power would be provided for the project.
- As per the information furnished (May 2022) by the Irrigation Department to the Special Chief Secretary, I&CAD Department, the power requirement of the 20 LISs in the State was assessed at 13,496.75 MW, out of which, the power requirement of Kaleshwaram Project was shown as 5,558.30 MW only. Considering the fact that the Kaleshwaram Project would require a total of 8,459.10 MW of power after its completion, the total power requirements of all the LISs⁶⁹ in the State would reach 16,397.55 MW by the year 2024. As per

⁶⁷ July to November

⁶⁸ State: 8763.65 MW, Private: 7129.24 MW and Central: 2176.15 MW (as per the official website of the Central Electricity Authority Functioning under the Ministry of Power, GoI)

⁶⁹ including Kaleshwaram project, Palamuru-Rangareddy LIS, Seetha Rama LIS

the generation capacity approved⁷⁰ by the Telangana State Electricity Regulatory Commission (TSERC), the installed capacity in the State was projected to increase to 23,311.22 MW by 2023-24. The combined power requirements of all the 20 LISs in the State would work out to 70.34 *per cent* of the total installed capacity expected to be reached by 2023-24.

Daily energy requirements

- As per the power statistics data⁷¹ of TSTRANSCO, the total electricity availed in the State during the year 2021-22 was 71,563 million units (MU). The average power consumption in the State works out to 196.06 MU per day. During pumping season, in Kaleshwaram Project alone, the peak demand (when all the pumps under the project are operated simultaneously) works out to 203.02 MU per day, which is more than the present average daily supply in the entire State. This indicates that the energy requirements for the project would be challenging to meet. It is also not clear as to how the State Government plans to supply the energy for the project as the same was not analysed in the DPR.
- The 20 LISs in the State, including Kaleshwaram Project, would require nearly 393.54 MU per day, during the pumping season. This is more than double the daily average power supplied across the State in 2021-22.

Total energy requirements

- Out of the total electricity of 71,563 MU availed in the State during 2021-22, only 28,838 MU was availed from State generating stations and the remaining 42,725 MU was availed through purchase/import⁷² from the Central Generating Stations (CGS), other States and private power producers.
- The I&CAD Department did not furnish the details of energy requirements of all the ongoing LISs in the State on their completion. As per the information furnished by the power distribution companies, the total power consumed by the LISs in the State during 2021-22 was 3,881.89 MU. Out of this, the consumption under Kaleshwaram Project was 1,616.80 MU. Considering that the Kaleshwaram Project requires a total of 14,344.39 MU every year after completion, the total energy demand of all the LISs in the State would increase to at least 16,609.48 MU by the year 2024-25. Thus, on account of Kaleshwaram Project alone, the energy requirement of LISs will increase by 12,727.59 MU (*i.e.*, by more than three times). In addition, the energy demand of domestic, industrial and other sectors is also likely to increase. Considering the fact that the State is presently purchasing/importing nearly 60 *per cent* of its energy requirement from external sources, providing power to all the lift

⁷⁰ Order on Annual Fee and Operating Charges for State Load Despatch Centre for 4th Control Period (FY 2019-20 to FY 2023-24) for TSTRANSCO issued by the TSERC

⁷¹ As per Telangana State Power Statistics Reports available in the official website of TSTRANSCO

⁷² At an average rate of ₹4.20/unit from CGSs and ₹5.04 from private power plants

irrigation schemes including Kaleshwaram Project will be a challenge to the State.

Government replied that the TSTRANSCO assured the Irrigation Department in November 2017 that 4,627 MW of power would be made available. Government also replied that the entire Kaleshwaram Project is divided into seven links and there would be flexibility in operation of motors depending on the inflows in the river, water demand for crops in other links, sufficient storage capacity in reservoir available to store the water during rainy season, market rates in power exchange, etc. Further, it also replied that TSGENCO informed that TSDISCOMs had signed Power Purchase Agreements with Central Government. companies like NTPC/ SECI, etc. for purchase of solar power to the extent of 4,137 MW. In addition, it replied that TSTRANSCO is taking up all the works of sub-stations of Kaleshwaram Project on behalf of the Irrigation Department, which itself shows that TSTRANSCO has the ability to cater to the supply of required power to all the pumping stations of Kaleshwaram Project.

The reply is general in nature. It does not specifically answer in a holistic manner as to how the total power requirement of the State in coming years is going to be met from all expected installed capacity of the State, Private and Central Power Units. The reply only mentioned the purchase of solar power without indicating the purchase of power from thermal, hydel sectors, etc. to meet the power requirement. The reply is also silent on the details as to how TSTRANSCO is going to meet the enhanced power requirement of 8,459.10 MW of the Kaleshwaram Project without compromising on the power supply to other sectors.

Recommendation - 2

Government should devise and implement a long-term plan to meet the future power demand of various lift irrigation schemes including Kaleshwaram Project without compromising on the power supply to the other sectors.

4.4 Assessment of Project Cost

As per the project proposal approved by CWC/TAC, the total cost of Kaleshwaram Project was ₹80,190.46 crore, as assessed in the DPR submitted by the Department. However, for the purpose of computation of BCR of the project, the CWC had considered the project cost as ₹81,911.01 crore by including ₹1,477.70 crore for land development and ₹242.85 crore being the one-third cost of Yellampally project (for using its 20 TMC of water).

Audit observed that the project cost as assessed in the DPR was understated as discussed below:

4.4.1 Cost of project works

In the project cost submitted to CWC, the estimated cost of project works was shown as ₹63,352 crore (excluding land development cost).

- As seen from the DPR, which was submitted to CWC in the year 2017, the cost of project works was computed with 2007-08 and 2008-09 prices for the additional works proposed to be taken up under the already existing packages (of PCSS), and with 2015-16 prices for the new works to be taken up. The contracting system adopted in the State provided for price adjustment on cement, steel and POL used in the works. Though the DPR contemplated that completion of revised project works would take three to five years, no provision was made in the project cost estimates for the inevitable cost escalation payable to contractors during construction. Preparation of cost estimates with old price levels and non-inclusion of provision for price escalation led to understatement of the project cost in the DPR.
- Moreover, as discussed in Paragraph 4.1.2, the Department made further changes in the project works initially awarded after re-engineering. These changes led to huge increase in the cost of works under the project. As per the latest revised estimates/administrative approvals, which included the cost of additional works and provision for price escalation, *etc.*, the total cost of the civil works of the project already entrusted so far (March 2022) stands at ₹1,02,267.99 crore, as of now. Since the project works are still ongoing, there is every possibility of further increase in the cost of works.
- Further, the project proposes to provide irrigation to 18,25,700 acres of CA to be newly created as part of the project works. Audit, however, observed that the works awarded so far (March 2022) included creation of distributary network for only 14,82,552 acres of CA (refer Paragraph 5.5.1). Works for distributary network for the remaining 3,43,148 acres⁷³ were yet to be awarded. In the works already awarded, the rate provided for creation of distributary network was ₹16,500 per acre. At this rate, the cost of the remaining distributary network alone works out to ₹566.19 crore. This cost may further increase if any further works like lifts, main canals, *etc.* are found necessary after detailed survey and investigations in respect of this remaining CA. For example, Government accorded (January 2019) administrative approval for ₹426.79 crore for creation of new CA of 38,307 acres under Sangareddy canal system Reach-III (in Link-IV of the project). The work was yet to be entrusted. When the cost of this work is taken as a benchmark, the cost of creation of the remaining CA 3,04,841 acres⁷⁴ may be about ₹3,396.33 crore.
- In addition to the above-mentioned project works, there were 16 more agreements concluded by the Department for preparation of DPRs, block level survey and investigation of the CA under Konda Pochamma Sagar Reservoir, installation of decision support system, construction of office buildings/guest

⁷³ The Districts/Mandals where the new CA was proposed to be developed were identified and mentioned in the DPR prepared by WAPCOS.

⁷⁴ 3,43,148 acres *minus* 38,307 acres

houses and other consultancy services for Kaleshwaram Project, the aggregate cost of which works out to ₹96.04 crore.

Considering the above costs, the final cost of project works and other services under Kaleshwaram Project is likely to exceed ₹1,06,187.15 crore, as against ₹63,352 crore projected in the DPR, as shown in the Table 4.6 below:

Table 4.6 – Likely cost of works/services under Kaleshwaram Project

S. No.	Components	Likely cost (₹ in crore)
1	Actual cost of civil works already entrusted as of March 2022	1,02,267.99
2	Approved cost of Sangareddy canal (Reach-III) yet to be entrusted	426.79
3	Likely cost of remaining distributary network yet to be taken up for 3,04,841 acres, as worked out by Audit	3,396.33
4	Actual value of contracts for other consultancy services/buildings	96.04
	Total cost of works/services for the project	1,06,187.15

Source: Worked out by Audit based on the information collected from the records of the I&CAD Department

The Government replied (May 2023) that the provision of price escalation cannot be included in the DPR before-hand as the price escalations are based on actual price variations of various items such as cement, steel, fuel, *etc.*, and the payment is made only if the variation in price is above 5 *per cent*. The price escalation is payable to the contractors as per the agreement conditions. It was further stated that in any project, the original estimated cost revision at a subsequent stage is done keeping in view the necessary changes as per actual execution, which may be due to inclusion or deletion or modification of certain items of works, change in specifications, *etc.*, depending on the actual requirement during execution. The approved cost of DPR *i.e.*, ₹80,190.46 crore includes the cost of distributary network to the entire new CA of 18,25,700 acres and not for 14,82,552 acres as pointed out by Audit. Therefore, the additional cost considered by the Audit is incorrect.

The reply of the Government is not convincing in respect of EPC works, as these works were originally taken up under PCSS project and later continued to be a part of Kaleshwaram Project. These works were estimated on 2007-08 & 2008-09 prices with a clause towards price adjustment (cement, steel and fuel) in the agreement. The Government Order No.94 of 2003 also stipulates for provision of Price Adjustment in the work agreements costing more than ₹2 crore and having completion period of more than 18 months. The DPR of Kaleshwaram Project was submitted to CWC in February 2017. Despite being aware of the applicability of price adjustment in these works, the Department completely ignored it while arriving at the updated cost of EPC works. This led to the understatement of cost of total project works. The Government did not offer its specific reply on increase in cost of works post re-engineering. Further, Audit calculated the additional cost of distributary network based on actual execution and award of works.

4.4.2 Other costs

(i) **Cost of sub-stations:** The DPR projected the cost of power supply arrangements and sub-stations as ₹2,885.84 crore. However, due to increase in the number/capacity of lifts under the project, this cost has now increased to ₹6,594.02 crore, as per the latest demand raised (November 2021) by TSTRANSCO.

