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Report of the Comptroller and Auditor General of India

Performance Audit on

Kaleshwaram Project

Government of Telangana

Report No. 1 of 2024

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Preface

This Report pertaining to the State of Telangana has been prepared for submission to the Governor under Article 151 of the Constitution of India for being laid before Legislature of the State.

The Report contains the results of the Performance Audit on the 'Kaleshwaram Project' being constructed in Telangana. This project is an off-shoot of the Dr. B.R. Ambedkar Pranahitha-Chevella Sujala Sravanthi Lift Irrigation Scheme (PCSS Project) formulated by the erstwhile combined State of Andhra Pradesh. After formation of the State of Telangana (June 2014), the Government of Telangana re-engineered (June 2016) the PCSS Project into two separate projects viz., the Dr. B.R. Ambedkar Pranahitha Project and the Kaleshwaram Project. This Report focuses on the issues relating to the process of re-engineering of the PCSS Project into Kaleshwaram and Pranahitha projects, planning and execution of the projects and contract management.

The audit has been conducted in conformity with the Auditing Standards issued by the Comptroller and Auditor General of India.

Executive Summary

- The cost of the Kaleshwaram Project is now likely to exceed ₹1,47,427.41 crore, as against the cost of ₹81,911.01 crore projected to the CWC.
- The Government of Telangana has not accorded administrative approval of the project as a whole and instead it has issued separate approvals i.e. as many as 73 administrative approvals aggregating to ₹1,10,248.48 crore; there are no orders from the Government about the funding pattern for the project.
- Out of the total expenditure of ₹86,788.06 crore incurred on the project (March 2022), an expenditure of ₹55,807.86 crore (*i.e.*, 64.3 *per cent*) was met from the off-budget borrowings (OBBs) raised by KIPCL.
- The Benefit-Cost Ratio (BCR) of the project was inflated. Even with the understated project cost of ₹81,911.01 crore, BCR works out to 0.75. Considering the latest likely project cost (₹1,47,427.41 crore), the BCR works out to 0.52. This means that every rupee spent on the project would yield only 52 paise. It clearly indicates that the project was, ab-initio, economically unviable.
- The peak energy demand, when all the pumps are operated, is more than the average daily energy availed in the entire State (2021-22). Providing power to lift irrigation schemes will pose a challenge to the State.
- 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 an indication of improper planning.
- Against targeted new CA of 18.26 lakh acres, the works entrusted so far (March 2022) included development of distributary network for only 14.83 lakh acres. The actual command area created so far was 40,888 acres only (March 2022).
- The Department showed undue haste in award of works. Seventeen works costing ₹25,049.99 crore were awarded even before approval of the DPR.
- In the DPR, water for the project was proposed to be lifted from River Godavari at the rate of 2 TMC per day. The pumping capacity was later increased to 3 TMC per day involving additional cost of ₹28,151 crore.
- Due to re-engineering of the PCSS Project and changes made in the project works, certain portions of works already executed had become redundant, resulting in a loss of ₹767.78 crore.
- Out of the 56 project works, only 12 works were completed, 40 works were ongoing while 4 works have not even commenced, as of March 2022. Lands required for distributary network, *etc*., are yet to be fully identified.
- The possibility of undue benefit of at least ₹2,684.73 crore to the contractors for supply and commissioning of pumps, motors *etc*., cannot be ruled out. Further, post tender inclusion of price adjustment clause resulted in avoidable payment of ₹1,342.48 crore.

Background

In the year 2008, the Government of the erstwhile combined State of Andhra Pradesh took up the Dr. B.R. Ambedkar Pranahitha-Chevella Sujala Sravanthi Lift Irrigation Scheme (PCSS Project) at a cost of ₹38,500 crore. The project proposed to lift 180 thousand million cubic feet (TMC) of water from Pranahitha and Godavari rivers and provide irrigation to a new command area (CA) of 16.40 lakh acres in the Telangana region. Even without approval of the project by the Central Water Commission (CWC), the project works were awarded to different contractors during 2008-2009 and execution of the works commenced. After the re-organisation (June 2014) of the Andhra Pradesh State, the Government of the newly formed Telangana State decided (June 2016) to re-engineer the PCSS project and divided it into two separate projects, *viz*., the Dr. B.R. Ambedkar Pranahitha Project and the Kaleshwaram Project.

The re-engineering substantially changed the scope and cost of the two projects. Together, the two projects were estimated to cost ₹85,651.81 crore. Together, they were expected to provide irrigation to a new CA of 20.26 lakh acres and, in addition, supplement water to four other existing projects. The projects were being executed by the Irrigation and Command Area Development (I&CAD) Department. As of end of March 2022, an expenditure of ₹1,727.44 crore and ₹86,788.06 crore was incurred on the Pranahitha and Kaleshwaram Projects, respectively.

Audit had earlier reviewed the PCSS project in 2011 as a part of the Performance Audit on Jalayagnam. The results of audit had appeared in the Report of the Comptroller and Auditor General of India on Jalayagnam (Report No: 2 of 2012). Keeping in view the re-engineering of PCSS project into two projects, the huge scale of investment and contemplated benefits involved in the Kaleshwaram and Pranahitha projects, a Performance Audit of these two projects has been taken up. The audit was conducted (April – August 2018 and August 2021 to March 2022) with an objective to seek an assurance as to whether – *(i) Re-engineering of the PCSS project was done scientifically and transparently and addressed the deficiencies of the project; (ii) The projects were conceived and planned scientifically with well-defined benefits, sound designs and cost considerations and had received all the statutory approvals in a timely manner; (iii) The projects were implemented holistically, timely, economically and have achieved the intended benefits; (iv) Financial management in the projects was prudent, economic and effective; and (v) Award of works and contract management was transparent and economical.*

Re-engineering of PCSS Project

The I&CAD Department took up the PCSS Project and commenced the project works in a haphazard manner without properly evaluating and addressing the basic project requirements like availability of water, inter-state issues, storage facilities, *etc*. that are critical for achieving the intended objectives of the project.

In the Report on Jalayagnam, Audit had pointed out deficiencies in the PCSS Project like – non-establishment of availability of water for the project, awarding of project works even before preparation/approval of Detailed Project Report (DPR) and non-settlement of inter-state issues with Maharashtra regarding submergence areas. The same issues which were pointed out by Audit had contributed to the need for re-engineering of the PCSS Project. While scrutinizing the DPR of the PCSS Project, the CWC had in March 2015, stated that adequate water would not be available at the proposed source location (Tummidihetti barrage) and suggested to review the water availability as well as the storages proposed in the project.

Consequently, during re-engineering, the first Link of the PCSS project was separated and re-named as the Dr. B.R.Ambedkar Pranahitha Project. This project proposes to draw 20 TMC of water from the River Pranahitha near Tummidihetti and to provide irrigation to two lakh acres of new CA.

The remaining Links of the PCSS project, with some changes, were brought under the newly named Kaleshwaram Project. The source of water