(ii) **Cost of land acquisition:** As per DPR, the total land requirement for project works was assessed at 1,06,751 acres, for which an amount of ₹6,953.65 crore was provided. However, as of March 2022, the Department acquired only 63,972.16 acres of land by incurring an expenditure of ₹5,510.32 crore. This means that 60 per cent of the total required land was acquired at 80 per cent of the amount provided in the DPR. The average cost of the lands acquired so far works out to ₹8.61 lakh per acre. At this rate, a further amount of ₹3,683.26 crore would be required for acquisition of the remaining 42,778.84 acres of land. Thus, the total cost of land acquisition for the project would reach at least ₹9,193.58 crore as against the projected cost of ₹6,953.65 crore. Further, the future cost of balance land acquisition would be much higher since the per acre average cost mentioned above is based on the cost of land acquired during 2008-09 (*i.e.*, since inception of PCSS project) to 2021-22.

(iii) **Cost of Rehabilitation & Resettlement (R&R):** In the DPR, it was assessed that five new reservoirs⁷⁵ to be constructed under the project would cause submergence of 20 villages and involve R&R of the Project Displaced/Affected Families (PDFs/PAFs). An amount of ₹1,464.34 crore was provided in the project cost towards R&R activities. However, the Department later found that R&R would be necessary in two more reservoirs⁷⁶. Out of these seven reservoirs, R&R activities in respect of only three reservoirs⁷⁷ was completed as of March 2022 (all the identified 8,947 PDFs relocated) and an expenditure of ₹1,238.60 crore was incurred thereon. In the remaining four reservoirs, 16 villages are likely to be affected. However, the Department was yet to identify the PDFs fully and R&R was yet to be taken up (Discussed in Paragraph 5.3.1). As per preliminary assessment made by the Department, about 2,960 houses/ PDFs would be impacted in 14 villages under these four reservoirs⁷⁸. Considering the expenditure incurred on already relocated PDFs, the Department will require an amount of ₹409.77 crore⁷⁹ for providing R&R for these 2,960 houses/PDFs. As per the R&R Policy of Telangana, each major son and major daughter residing in a house would be treated as a separate family. Hence, the number of PDFs in these 14 villages would be much higher since there would be more than one PDF in a house. Further, no assessment of PDFs was made in two villages. Hence,

⁷⁵ Sri Komaravelli Mallanna Sagar (SKMS), Konda Pochamma Sagar, Anantagiri, Baswapur and Gandhamalla reservoirs

⁷⁶ Medaram and Kondemcheruvu reservoirs

⁷⁷ Sri Komaravelli Mallanna Sagar (SKMS), Konda Pochamma Sagar and Anantagiri reservoirs

⁷⁸ Baswapur reservoir: 1,085 PDFs in one village (PDFs yet to be assessed in two more villages); Medaram: 83 houses in one village; Gandhamalla: 1,145 houses in three villages; and Kondemcheruvu: 647 houses in nine villages

⁷⁹ ₹1,238.60 crore X 2,960 PDFs/8,947 PDFs

the number of actual PDFs in these 16 villages would be much higher. Moreover, the future cost of construction of R&R colonies/houses would also be higher due to cost escalation. Hence, the requirement of funds for providing R&R in the remaining 16 villages may be more than ₹409.77 crore. Even when the minimum further requirement of ₹409.77 crore is considered, the total expenditure on R&R under the project is likely to reach ₹1,648.37 crore, as against the amount of ₹1,464.34 crore provided in the DPR.

(iv) Interest During Construction (IDC): Major portion of expenditure incurred on execution of Kaleshwaram Project is being met from the market loans raised by the Kaleshwaram Irrigation Project Corporation Limited (KIPCL). The KIPCL has concluded agreements for a total loan amount of ₹87,449.15 crore (amount drawn: ₹55,807.86 crore as of March 2022). These loans carry interest ranging from 7.8 *per cent* to 10.9 *per cent* per annum. The amount of interest during construction (IDC) already paid to the end of March 2022/payable till commencement of repayment of these loans works out to ₹19,556.40 crore (refer Paragraph 4.7.2.8). As the project works are still in progress, the IDC is bound to increase further till the project is completed and becomes fully operational.

In any project of capital nature, it is a common practice to add the IDC to the project cost. However, no such provision was made while working out the estimated project cost in the DPR. Had the cost of IDC been considered the project cost would have gone up substantially.

The Government replied (May 2023) that the expenditure incurred till date towards sub-stations, land acquisition and R&R is within the provisions made in the DPR. It was also replied that the assumptions made to arrive at the present likely cost by Audit are incorrect and are based on pro-rata calculations and is very high. The increase in all the rates cannot be forecast during the time of estimate itself. Further, the cost was arrived at as per guidelines of DPR, wherein it was not specified to include the IDC. The same was scrutinized and approved by the CWC and accepted by the TAC.

The Government reply was not convincing as the Department considered the expenditure as of May 2023 as a criterion while stating likely project cost. However, Audit calculated the future liability of completion of the project by calculating the land cost at ₹8.61 lakh per acre as an average cost (total expenditure on land divided by extent of land acquired) against the rate of ₹10 lakh per acre adopted by the Department in their latest estimates. Similar method is adopted while calculating the R&R cost. In case of the costs of substations, the up-to-date actual cost as demanded by TSTRANSCO is being adopted by Audit. Regarding IDC, Audit is of the opinion that as most of the project is being executed through loans from Financial Institutions, wherein IDC is an integral part of repayment, the same should be reflected in the project cost.

4.4.3 Present likely project cost

Considering all the costs mentioned above, the total cost of the Kaleshwaram Project is likely to increase from ₹81,911.01 crore (as per approval of CWC) to ₹1,47,427.41 crore as shown in Table 4.7 below:

Table 4.7 – Project cost as per approval by CWC and the present likely project cost

(₹ in crore)			
S. No.	Component	Cost as submitted to CWC	Present likely cost
1	Works	63,352.00	1,06,187.15
2	O&M, Miscellaneous items and other unforeseen items	1,529.59	
3	Land development cost	1,477.70	
4	One-third cost of Yellampally project	242.85	242.85
5	Sub-stations	2,885.84	6,594.02
6	Land Acquisition	6,953.65	9,193.58
7	Rehabilitation & Resettlement	1,464.34	1,648.37
8	Forest land	741.52	741.52
9	Establishment charges	1,365.43	1,365.43
10	Tools & Plants and recoveries	769.27	769.27
11	Indirect charges	1,128.82	1,128.82
12	Interest During Construction	0	19,556.40
Total likely Project Cost		81,911.01	1,47,427.41

Source: As per the records of the I&CAD Department. The present likely cost worked out by Audit based on the information collected from the departmental records

As seen from the above table, the project cost has now increased by at least ₹65,516.40 crore (*i.e.*, by 79.98 per cent) over the cost projected earlier without any increase in the targeted benefits.

Kaleshwaram Project proposes to serve a total CA of 22,96,450 acres (18,25,700 acres of direct CA and supplementation to 4,70,750 acres⁸⁰ in other projects). Considering the present likely project cost of ₹1,47,427.41 crore, the capital cost of providing irrigation to the targeted CA would work out to ₹6.42 lakh per acre. Since the project works are still ongoing and likely to take a few more years for completion (discussed in Chapter-V), the capital cost of the project is likely to increase further with time overrun. Accordingly, the per acre capital cost would also increase further.

Moreover, as already discussed in Paragraph 4.2, the 169 TMC of water earmarked for irrigation is unlikely to be adequate to provide irrigation to the full CA targeted under the project. Therefore, the per acre capital cost would be much higher.

The Government replied (May 2023) that considering (i) works of Kaleshwaram Project with the variations/workslips including additional TMC works, (ii) land acquisition, (iii) sub-stations, (iv) R&R, (v) Establishment, *etc.*, the present project cost has been arrived at ₹1,21,764.82 crore and not as arrived by Audit. It further

⁸⁰ *i.e.*, 25 per cent of 18.83 lakh acres

replied that the assumptions made by Audit to arrive at the present likely cost of land acquisition and R&R are based on pro-rata calculations and are incorrect. It was also stated that the project cost was arrived as per guidelines of DPR, wherein it was not specified to include the IDC.

The Government reply is not acceptable as while calculating the latest project cost, the Department did not consider the latest cost of the project works in several cases, even though it had prepared revised estimates. Further, Audit calculated the future liability on the balance land acquisition by considering the actual average land cost at ₹8.61 lakh per acre (total expenditure on land divided by extent of land acquired) whereas the Department is adopting a rate of ₹10 lakh per acre in the latest works estimates. Audit adopted similar method for calculating the balance R&R cost also. Thus, Audit calculation is based on a lesser rate as compared to Department's own calculations. In case of sub-stations, Audit has taken into account the latest cost as per the actual demand raised by TSTRANSCO.

In respect of Interest During Construction (IDC), since most of the Project is being executed through loans from Financial Institutions, wherein IDC is an integral part of repayment, the same needs to be reflected in the project cost.

As regards the per acre capital cost, the Government replied (November 2023) that Kaleshwaram Project is proposed to irrigate a new CA of 18,25,700 acres in Kharif, 5,50,160 acres in Rabi and also to stabilize a CA of 18,82,970 acres under existing projects and therefore, the annual irrigation of about 42,58,830 acres of CA is proposed under the Project and not 22,96,450 acres as considered by Audit.

The reply is not acceptable as the DPR itself envisaged creation of 22,96,450 acres (new CA of 18,25,700 acres plus stabilization CA of 25 *per cent* of existing CA of 18.83 lakh acres (*i.e.*, 4,70,750 acres) and not 42,58,830 acres as mentioned in the reply. Further, irrigation in Rabi season was also proposed as a part of the same new CA (18,25,700 acres) and not for any additional CA. Moreover, as already pointed out in Paragraph 4.2, availability of water for rabi season was not guaranteed. As regards the stabilization CA of 4,70,750 acres, Audit considered the area while arriving at the capital cost under Kaleshwaram Project, even though creation of this stabilization CA is already included in the capital cost of the respective projects and not in the capital cost of Kaleshwaram Project. In case this stabilization CA is not considered, the per acre capital cost of Kaleshwaram Project would actually be much higher.

4.5 Economic viability of the project

As per the guidelines issued (2010) by the Ministry of Water Resource, Government of India on 'Preparation of Detailed Project Reports for Irrigation and Multipurpose Projects', the economic viability of an irrigation project has to be assessed by computing Benefit Cost Ratio (BCR). BCR refers to the ratio between the value of annual benefits anticipated from a project to the annual costs. These guidelines also stipulate the methodology for computing the BCR. As per these guidelines, a project is considered economically viable when the BCR is more than 1.5 in normal areas and

more than 1.0 in case of the projects proposed in scanty/drought prone areas. This means that the investment on an irrigation project is justified only when the annual benefits exceed the annual costs. BCR is the key parameter for approval of a project by CWC.

The CWC had cleared (June 2018) the Kaleshwaram Project with a BCR of 1.51 as projected by the Department. However, Audit analysis revealed that the re-engineered Kaleshwaram Project was economically unviable, ab-initio. In the DPR, the BCR was inflated by under-projecting the annual costs and overstating the value of annual benefits expected from the project, as discussed below:

4.5.1 Overstatement of anticipated benefits from the Project

The annual benefits include the value of benefits from agriculture (post-project benefits minus pre-project benefits), revenue from industrial and drinking water supply and benefits from fisheries.

(i) Agricultural income: For computation of BCR, the Department had projected the income from agricultural produce from the new CA after completion of the project as ₹12,553.47 crore per annum (₹10,577.30 crore in Kharif and ₹1,976.17 crore in Rabi season). The agricultural income from stabilisation of CA of other existing projects was worked out on pro-rata basis at ₹3,236.82 crore.

However, as discussed in Paragraph 4.2 earlier, considering the experiences in other irrigation projects in the State, the 169 TMC of water allocated for irrigation needs under the project would be sufficient for Kharif season alone and there is a significant risk that it may not be possible to provide irrigation during Rabi season. Thus, there may not be any agricultural income during Rabi season under the project as assumed by the Department in the DPR. In case the Rabi income is excluded, the anticipated income from agriculture in Kharif would work out to only ₹13,304.57 crore (new CA: ₹10,577.30 crore and stabilisation: ₹2,727.27 crore) and not ₹15,790.29 crore projected by the Department.

The Government replied (May 2023) that the assumption made by Audit that 169 TMC of water would be sufficient for irrigating Kharif crop alone is incorrect. The crop water requirement is arrived at based on scientific methodology as per the CWC guidelines, which was approved by the Irrigation Planning Directorate of CWC and accepted by the TAC.

The reply of the Government is not acceptable as only 10,000 acres of CA could be served by one TMC of water as arrived at by Audit duly observing the crop water requirement of existing projects in Telangana State. Accordingly, it is unlikely that 134.50 TMC of water provided for irrigation purpose would be sufficient to serve the CA in Kharif season (as also commented in Paragraph 4.2(iii)).

(ii) Revenue from industrial water supply: In addition to the irrigation benefits, the Kaleshwaram Project also contemplates supply of 16 TMC of water for industrial purposes. In the BCR calculations, the Department projected a revenue of

₹3,805.40 crore through supply of water for industrial purposes. Audit observed that the Department had computed this revenue by adopting a rate of ₹84/Cu.M. obtained from the Hyderabad Metropolitan Water Supply and Sewerage Board (HMWSSB). Audit observed that as per the rates prescribed by Government⁸¹, the basic rate chargeable for industrial water supply is only ₹2.09/Cu.M. Thus, the basic rate for 16 TMC of water works out to ₹94.69 crore⁸². The Government orders further stipulated that if the water is drawn from lift irrigation schemes, energy costs for lifting the water and 10 *per cent* maintenance charges on energy charges would also be levied in addition to the basic rate. In Kaleshwaram Project, the energy cost for lifting of 16 TMC of water from Medigadda barrage to Konda Pochamma Sagar Reservoir works out to ₹745.28 crore and 10 *per cent* maintenance charges thereon works out to ₹74.53 crore. Thus, the maximum revenue from supply of water to industries would be ₹914.50 crore⁸³ and not ₹3,805.40 crore as projected in the DPR. However, getting even this revenue may not be possible since it would require increasing the present water charges of ₹2.09/Cum by 10 times.

The Government replied (May 2023) that as per HMWS&SB, the rate for industrial water since 2014 was ₹180 per Cu.M while Audit has adopted a lesser rate of ₹2.09 per Cu.M., which is even lower than the production cost per Cu.M..

The contention of the Government is not correct as the water charges at ₹180 per Cu.M. is applicable for the water supplied by HMWS&SB to the industries in Hyderabad and its peripheral area. Audit has adopted the rate of industrial water of ₹2.09 Cu.M. as promulgated in the Order issued by the Government in 2015 which is applicable as of date. Further, the Engineer-in-Chief, Gajwel while recommending permission to industrial water to industrial parks at Banda Thimmapur in Siddipet District has also adopted the rate as prescribed by the Government in 2015. Similarly, in case of NTPC, a rate of ₹2.78 per Cu. M was adopted which is lower than the revenue projected by the Department.

(iii) Revenue from fisheries: For the purpose of computing the BC Ratio of the project, the estimated revenue from fisheries was taken as ₹1,750 crore. This amount was arrived at on the assumption that the total water spread area of the 20 reservoirs (total capacity: 147.71 TMC) under the project in which fisheries was proposed, would be 3.5 lakh hectares. However, as per the departmental records, the total extent of submergence under the 16 reservoirs (under which fisheries activities were planned to be taken up) being constructed under the project was 30,823 hectares. Thus, the expected revenue from fisheries in this water spread area works out to ₹154.12 crore⁸⁴

⁸¹ vide G.O.Ms.No.115, dated 27 June 2015 issued by the I&CAD Department

⁸² One TMC = 2,83,16,846 Cu.M. The cost of 16 TMC = 2,83,16,846 Cu.M. X ₹2.09 X 16 TMC = ₹94.69 crore

⁸³ Basic rate for 16 TMC of water: ₹94.69 crore; Energy cost for lifting this water from Medigadda barrage to Konda Pochamma Sagar Reservoir: ₹745.28 crore; and maintenance charges: ₹74.53 crore. Total: ₹914.50 crore

⁸⁴ (₹1,750.00 crore /3,50,000 Ha) X 30,823 Ha = ₹154.12 crore

only. This indicates that the benefits anticipated through fisheries were exaggerated by more than 10 times.

No reply was offered by the Government.

4.5.2 Understatement of annual costs

The annual costs in a lift irrigation project include interest on capital, O&M costs, electricity consumption costs and depreciation on civil works, pumps/motors and pipelines.

(i) Annual energy costs: In the DPR, the Department had assessed the electricity requirement under the project at 13,558 MU, on the initial assessment that 180 TMC would be lifted (at the rate of 2 TMC for 90 days) from Medigadda and 20 TMC from Yellampally reservoir for the project. The DPR projected the annual energy costs at ₹4,148.80 crore in the BCR calculations. However, the CWC raised the quantum of water to be lifted at Medigadda to 195 TMC. Thus, the electricity requirement would proportionately increase to 14,687.83 MU⁸⁵. Further, as per the guidelines on preparation of DPRs issued by GoI, the annual energy cost has to be worked out with the prevailing rate. However, the Department had adopted a lower rate of ₹3/unit whereas the prevailing tariff⁸⁶ chargeable for Government lift irrigation schemes by DISCOMs at the time of preparation/submission of DPR was ₹6.40/unit. Considering the correct tariff, the annual cost on electricity consumption of 14,687.83 MU works out to ₹9,400.21 crore as against the amount of ₹4,148.80 crore projected in the DPR.

The Government replied (May 2023) that the energy requirement of 13,558 MU calculated in the DPR is for lifting 195 TMC of water and not for 180 TMC as opined by Audit. Further, it was informed that energy charges were considered at the rate of ₹3.00 per unit during the preparation of DPR of Kaleshwaram Project in anticipation that with the advent of National Grid and promotion of Renewable Energy sources, the cost of power would come down.

The reply of the Government is not tenable because the contents in page 15 and 16 of Chapter-1 of Vol.-I of DPR of the project clearly elucidate that to lift 180 TMC of water a total of 13,558 MU of electricity is required. Further, the contention of Government towards adoption of ₹3.00 per unit is not correct because as per the Guidelines for preparation of DPR, energy charges prevalent as on date of preparation of DPR should have been considered. This methodology was also adopted by the Government in its calculation of revised BCR wherein it considered the prevailing rate of ₹6.30 per unit of electricity.

(ii) Maintenance cost of headworks: As per the guidelines on preparation of DPRs issued by GoI, the annual cost shall also include cost of maintenance of headworks to

⁸⁵ $13,558 \text{ MU} \times 195 \text{ TMC} \div 180 \text{ TMC} = 14,687.83 \text{ MU}$

⁸⁶ The DPR of Kaleshwaram project was submitted to the CWC in February 2017 and CWC approved the same in June 2018. The tariff fixed by the Telangana State Electricity Regulatory Commission for lift irrigation schemes was ₹6.40/unit for the years 2016-17 and 2017-18

be worked out at the rate of one *per cent* of the cost of headworks. However, the Department did not make a provision for this resulting in understatement of the annual costs. Considering the value of agreements (₹4,550.40 crore) initially concluded for the three barrages at Medigadda, Annaram and Sundilla, the cost of maintenance of headworks would work out to ₹45.50 crore.

4.5.3 Ab-initio BCR as worked out by Audit as per the approved DPR cost

In view of the overstatement of benefits and understatement of annual costs by the Department while computing the BCR as mentioned above, Audit computed the BCR of the project with realistic assumptions and figures of annual costs and benefits, but considering the same project cost estimated by the Department in the DPR, which is shown in Table 4.8 below.

Table 4.8 – Ab-initio BC Ratio of Kaleshwaram Project

(₹ in crore)

S. No.	Component of benefit/cost	As per Department	As worked out by Audit	Basis for Audit calculations
Annual Benefits				
1	Agricultural income			
	Income of farm produce, post-project, from new CA	12,553.47	10,577.30	Audit considered income from only the Kharif season as water is not likely to be available for Rabi crops. Hence income from Rabi crops was not taken into account.
	Income of farm produce from stabilization (25% of 18,82,970 acres)	3,236.82	2,727.27	
	<i>Less:</i> Income of farm produce in pre-project scenario	682.65	682.65	
	Net value of farm produce, post-project	15,107.64	12,621.92	
2	Revenue from Drinking Water Supply	1,019.30	1,019.30	As per Department
3	Revenue from Industrial Water Supply	3,805.40	914.50	As per the actual rates prescribed by Government
4	Revenue from Fisheries	1,750.00	154.12	As per the actual water spread area of the reservoirs
	Total annual benefits	21,682.34	14,709.84	---
Annual costs				
1	Interest on capital @ 10% of estimated total cost of the project	8,191.10	8,191.10	As per Department
2	Annual energy cost of pumping water for irrigation and other purposes	4,148.80	9,400.21	As per the revised power requirements and prevailing rate of electricity charges
3	Depreciation of the project @ 1% of the cost of the project for 100 years life	804.33	804.33	As per Department
4	Annual O&M charges at ₹1,175 per Ha of command area	112.97	112.97	As per Department
5	Maintenance cost of headworks @ 1% of its cost	--	45.50	Provided as per DPR guidelines issued by GoI

S. No.	Component of benefit/cost	As per Department	As worked out by Audit	Basis for Audit calculations
6	Depreciation of the pumping system @ 8.33% of the cost of the pumping system assuming life of the system as 12 years	1,023.07	1,023.07	As per Department
7	Depreciation of the raising mains @ 3.33% of the cost of the raising mains assuming life of the system as 30 years	71.13	71.13	As per Department
Total annual costs		14,351.40	19,648.31	---
B.C. Ratio = Annual Benefits/Annual costs		1.51	0.75	Project is economically unviable

Source: As per the records of the I&CAD Department. Audit calculations are as per the DPR guidelines issued by the CWC and based on the information collected from the I&CAD Department

As seen from the above table, the BCR of Kaleshwaram Project was overstated in the DPR. The BCR estimated by Audit, even with the understated project cost submitted to CWC, works out to only 0.75 and not 1.51 as projected by the Department. Thus, the re-engineered Kaleshwaram Project was, ab-initio, economically unviable.

The Government repeated the reply as already stated in the Paragraph 4.5.1.

4.5.4 BCR of the project with the present likely project cost

Moreover, as discussed in Paragraph 4.4, the project cost was understated in the DPR. With further changes made in the project works and revision of estimates thereof, the actual project cost is now likely to exceed ₹1,47,427.41 crore as against the amount of ₹81,911.01 crore considered by the Department for calculation of BCR. With the actual project cost, the annual costs of the project would substantially increase, as below:

(i) Interest on capital: While computing the BCR, Department provided an amount of ₹8,191.10 crore towards interest (at the rate of 10 per cent) on project cost under the annual costs. Considering the present project cost of ₹1,47,427.41 crore, the interest there on works out to ₹14,742.74 crore.

The Government replied (May 2023) that the cost was arrived as per the guidelines of DPR, wherein it was not specified to include the IDC.

(ii) Annual energy costs: In the DPR, the Department had assessed the electricity requirement under the project at 13,558 MU. However, due to subsequent increases in the pumping capacities of lifts under the project, the annual power requirement under the project now works out to 14,344.39 MU (as discussed in Paragraph 3.2.2-ii). The prevailing rate⁸⁷ of energy charges applicable for Government lift irrigation schemes was ₹6.30/unit. At this rate, the total energy charges for Kaleshwaram Project would work out to ₹9,036.97 crore⁸⁸.

⁸⁷ fixed by the TSERC vide Tariff Order for the year 2022-23

⁸⁸ 14,344.39 MU X ₹6.30 per unit

Further, from the year 2018-19, the Telangana State Electricity Regulatory Commission (TSERC) has introduced a two-part tariff structure for lift irrigation schemes. Under this new structure, Demand Charges (or Fixed Charges) are also payable, in addition to the actual energy consumption charges. As per the latest Tariff Order (2022-23) issued by TSERC, the DISCOMs levy Demand Charges at the rate of ₹275 per kVA per month on ‘80 per cent of the Contracted Maximum Demand (CMD)⁸⁹’ or the ‘Recorded Maximum Demand (RMD)⁹⁰’, whichever is higher during the operational period (pumping season) of five months (July to November). During the remaining seven months of non-operational period (December to June), Demand Charges would be levied on ‘25 per cent of the CMD’ or the actual RMD, whichever is higher. In simple terms, irrespective of the fact that the lifts/pumps are operated or not, the I&CAD Department, in addition to the consumption charges, has to pay minimum Demand Charges on 80 per cent of the CMD for five months and 25 per cent of the CMD for seven months. Considering the fact that the total demand of Kaleshwaram Project is 8,459.10 MW, the Demand Charges payable (at the rates prevailing at present) would work out to ₹1,337.59 crore⁹¹ every year, when the project becomes fully operational.

Thus, there would be an annual commitment of ₹10,374.56 crore on the energy charges and fixed charges on electricity for the project. This is the annual commitment at the prevailing tariff fixed by the TSERC and may increase further if there is any upward revision in the electricity charges in future.

(iii) Depreciation: While computing the BCR, the Department had provided an amount of ₹804.33 crore towards depreciation at the rate of one per cent on the project cost (of ₹80,433 crore, excluding land development cost and including the one-third cost of Yellampally project), ₹1,023.07 crore towards depreciation at the rate of 8.33 per cent on the cost of pumping system and ₹71.13 crore towards depreciation at the rate of 3.33 per cent on the cost of raising mains (pipelines). However, as per the revised estimates, the total cost of works now stands at ₹1,02,267.99 crore and the costs of civil works, pumping system and raising mains has now increased to ₹68,301.84 crore, ₹18,936.65 crore and ₹15,029.50 crore, respectively. Accordingly, the depreciation on civil works, pumping system and raising mains works out to ₹683.02 crore (at the rate of one per cent on the cost of civil works), ₹1,577.42 crore (at the rate of 8.33 per cent on the cost of pumping system) and ₹500.48 crore (at the rate of 3.33 per cent on the cost of pipelines), respectively.

⁸⁹ CMD is the maximum demand (in kVA/MVA) for which power connection was taken by the I&CAD Department from the DISCOM

⁹⁰ The maximum demand of power (in kVA/MVA) recorded during a billing month

⁹¹ CMD of Kaleshwaram project = 8,459.10 MW; Demand Charges:- During operational period: (84,59,100 kVA X 80 per cent X ₹275 X 5 months) = ₹930.50 crore, During Non-operational period: (84,59,100 kVA X 25 per cent X ₹275 X 7 months) = ₹407.09 crore, Total Demand Charges in a year: ₹930.50 crore + ₹407.09 crore = ₹1,337.59 crore

(iv) **Maintenance cost of headworks:** Considering the latest cost of ₹9,035.40 crore being incurred on the three barrages at Medigadda, Annaram and Sundilla, the cost of maintenance of headworks would work out to ₹90.35 crore.

Considering the current likely project cost and increased annual costs, the BCR of the project drastically went down further, as shown in the Table 4.9 below:

Table 4.9 –BCR of Kaleshwaram Project with the latest likely project cost

(₹ in crore)

S. No.	Component of benefit/cost	As per Department ⁹²	As worked out by Audit	Basis for Audit calculations
Annual Benefits				
1	Agricultural income			
	Income of farm produce, post-project, from new CA	12,553.47	10,577.30	Audit considered income from only the Kharif season as water is not likely to be available for Rabi crops. Hence income from Rabi crops was not taken into account.
	Income of farm produce from stabilization (25% of 18,82,970 acres)	3,236.82	2,727.27	
	<i>Less:</i> Income of farm produce in pre-project scenario	682.65	682.65	
	Net value of farm produce, post-project	15,107.64	12,621.92	As per Department
2	Revenue from Drinking Water Supply	1,019.30	1,019.30	As per Department
3	Revenue from Industrial Water Supply	3,805.40	914.50	As per the rates prescribed by Government
4	Revenue from Fisheries	1,750.00	154.12	As per the actual water spread area of the reservoirs
	Total annual benefits	21,682.34	14,709.84	---
Annual costs				
1	Interest on capital @ 10% of estimated total cost of the project	8,191.10	14,742.74	As per the present likely cost of the project
2	Annual energy cost of pumping water for irrigation and other purposes	4,148.80	10,374.56	As per the revised power requirements and prevailing rates of electricity charges
3	Depreciation of the project @ 1% of the cost of the project for 100 years life	804.33	683.02	As per the present cost of the civil works
4	Annual O&M charges at ₹1,175 per Ha of command area	112.97	112.97	As per Department
5	Maintenance cost of headworks @ 1% of its cost	--	90.35	Provided as per DPR guidelines issued by GoI
6	Depreciation of the pumping system @ 8.33% of the cost of the pumping system assuming life of the system as 12 years	1,023.07	1,577.42	Calculated on the actual cost of pumping system including additional works taken up

⁹² Audit has taken the rates adopted by the Department as per original approved DPR (approved in June 2018).

S. No.	Component of benefit/cost	As per Department ⁹²	As worked out by Audit	Basis for Audit calculations
7	Depreciation of the raising mains @ 3.33% of the cost of the raising mains assuming life of the system as 30 years	71.13	500.48	Calculated on the actual cost of pumping mains including additional works
Total annual costs		14,351.40	28,081.54	---
B.C. Ratio = Annual Benefits/Annual costs		1.51	0.52	Project is economically unviable

Source: As per the records of the I&CAD Department. Audit calculations are as per the DPR guidelines issued by the CWC and based on the information collected from the I&CAD Department

Thus, considering the estimated latest project cost (as calculated by Audit), the BCR of Kaleshwaram Project works out to mere 0.52. This means that every rupee spent on the project would yield a benefit worth only 52 paise, indicating that the project is economically unviable.

The Government replied (November 2023) that the total cost of the project arrived by Audit includes latest cost of works including variations and price escalation, latest electricity charges, latest estimates for construction of sub-stations, *etc.* However, Audit has not considered the latest market rates of agricultural produce, wherein there was a remarkable increase in the latest prices of various agricultural crops. Regarding the annual energy cost of the project and the adequacy of water for Rabi crop, the Government furnished the same replies as given at Paragraph 3.2.2 (ii) and Paragraph 4.2. It was also replied that revised BCR worked out with the latest cost and benefits is worked out to 1.731.

The replies regarding the energy charges and adequacy of water for Rabi crop are not acceptable as already mentioned in the respective Paragraphs. However, even when the 20 *per cent* reduction in annual energy costs is taken into account and even after considering the latest market rates of agricultural produce as stated by Government in its reply, and removing the IDC amount from the present likely project cost, the BCR still works out to 0.813 (as shown in *Appendix 4.3*), which confirms that the project is economically unviable.

4.5.5 Possibility of further diminishing of BCR of the project

While the present BCR of the project is very low as discussed above, the BCR is likely to go much lower considering the following:

(i) Escalation in cost of works and interest during construction: The project works are still ongoing and some of the works were yet to commence or yet to be taken up (discussed in Chapter-V). It is unlikely that all the project works are completed in full shape by June 2024, as targeted by the Department and it may take few more years for their completion. With the possible time overrun, there would be inevitable escalation in the cost of works. Moreover, the amount of interest during construction (IDC) payable will also increase further, thereby increasing the project cost. As a result, the annual cost of the project will also increase.

(ii) Ambitious projection of post project crop yields: For computation of the income from agricultural produce after completion of the project, the Department had projected that the yield of agricultural crops would increase multifold (*i.e.*, 120 per cent to 400 per cent increase) as compared to the pre-project scenario, as shown in Table 4.10 below:

Table 4.10 – Increase in crop yields projected by the Department and actual average crop yields

S. No.	Crop	Proposed crop area (in Ha.)	Pre-project yield (Qtl./ Ha.)	Projected post project yield (Qtl./ Ha.)	Percentage increase projected	Average yield in the State in 2017-18 (Qtl./ Ha.)
1	Paddy	1,11,323	10	50	400%	31.92
2	Maize	11,689	12	50	316.67%	43.64
3	Jowar	17,812	10	40	300%	10.90
4	Green Gram	73,473	10	22	120%	6.38
5	Black Gram	73,473	10	22	120%	8.07
6	Groundnut	1,00,191	15	40	166.67%	22.30
7	Cotton	1,11,323	15	35	133.33%	4.66
8	Soyabean	1,11,323	18	40	122.22%	16.24

Source: DPR of Kaleshwaram Project. The average yield in the State is taken from the Agriculture Action Plan for the year 2019-20 published by the Agriculture Department, Government of Telangana. Specific data for crop yield in irrigated and non-irrigated area not available in the Action Plan.

As seen from the above table, the post project crop yield projected by the Department was abnormally higher than the average yield achieved in the State and was unrealistic. Further, increase in productivity in the command area does not depend only on water but also on other inputs like fertilizers/pesticides, *etc.*, the percentage of marginal farmers and the agricultural practices. The actual post-project income from agriculture may be far less than that projected for computation of BCR.

The Government replied (November 2023) that the projected yield is certified by the Agriculture Department of Telangana. However, the fact remains that the crop yields projected were abnormally higher than the actual average yields achieved in the State.

(iii) Under estimation of cost of cultivation: For computation of the net income from agricultural produce, the cost of production is deducted from the value of crop produce. Audit made a comparison of the production costs adopted by the Department while computing the value of agricultural income from the project with the production costs of various crops available in the Pocket book of Agricultural Statistics published by the Ministry of Agriculture and Farmers Welfare, Government of India every year. It was observed that the Department adopted abnormally low production costs for various crops as shown in Table 4.11 below:

Table 4.11 – Low input costs taken by the Department for various crops

S. No.	Crop	Production cost per Ha (combined Andhra Pradesh figures)			Production cost per Ha taken by the Department (₹)
		in 2015-16	in 2016-17	in 2017-18	
1	Paddy	53,108	80,304	60,846	7,578
2	Maize	43,025	67,285	49,333	6,284
3	Jowar	20,672	39,772	42,472	4,328
4	Green gram	20,237	23,882	19,481	5,943
5	Black gram	17,797	28,002	23,426	7,476
6	Pigeon pea	26,237	52,053	29,686	4,704
7	Groundnut	42,936	59,841	52,582	7,041
8	Cotton	52,788	83,117	67,515	8,547
9	Soyabean	33,059	60,533	34,888	6,068

Source: DPR of Kaleshwaram Project and the Pocket book of Agricultural Statistics - 2018, 2019 and 2020 published by the Ministry of Agriculture and Farmers Welfare, GoI

In case realistic production costs are taken into account, the net income from agriculture would be far less than that projected by the Department.

(iv) Revenue from drinking water supply: The Kaleshwaram Project envisages providing drinking water to the en-route villages (10 TMC) in the project location and to the twin cities of Hyderabad and Secunderabad (30 TMC). In the BCR calculations, the Department had projected a revenue of ₹1,019.30 crore from drinking water supply (at the rate of ₹9/Cu.M.).

Audit observed that the Panchayat Raj and Rural Development Department has been implementing a flagship program called ‘Mission Bhagiratha’ to provide protected and assured drinking water to all households of the State. On 25 February 2019, the Chief Minister of Telangana announced in the State Legislative Assembly that no water charges would be collected from the Gram Panchayats under Mission Bhagiratha.

The Hyderabad Metropolitan Water Supply and Sewerage Board (HMWSSB) is responsible for supply of potable drinking water supply in the Hyderabad metropolitan area. From December 2020 onwards, Government of Telangana has been providing 20,000 litres of domestic water per month per household within the HMWSSB jurisdiction free of cost.

Thus, the revenue from drinking water supply from the Kaleshwaram Project would be far less than that projected in the BCR calculations.

The Government replied (November 2023) that based on its decision to waive off the water charges for the welfare of public, the subsidy amount would be paid to the concerned Department. The reply confirms the audit observation that the revenue from drinking water supply from the project would be less than that projected in the DPR and when subsidy is paid to compensate this, there would be an additional cost to the public exchequer.

Considering the possibility of further increase in the project cost and shortfall in the value of project benefits as discussed above, there is a risk that the BCR of Kaleshwaram Project could be lower than 0.50.

No specific reply was furnished by the Government on this audit observation.

4.6 Statutory clearances

As per the CWC guidelines, any project taken up on an inter-state river or its tributary is deemed to involve inter-state ramification and as such the clearance from CWC is mandatory. The CWC examines the Hydrology, Interstate aspects, Irrigation Planning, Economic viability of the project, *etc.* In addition, the State Government shall obtain all required statutory clearances like Environmental/Forest Clearance, approval for Rehabilitation and Resettlement Plan and other clearances from the Ministry of Environment & Forests and Ministry of Tribal Affairs before the Investment Approval is accorded.

The State Government had obtained all the initial clearances for the Kaleshwaram Project during October 2017 - June 2018 except Rehabilitation and Resettlement (R&R) clearance from Ministry of Tribal Affairs which was obtained in January 2023.

(i) CWC approval for the DPR: The Kaleshwaram Project was cleared by the Technical Advisory Committee of Ministry of Water Resources, River Development & Ganga Rejuvenation for an estimated project cost of ₹80,190.46 crore⁹³ in the 136th Meeting held in June 2018. However, there have been subsequent additions to the scope of the project works which led to increase in the estimated cost of works. As against the amount of ₹63,352 crore projected in the DPR, the total cost of works already entrusted as of March 2022 stands at ₹1,02,267.99 crore. The major change in the project components was increasing the capacity of lifts and water conveyor system from 2 TMC per day to 3 TMC per day. Further, the cost of works/project cost would increase further as the works for distributary network for 3,43,148 acres were yet to be awarded (March 2022). Despite the huge increase in the scope and cost of project works, the Department did not prepare and submit any revised DPR to CWC duly incorporating these subsequent changes and likely increase in the project cost.

The Government replied (May 2023) that the Revised Project Report of Kaleshwaram Project including hydrology, revised estimate and revised BCR was prepared and submitted to the Ministry of Jal Shakti (MoJS) in March 2022. Subsequently, CWC had raised (May 2022) certain comments on the project. The suitable replies were submitted in same month. Further remarks from CWC were also attended. It was further stated that the Revised Project Report has been scrutinized in the Hydrology Directorate and the proposals were found to be in order. Also, the cost estimate is being scrutinized in the Cost Appraisal Directorate and the remarks are being attended to from time to time.

The fact remains that the Revised DPR is yet to be approved by the CWC.

⁹³ Excluding land development cost and the one-third cost of Yellampally project

(ii) Environmental Clearance by MoEF: The Ministry of Environment, Forest & Climate Change (MoEF), GoI had accorded Environmental Clearance (EC) for Kaleshwaram Project in December 2017 subject to compliance to certain conditions. In the EC, the MoEF had stipulated a condition that “in case of change in the scope of Project, the same shall be intimated to the Ministry and fresh approval, if required, shall be taken from the Ministry”.

As discussed in Paragraph 4.1.2, there have been some major changes in the scope of project works/increase in quantities of work after approval of the project by CWC and after accordance of EC by MoEF. As per the departmental records, the quantities of earthwork and concrete works under Kaleshwaram Project have increased substantially since 2018, as shown in Table 4.12 below:

Table 4.12 - Increase in work quantities after receipt of Environmental Clearance

S. No.	Component of work	Quantities as of March 2018	Quantities as of March 2022	Increase	Increase percentage
1	Earthwork (lakh Cu.M.)	3,334.91	8,123.47	4,788.56	143.59%
2	Concrete (lakh Cu.M.)	166.44	226.76	60.32	36.24%
3	Structures (No.)	2,684	11,432	8,748	325.93%

Source: Records of the I&CAD Department

Despite the huge increase in the scope of project works after accordance of EC which may have additional impact on the environment, the Department did not communicate the revised scope of project works to the MoEF for fresh EC. Further, there is no evidence to show that the Department has initiated any action for conducting fresh studies for assessing the environmental impact due to the increased scope of works.

The Government replied (November 2023) that there is no change in scope of works and increase in quantities is normal in any construction project based on the site conditions during execution and that the EC is already obtained.

The reply is not acceptable as there have been major changes in the project works including increase in the lifting/conveying capacity by an additional one TMC and huge increase in the quantities of earthwork, cement concrete and structures as already stated above. The cost of works alone has increased from ₹63,352 crore (as projected in the DPR) to ₹1,02,267.99 crore *i.e.*, by ₹38,915.99 crore (or by 61.43 *per cent*).

4.7 Financial arrangements for the project

Planning of finances is vital for taking up a project like Kaleshwaram which involves huge capital investments. The Kaleshwaram project is being executed with funding through normal State Budget and by raising market loans. Audit observations on the financial arrangements for the project are discussed below:

4.7.1 Administrative Approval for the project

Article 187(a) of the State Financial Code stipulates that as a rule, no work allotted to the Public Works Department should be started until both administrative approval and technical sanction have been accorded for the whole work. It further stipulates that in exceptional circumstances, estimates for any component parts of the project can be sanctioned subject to the condition that there must be a fully prepared detailed estimate for each such component, and the administrative approval of the project as a whole must include specific approval of a definite amount of expenditure on that component part.

Though the Kaleshwaram Project was estimated to cost ₹81,911.01 crore⁹⁴, the Government of Telangana has not accorded administrative approval covering the project as a whole. Instead, the Government has been issuing separate administrative approvals for individual works on ad-hoc basis, in violation of the provisions of State Financial Code. The Government has so far (March 2022) accorded as many as 73 administrative approvals for the works and consultancy services aggregating to ₹1,10,248.48 crore. The aggregate amount of the technical sanctions accorded so far in respect of the project works was ₹1,09,768.67 crore. A total expenditure of ₹70,666.48 crore⁹⁵ was already incurred on the project works as of March 2022.

Moreover, there are no orders from Government regarding the funding pattern for the project duly indicating the proposed funding from State budget and funding proposed through other sources including market loans. The absence of a comprehensive plan duly spelling out the sources of funds for a project of this scale which will have a long term impact on the finances of the State, is a clear indication of improper planning and ad-hocism.

The Government replied (May 2023) that it had accorded administrative approval to the PCSS Project for ₹38,500 crore in December 2008 itself. It was also stated that after re-engineering, the Kaleshwaram Project was divided into 7 links and 28 packages. All these 28 packages were not grounded at a time and that the Government issued separate administrative approvals for individual packages from time to time. Regarding the funding pattern, it was replied that a Techno Economic Viability (TEV) Study of the Kaleshwaram Project has been prepared and as per the report, the project is proposed to be funded through equity, Government grant, term loans from commercial banks/financial institutions and therefore, the audit comment on the absence of comprehensive plan about the sources of funds, improper planning and ad-hocism is not correct. The Government further replied (November 2023) that after completion of the project works, a comprehensive proposal for the total project cost would be submitted for according administrative approval.

⁹⁴ including ₹1,477.70 crore for land development and ₹242.85 crore being the one-third cost of Yellampally project

⁹⁵ including price escalation payments and other re-imburements

The Government reply is not acceptable since according administrative approvals separately for each work instead of the project as a whole is in contravention of the provisions of the State Financial Code. Further, administrative approval for the whole of the project was required to be obtained beforehand and not after completion of the project. As for the funding pattern, the reply is not tenable since the TEV report cited by Government was a report prepared by the KIPCL⁹⁶ for the purpose of raising loans for the project. No funding pattern was approved by the Government.

4.7.2 Creation of a Special Purpose Vehicle

In October 2015, the Government of Telangana issued orders⁹⁷ for formation of a Special Purpose Vehicle (SPV) named Kaleshwaram Irrigation Project Corporation Limited (KIPCL)⁹⁸ to mobilise funds for Kaleshwaram Project. Accordingly, the KIPCL was incorporated under the Companies Act, 2013 in August 2016. The aim of the SPV was to plan, appraise, approve, release funds, implement, manage, operate, monitor and evaluate the Project.

4.7.2.1 Huge loans taken for Kaleshwaram Project

As per the Government orders, the KIPCL was empowered to raise loans from banks and other financial institutions for financing the Project, for which Government would provide unconditional and irrevocable guarantees for repayment of principal and interest. As per loan documents, the debt was proposed to be serviced from the project revenues generated/budgetary support from State Government.

As of March 2022, the KIPCL had concluded 15 loan agreements with banks and other financial institutions for an aggregate loan amount of ₹87,449.15 crore⁹⁹, which included an amount of ₹11,220.22 crore of interest during construction (IDC) which would be added to the principal amount of loan. These loans carry interest at the rates ranging from 7.8 per cent to 10.9 per cent. As per the repayment schedules incorporated in the respective loan agreements, these loans were to be repaid in 48 quarterly/144 monthly instalments (*i.e.*, in 12 years). As of March 2022, loans amounting to a total of ₹64,283.40 crore (Hard cost¹⁰⁰: ₹55,807.86 crore and IDC accrued: ₹8,475.54 crore) were drawn and utilised by KIPCL (Chart 4.2) (details in *Appendix 4.4*).

⁹⁶ Kaleshwaram Irrigation Project Corporation Limited

⁹⁷ GO. Ms. No.145 dated 6 October 2015 of I& CAD (Projects-II) Department

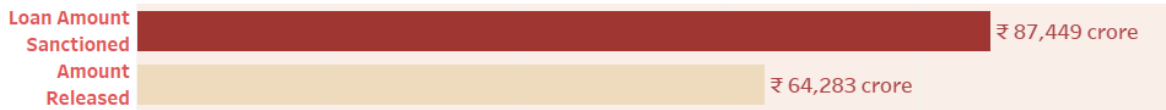
⁹⁸ a wholly owned Company of Telangana Government

⁹⁹ (i) Consortium led by Andhra Bank (now Union Bank of India): ₹7,400 crore; (ii) Consortium led by Punjab National Bank: ₹11,400 crore; (iii) Consortium led by Vijaya Bank (now Bank of Baroda): ₹2,150.00 crore; (iv) Power Finance Corporation (6 agreements): ₹27,737.10 crore; (v) National Bank for Agriculture and Rural Development (NABARD) (3 agreements): ₹8,225.97 crore; and (vi) Rural Electrification Corporation (3 agreements): ₹30,536.08 crore

¹⁰⁰ Hard cost is the portion of loan meant for meeting the construction cost of the project works

Chart 4.2 - Loans sanctioned and released to KIPCL as of March 2022

KIPCL Loan Sanctioned/Amount Released



KIPCL Loans & Works Details

Bank/FI	Purpose	Loan Amount Sanctioned	Amount Released
AB Consortium	For part financing of Kaleshwaram Project Link-I	₹ 7,400 crore	₹ 7,342 crore
PNB Consortium	For part financing of Kaleshwaram Project Link-II , Link-III and Link-IV	₹ 11,400 crore	₹ 11,273 crore
Vijaya Bank	For Link-V comprising of Package 15 and Package 16	₹ 2,150 crore	₹ 2,150 crore
PFC (EM&HM)	Construction of Pump Houses, Surgepools, EM&HM components, substations and transmission lines	₹ 12,067 crore	₹ 11,574 crore
PFC (Pkg 21A)	For Package 21 A	₹ 2,380 crore	₹ 2,005 crore
PFC (Link-I)	For balance cost of EM&HM Components and associated Civil works of Link-I	₹ 5,405 crore	₹ 5,404 crore
PFC (Ass. Works)	Construction of EM & HM Pump houses and substation components and associated civil works in Packages 6,8 to 11 and 14	₹ 4,075 crore	₹ 4,031 crore
PFC (Addl Loan)	Financial assistance towards cost revision for implementation of balance electro-mechanical and associated civil works of Packages 6,8 to 11 & 14 and for payment of PFC's IDC dues.	₹ 2,425 crore	₹ 1,061 crore

KIPCL Loans & Works Details

Bank/FI	Purpose	Loan Amount Sanctioned	Amount Released
PFC (Addl IDC)	For cost overrun of Interest During Construction (IDC)	₹ 1,385 crore	₹ 1,294 crore
NABARD (Pkg 12,13)	For civil works, land acquisition and other components of Package 12, Pkg-12 Feeder Channel and Package-13	₹ 1,500 crore	₹ 1,125 crore
NABARD (SKMS)	For construction of balance works of Sri Komaravelli Mallanna Sagar (SKMS)	₹ 4,675 crore	₹ 3,729 crore
NABARD (Link-V)	Balance works of Package 15, 16 and Baswapur Reservoir under Link-V	₹ 2,051 crore	₹ 678 crore
REC (Link-I)	For lifting of additional 1 TMC water per day from Medigadda Barrage to SYP Reservoir under Link-I	₹ 4,658 crore	₹ 3,771 crore
REC (Link-IV)	For lifting of additional 1 TMC water per day from MMR to SKMS under Link-I	₹ 14,093 crore	₹ 5,530 crore
REC (Link-II)	For Lifting capacity enhancement of existing system by 1.1 TMC water per day from SYP to MMR under Link-II	₹ 11,785 crore	₹ 3,316 crore

KIPCL - Kaleshwaram Irrigation Project Corporation Limited

Source: Records of the KIPCL

The Government Orders constituting the KIPCL stipulated that the State shall ensure that a dedicated and substantial revenue stream is made available to the SPV to make it self-sustainable so that it could evolve its own credit worthiness for raising additional resources from the market. However, though the KIPCL has concluded loan agreements for a total amount of ₹87,449.15 crore, it does not have any sources of revenue necessary for servicing such a huge debt. Since the Government of Telangana provided guarantees to these loans, in the absence of any sources of revenues to KIPCL, the burden of repayment of these loans and interest thereon would ultimately fall on the State Government.

The Government replied (November 2023) that as the Kaleshwaram Project's critical components were completed and the water was stored in all the reservoirs, various industries are coming forward for establishment in the vicinity of the project. The KIPCL is expecting revenues from supply of water to industries in the coming years. The Government further stated that it has issued orders (June 2023) permitting the KIPCL to receive the amount towards water supply to National Thermal Power Corporation (NTPC), Ramagundam and M/s Ramagundam Fertilizers and Chemicals Ltd (RFCL), Peddapalli District and also permitted the KIPCL to receive revenues from other industries which may be established in future. The KIPCL has received an amount of ₹6.92 crore till September 2023. It was further replied that the KIPCL is also in the process of raising the invoice for the water supplied to the Mission Bhagiratha and HMWSSB. As such, the KIPCL will generate the revenue as assessed in the DPR and the Techno Economic Viability (TEV) report and can service the interest on the loans in future.

The fact, however, remains that the revenue received by the KIPCL so far is meagre and it is dependent on Government for repaying the loans. Moreover, even as per the TEV report, the expected annual revenues ranged between ₹5,199 crore and ₹6,900 crore only (from industrial and drinking water supply, water tax and other income) whereas the KIPCL requires funds at an average of ₹10,110.33 crore per year for debt servicing (refer Paragraph 4.7.2.8). Hence, the burden of repayment of loans and interest thereon would ultimately fall on the Government.

4.7.2.2 Government's over-dependence on off-budget borrowings

In December 2017, the Department had submitted to the CWC a certificate issued¹⁰¹ by the Principal Secretary, Finance stating that Government of Telangana would provide funds to the tune of ₹80,500 crore for execution of Kaleshwaram Project. Though the Government, by that time, had already formed (August 2016) the KIPCL for raising loans from financial institutions for funding the project, the proposal to raise market loans was not informed to the CWC.

As per the information furnished by the I&CAD Department, a total expenditure of ₹86,788.06 crore has been incurred on the project to the end of March 2022. Since its formation (August 2016), the KIPCL has so far (March 2022) drawn and utilised loans amounting to ₹55,807.86 crore (hard cost) on the project. This means that 64.3 *per cent* of the total project expenditure was met from the off-budget borrowings raised through KIPCL.

Out of the total expenditure of ₹86,788.06 crore incurred on the project so far, an expenditure of ₹10,146.64 crore was incurred before re-engineering (*i.e.*, up to the year 2015-16) and the remaining expenditure of ₹76,641.42 crore was incurred after re-engineering (*i.e.*, during 2016-17 to 2021-22). Thus, out of the total expenditure (₹76,641.42 crore) incurred after re-engineering, as high as 72.82 *per cent* was met

¹⁰¹ vide Rc.No.62/Finance(WP)/A2/2017, dated 04 December 2017

from off-budget borrowings (₹55,807.86 crore) and only 27.18 *per cent* was met through budgetary allocations.

As of March 2022, the KIPCL has so far repaid an amount of ₹79.27 crore (principal amount) and interest of ₹6511.51 crore (interest) out of funds provided by the Government of Telangana.

Further, Audit observed that out of the loan agreements of ₹87,449.15 crore concluded by the KIPCL so far, agreements¹⁰² for loans amounting to ₹30,536.08 crore¹⁰³ (*i.e.*, 34.92 *per cent* of the total loans) were concluded for the unwarranted additional TMC works (Refer to Paragraph 4.1.2.1). These loans carry an interest rate of 10.9 *per cent* per annum.

The above facts indicate that the Government of Telangana took up the re-engineered Kaleshwaram Project without ensuring that the State Government had the financial capacity to meet the scale of investments required and depended largely on off-budget borrowings for executing the project.

In response to the above, the Government replied that to meet such a huge expenditure from the state budget it would take at least 10-15 years. This would increase the total project cost by manifold due to price escalation, increase in costs of land acquisition and R&R, *etc.* The overall cost would thus be more than the borrowing rate of interest payable. Hence, to complete the project in the stipulated time, it is better to meet the finances through off-budget borrowings.

The reply is not acceptable as the State Government should consider the financing aspect and payable interest on borrowing loans before taking up the project. The fact however remains that the 72.82 *per cent* of the total expenditure incurred on the project is met through the off-budget borrowings.

In response to the issue of unwarranted works, the Government stated that the additional 1 TMC of water per day was proposed in addition to 2 TMC per day to increase the carrying capacity of the conveyance system in the Kaleshwaram Project up to SKMS reservoir during the crucial period of sufficient inflows in Godavari River. This was also done to avoid the mismatch between demand and supply in Link-IV of Kaleshwaram Project from MMR to SKMS. To achieve the demand and supply of water for irrigation, drinking water to twin cities and enroute villages and industrial water requirement and to achieve 100 *per cent* success rate every year, the creation of additional infrastructure for 1 TMC is essential and are hence not unwarranted works.

The reply is not acceptable as the works for drawal of additional 1 TMC per day of water were also taken up without the approval of the CWC (Reference to Paragraph 4.1.2.1). Hence taking up these works through raising loans was not justifiable.

¹⁰² Three agreements concluded (September 2019 to June 2020) with Rural Electrification Corporation

¹⁰³ Hard cost: ₹27,310.01 crore and IDC: ₹3,226.07 crore

Recommendation - 3

Government should minimize its dependence on off-budget borrowings for funding capital intensive projects and consider putting a cap on the proportion of funding through market borrowings to ensure financial discipline and to avoid strain on the State finances in future.

4.7.2.3 Deferment of repayment schedules

In 10 out of the 15 agreements, the repayment of loan was scheduled to commence during 2020-21 and 2021-22, as per the terms and conditions of these loan agreements. However, on the request of the KIPCL (with the approval of Government), the lending agencies had agreed for deferment of repayment dates by one year in four cases and by two years in five cases on the ground that commercial operations of the project were not started. Deferment of repayment dates would further increase the interest burden on the KIPCL and ultimately on the State Government. Due to deferment of repayment schedules, the additional interest burden on the loan amounts already drawn up to March 2022 works out to ₹8,182.44 crore (as calculated by Audit).

The Government replied (November 2023) that due to non-completion of the project works and due to COVID pandemic, it requested various banks to postpone the repayment schedules.

The reply is silent as to how timely completion of works would facilitate timely repayment of loans, as not much revenues were expected from the project. The fact remains that due to postponement of repayment schedules, the Government/KIPCL has to bear the additional interest burden, which is unwarranted.

4.7.2.4 Diversion of loan amounts

The purpose of raising loans by KIPCL was to ensure adequate cashflows into the project and to see that shortage of funds do not hinder the execution of the project. Since the KIPCL did not have any revenue sources, it was essential that the Government provided financial support to KIPCL in servicing of the debt. Contrary to this, in March 2018, the Government of Telangana issued orders¹⁰⁴ for transfer of an extent of 19,570 acres of land already acquired for the project by the I&CAD Department to KIPCL at a price of ₹1,690.09 crore. Even before issue of this order, the KIPCL had diverted an amount of ₹1,500 crore from the loan taken from the consortium led by Vijaya Bank and paid (January 2018) to the Government. The remaining amount of ₹190.09 crore was paid (March 2020/January 2021) to Government out of the loans taken from NABARD. Utilization of the loan amounts for recoupment of the expenditure already incurred on land instead of spending the loan amounts for executing the balance works indicates poor financial management on part of the Government and the KIPCL. The interest burden on KIPCL on the loan

¹⁰⁴ vide GO Rt. No.145 dated 31 March 2018 of Finance (BG) Department

amount transferred to Government works out to ₹587.65 crore (up to March 2022). Moreover, the said land had not been transferred to KIPCL even after four years.

In response to the above, the Government stated that the loan amounts were taken for recoupment of expenditure already incurred on lands by Government instead of spending the loan amounts for executing the balance works of Kaleshwaram Project. Hence, the same does not come under diversion of funds.

The reply is not acceptable as the loan raised from Vijaya Bank was to be utilised for execution of works under the Link-V (Phase-III) of the project. However, out of ₹1,690.09 crore, an amount of ₹1,500 crore from Vijaya Bank loan account was transferred to the Government for the expenditure already incurred on acquisition of lands for Phase-I and II. The balance amount of ₹190.09 crore was paid from NABARD loans. Thus, instead of meeting the expenditure on balance works of Kaleshwaram Project, the KIPCL has diverted the loan amount towards reimbursement on expenditure already incurred on LA by the Government even though the said lands have not been transferred by the State Government to KIPCL (March 2022).

4.7.2.5 Government's inability to meet Margin Money commitment

In eight loan agreements, the terms and conditions stipulated that the KIPCL has to meet certain proportion (ranging between 20 *per cent* to 30 *per cent*) of the project expenditure with their own funds, which is termed as 'margin money'. The amount of margin money to be met by KIPCL is mentioned in the respective loan agreements. The lending agencies release the loan amounts on pro-rata basis with reference to the margin money spent. The loan agreements contained an undertaking given by the Government that it would release funds to KIPCL towards margin money as and when required. Audit observed that as per the loan amounts disbursed up to March 2022, KIPCL was required to spend a total amount of ₹9,522.12 crore towards margin money. However, as of March 2022, the Government has released an amount of only ₹4,074.57 crore to KIPCL (in the form of grants to KIPCL) leaving a balance of ₹5,447.55 crore yet to be released. Due to non-receipt of funds from Government, the KIPCL resorted to diversion of ₹4,011.52 crore from the loans taken from Power Finance Corporation (which were meant for utilisation on works) towards margin money to be spent against the loan agreements concluded with three¹⁰⁵ lending agencies. Thus, in effect, loan amounts were utilized to secure more loans. The additional interest burden on the loan amount so diverted for margin money works out to ₹1,381.42 crore (up to March 2022).

In response to the above, the Government stated that in the interest of progress of works the KIPCL had utilized the reimbursement amount drawn from PFC to meet the margin money and IDC required for the loans of Andhra Bank, PNB and Vijaya Bank

¹⁰⁵ consortiums led by Andhra Bank (now Union Bank of India), Punjab National Bank and Vijaya Bank (now Bank of Baroda)

as per necessity. As such, it does not come under the diversion of funds since the funds are utilized for implementation of the Kaleshwaram Project only.

The reply is not acceptable as the amount drawn from the PFC was only for utilization of the execution of project works and not for the margin money payable from the Government. Non-release of margin money from the Government resulted in additional interest burden which is unwarranted.

4.7.2.6 Diversion of Capital Corpus Fund

During the year 2016-17, the Government released an amount of ₹100 crore to the SPV. The Government orders stated that the corpus amount shall be 'invested' in a manner such that the returns arising there upon be used to set off the expenditure of SPV.

Audit observed that contrary to Government orders, instead of investing the corpus fund amount in revenue yielding instruments/assets, the KIPCL had utilised the fund towards payment of work bills as part of margin money. Due to non-availability of any investments, the KIPCL did not have any revenues and it met its day-to-day expenditure of ₹5.50 crore during 2016-17 to 2021-22 from the amounts recovered from the contractors' work bills towards interest on mobilization advances, instead of remitting the interest amounts to Government.

In response to the above, the Government stated that in view of the urgency and progress of the work, the Corpus Fund of ₹100 crore was utilized for the payment of work bills and margin money instead of investing it at lower interest rates and the KIPCL has saved the differential interest on borrowing loans.

The reply is not acceptable since the action of KIPCL was in deviation to the Government Order which stipulated that the Corpus Fund shall be invested in such a manner that the returns arising there upon has to be used to set-off the Corporation's expenditure.

4.7.2.7 KIPCL's inability to pay interest on loans

All the 15 loan agreements contained a clause stipulating that interest would be levied on the disbursed loan amounts on monthly/quarterly basis from the date of disbursal of the first instalment of loan. In 11 loan agreements, the terms and conditions stipulated that this IDC would be added to the principal amount of loan. However, these agreements stipulated the maximum limit of IDC that could be added to the loan amounts. Once the maximum stipulated IDC is reached, the KIPCL was required to pay interest on the total outstanding loan (including IDC) on monthly/quarterly basis.

The total amount of IDC sanctioned (as part of loan amounts) in the 11 loan agreements was ₹11,220.22 crore. Out of this, an IDC of ₹8,475.54 crore has already been accrued and added to the outstanding loans as of March 2022. In eight loan agreements, the interest accrued had already reached the maximum IDC limit stipulated in the agreements. In these eight agreements, the KIPCL has paid a further interest of ₹6,046.10 crore beyond the IDC included in the loan amounts. In three other loan

agreements which did not have provision to add IDC to the loan amounts, the KIPCL has so far (March 2022) paid interest amounting to ₹465.41 crore. Thus, the total amount of IDC accrued and added to the loan amounts and the interest paid to the end of March 2022 works out to ₹14,987.05 crore. The IDC is bound to increase further due to rescheduling of the repayment dates in nine loan agreements and also with further drawal of the balance undisbursed loan amounts under the existing loan agreements.

To the end of March 2022, the total outstanding liabilities of KIPCL towards loans (including IDC) repayable to the banks/financial institutions on account of Kaleshwaram Project was ₹64,204.13 crore¹⁰⁶.

As the KIPCL does not have any sources of revenue, it has been paying interest on loans and principal by meeting the expenditure from the funds released by the State Government ‘*in the form of loans/equity*’ for this purpose. The outstanding liabilities on account of the loans taken from Government as of March 2022 was ₹3,524.95 crore, taking the total liabilities of KIPCL on account of Kaleshwaram Project to ₹67,729.08 crore.

The Government replied that about 89 *per cent* of the revenue was estimated from raw water supply to the industrial units. The Kaleshwaram Project is ready to serve water for industrial purpose, drinking water, tourism and fisheries. The Government further stated that it has issued orders (June 2023) permitting the KIPCL to receive the amount towards water supply to NTPC and RFCL and also permitted the KIPCL to receive revenues from other industries which may be established in future. The KIPCL has received an amount of ₹6.92 crore till September 2023. It was further replied that the KIPCL is also in the process of raising the invoice for the water supplied to the Mission Bhagiratha and HMWSSB. As such, the KIPCL will generate the revenue and can service the interest on the loans in future.

The fact, however, remains that the revenue received by the KIPCL so far is meagre and it is dependent on Government funds for repaying the loans and interest.

4.7.2.8 Future liability on debt servicing

Assuming that the KIPCL would draw the entire sanctioned loan amount of ₹87,449.15 crore and would start repayment of loans without any further extensions, the KIPCL/Government requires to pay a total amount of ₹1,41,544.59 crore in the next 14 years for debt servicing, as shown in Table 4.13 below:

¹⁰⁶ Total loan amounts drawn (including IDC): ₹64,283.40 crore minus the amount of loan repaid: ₹79.27 crore.

Table 4.13 – Future financial commitment of account of debt servicing

(₹ in crore)

S. No.	Year	Principal amount	Interest amount @	Total commitment
1	2022-23	2,765.39	4,145.34	6,910.73
2	2023-24	6,108.83	7,297.75	13,406.58
3	2024-25	6,950.64	7,511.51	14,462.15
4	2025-26	7,221.59	6,803.10	14,024.69
5	2026-27	7,221.59	6,080.91	13,302.50
6	2027-28	7,221.59	5,371.92	12,593.51
7	2028-29	7,221.59	4,637.60	11,859.19
8	2029-30	7,221.59	3,914.34	11,135.93
9	2030-31	7,640.55	3,177.31	10,817.86
10	2031-32	7,640.55	2,419.29	10,059.84
11	2032-33	7,640.55	1,654.11	9,294.66
12	2033-34	7,784.36	887.02	8,671.38
13	2034-35	4,037.23	255.90	4,293.13
14	2035-36	693.84	18.60	712.44
	Total	87,369.89	54,174.70	1,41,544.59

Source: Audit calculations based on the information collected from the records of the KIPCL

@ The interest liability is as worked out by Audit by applying simple interest on diminishing balances of loan amounts. As per the loan agreements, the rate of interest was variable and would depend on the lending rates fixed by the respective banks/lending agencies from time to time. For calculation of the future interest commitment, Audit has taken the initial rates of interest mentioned in the respective loan agreements.

While the hard cost portion (i.e., loan amount excluding IDC) of the loans sanctioned was ₹76,228.93 crore, the total amount of IDC accrued and the interest paid/payable thereon works out to about ₹73,731.10 crore, as shown in Table 4.14 below.

Table 4.14 – Interest paid/payable on the loans taken for Kaleshwaram Project

(₹ in crore)

S. No.	Interest component	Amount
1	IDC accrued and included in the loan amount up to March 2022	8,475.54
2	Interest paid up to March 2022 in addition to the IDC included in loan amount	6,511.51
3	Interest payable* from April 2022 till commencement of repayment	4,569.35
4	Interest payable during the repayment period (refer Table 4.13)	54,174.70
	Total interest paid/payable	73,731.10

Source: Audit calculations based on the information collected from the records of the KIPCL

* This has been calculated by Audit considering 100 per cent interest payable on the loan amount (including IDC) already disbursed so far and 50 per cent interest on the undisbursed loan amount (assuming that the undisbursed amount would be disbursed during the intervening period)

The Government replied (November 2023) that as per the Techno Economic Viability (TEV) study, about ₹5,012.08 crore (89 per cent of the revenue) was estimated from raw water supply to the industrial units. The Government further stated that it has issued orders (June 2023) permitting the KIPCL to receive the amount towards water

supply to National Thermal Power Corporation (NTPC), Ramagundam and M/s Ramagundam Fertilizers and Chemicals Ltd (RFCL), Peddapalli District and also permitted the KIPCL to receive revenues from other industries which may be established in future. The KIPCL has received an amount of ₹6.92 crore till September 2023. It was further replied that the KIPCL is also in the process of raising the invoice for the water supplied to the Mission Bhagiratha and HMWSSB and that the KIPCL is confident of generating the revenue and service the interest in future.

The fact, however, remains that the revenue received by the KIPCL so far is meagre and it is dependent on Government for repaying the loans. Moreover, even as per the TEV report, the expected annual revenues ranged between ₹5,199 crore and ₹6,900 crore only whereas the total debt to be serviced (including interest) over the period of 14 years upto 2035-36 stands at ₹1,41,544.59 crore, indicating that KIPCL would require funds at an average of ₹10,110.33 crore per year for debt servicing over the next 14 years. Hence, the burden of repayment of loans and interest thereon would ultimately fall on the Government.

4.7.3 Future requirement of funds for operation of Kaleshwaram project

As already discussed in Paragraph 4.7.2.8, in the coming years, the KIPCL/ Government would require funds ranging from ₹712.44 crore to ₹14,462.15 crore every year for servicing the debt raised for Kaleshwaram Project.

In addition to debt servicing, the Government/KIPCL would also require funds for operational expenses like the energy consumption charges for operating the lifts and operation and maintenance of the project works after the project becomes fully operational.

Annual charges on electricity: As discussed in Paragraph 4.5.4 (ii), the project would require an amount of ₹10,374.56 crore towards energy consumption charges and fixed charges every year.

Operation and maintenance cost: In addition to the electricity costs, funds would also be required every year for operation and maintenance (O&M) of the project works. Audit observed that in some of the contracts, the Department has entrusted the O&M activities also to the contractors. In the estimates prepared for these works, the Department had calculated the annual O&M cost at the rate of one *per cent* of the cost of electro/hydro-mechanical (EM&HM) equipment and at the rate of 0.1 *per cent* of the cost of civil work. At these rates, the annual O&M cost on all the project works would work out to ₹272.70 crore¹⁰⁷.

Even assuming that the project would be completed and would become fully operational from the year 2024-25, the requirement of funds for operation of Kaleshwaram Project including debt servicing in the coming years would be high as shown in the Table 4.15 below:

¹⁰⁷ Total cost of project works entrusted so far is ₹1,02,267.99 crore. Out of this, the cost of EM&HM equipment was ₹18,936.65 crore and the remaining ₹83,331.34 crore represents the cost of civil works. The O&M cost at the rate of 1 *per cent* on the cost EM&HM works and 0.1 *per cent* on the cost of civils works would work out to ₹272.70 crore (₹189.37 crore + ₹83.33 crore)

Table 4.15 – Requirement of funds for Kaleshwaram Project in the coming years

(₹ in crore)					
S. No.	Year	Debt servicing	Electricity charges	Annual cost of O&M	Total requirement
1	2024-25	14,462.15	10,374.56	272.70	25,109.41
2	2025-26	14,024.69	10,374.56	272.70	24,671.95
3	2026-27	13,302.50	10,374.56	272.70	23,949.76
4	2027-28	12,593.51	10,374.56	272.70	23,240.77
5	2028-29	11,859.19	10,374.56	272.70	22,506.45
6	2029-30	11,135.93	10,374.56	272.70	21,783.19
7	2030-31	10,817.86	10,374.56	272.70	21,465.12
8	2031-32	10,059.84	10,374.56	272.70	20,707.10
9	2032-33	9,294.66	10,374.56	272.70	19,941.92
10	2033-34	8,671.38	10,374.56	272.70	19,318.64
11	2034-35	4,293.13	10,374.56	272.70	14,940.39
12	2035-36	712.44	10,374.56	272.70	11,359.70

Source: Audit calculations based on the information collected from the records of the KIPCL and I&CAD Department

The annual operational cost on account of electricity charges and O&M costs alone works out to ₹10,647.26 crore. Thus, the operational cost for providing water for irrigation under the project works out to ₹46,364 per acre¹⁰⁸ per annum. The electricity cost mentioned above is as per the prevailing tariff fixed by the TSERC. In case there is any upward revision in the electricity charges in future, the annual electricity cost of the project and the per acre operational cost also will increase further.

This is only the normal O&M cost of the irrigation system. In addition, there would be inevitable costs on account of the regular repairs to the canal system and repairs and replacement of the pumps, motors and other EM&HM equipment and their spare parts. In case the rates of depreciation prescribed in the DPR guidelines issued by the CWC are considered, the depreciation on the Kaleshwaram Project works out to ₹2,760.92 crore¹⁰⁹ per annum. Moreover, there would also be the expenditure on the establishment charges of the departmental staff engaged on the project, the costs of which cannot be assessed. In case these costs are also considered, the cost of providing irrigation water would be much higher.

In the DPR, it was stated that there were no proposals for water levy on water supplied for agricultural purposes at present. Hence, the revenue from water charges can be taken as nil. The revenues from supply of industrial/drinking water and fisheries would also be negligible (refer Paragraph 4.5.1) Thus, almost the entire operational cost of the project has to be borne by the Government/KIPCL.

¹⁰⁸ Direct CA: 18,25,700 acres and Supplementation to other projects: 4,70,750 acres (i.e., 25 per cent of 18.83 lakh acres). Total CA: 22,96,450 acres. Operational cost = ₹10,647.26 crore/22,96,450 acres = ₹46,364 per acre

¹⁰⁹ Depreciation on the cost of civil works: ₹683.02 crore (at the rate of one per cent on the cost of civil works); depreciation on pumping system: ₹1,577.42 crore (at the rate of 8.33 per cent on the cost of pumping system); and depreciation on raising mains: ₹500.48 crore (at the rate of 3.33 per cent on the cost of pipelines). Total depreciation: ₹2,760.92 crore

As regards meeting the operational cost of the project, the Government reiterated the reply given to Paragraph 4.7.2.8.

Regarding the annual electricity cost of the project, the Government replied (November 2023) that while arriving at the maximum power rating of lifts, a margin of 20 per cent is usually kept in the power calculations and that the actual power consumption would be much less.

The reasons as to why this reply is not acceptable have already been mentioned at Paragraph 3.2.2 (ii). Even in case it is assumed that the energy consumption would be 20 per cent less than the rated capacities, the energy requirement of Kaleshwaram Project would still work out to 11,974.81 MU (*Appendix 3.1*) and the annual energy cost would still work out to ₹7,544.13 crore. Further, in case the fixed charges of ₹1,337.59 crore as mentioned in Paragraph 4.5.4 (ii) is added, the annual operational cost on account of electricity charges would be ₹8,881.72 crore. The total annual maintenance cost including O&M cost of ₹272.20 crore would be ₹9,153.92 crore and the average operational cost for providing irrigation under the project still works out to ₹39,861 per acre¹¹⁰ per annum.

4.7.4 Budgetary allocations for Kaleshwaram Project

The allocations made in the State Budget for Kaleshwaram Project ¹¹¹ and expenditure incurred therefrom during the years from 2016-17 to 2021-22 is given in the Table 4.16 below:

Table 4.16 – Budget allocations for Kaleshwaram Project and expenditure incurred during the period from 2016-17 to 2021-22

(₹ in crore)						
S. No.	Year	Budget allocated			Expenditure incurred	Savings (-)/ excess (+)
		Original	Supplemental	Total		
1	2016-17	3,073.36	3,000.00	6,073.36	5,072.39	(-) 1,000.97
2	2017-18	490.30	6,536.33	7,026.63	4,419.07	(-) 2,607.56
3	2018-19	770.11	5,386.41	6,156.52	1,382.29	(-) 4,774.23
4	2019-20	1,138.56	1,955.08	3,093.64	2,919.78	(-) 173.86
5	2020-21	849.14	1,927.32	2,776.46	2,429.70	(-) 346.76
6	2021-22	966.45	1,044.26	2,010.71	2,436.23	(+) 425.52
	Total	7,287.92	19,849.40	27,137.32	18,659.46	(-) 8,477.86

Source: Appropriation Accounts of Government of Telangana for the respective years

As can be seen from the above, the expenditure incurred from the normal State budgets in the last six years ranged from ₹1,382.29 crore to a maximum of ₹5,072.39 crore. As against a total budgetary allocation of ₹27,137.32 crore made for Kaleshwaram Project during the last six years, the expenditure incurred was only ₹18,659.46 crore (i.e., 68.76 per cent).

¹¹⁰ Annual Operational cost = ₹9,153.92 crore/22,96,450 acres = ₹39,861 per acre

¹¹¹ Major Head 4700 (Capital Outlay on Major Irrigation) – Minor Head 232 (Kaleshwaram Project)

Further, as already discussed earlier, the State Government could not meet its commitment to provide margin money funds to the KIPCL. As per the records of KIPCL, the dues of margin money receivable from Government to the end of each of the last five years is as shown in Table 4.17 below:

Table 4.17 – Amounts receivable from Government

S. No.	To the end of the year	Margin money receivable
1	2017-18	1,560.78
2	2018-19	3,483.17
3	2019-20	3,068.10
4	2020-21	3,068.10
5	2021-22	5,447.55

(₹ in crore)

Source: Records of the KIPCL

Audit noticed that on the one hand there were savings in the budget allocation as brought out in the Table 4.16 above, while on the other hand, the State Government could not meet the margin money requirement in two out of the five years.

Seen in this backdrop, meeting the annual requirement of funds for operation of Kaleshwaram Project including debt servicing in the coming years (ranging from ₹11,359.70 crore to ₹25,109.41 crore) will be a huge challenge to the State Government.

In response to the above, the Government replied (November 2023) that it had provided the required margin money from time to time from budget and PFC loan amount. The Government further stated that the KIPCL had availed loans from banks and financial institutions for the project and hence there was savings in allocated budget. It was also stated that the KIPCL is confident of generating revenue from industrial and drinking water supply.

The fact remains that KIPCL is yet to generate adequate revenues. Further, as pointed out in the above paragraph, the State Government did not even provide the margin money to KIPCL.

Recommendation - 4

Government should formulate a plan to identify the sources of income for the KIPCL and to finance the debt servicing and the operational costs of the Kaleshwaram Project.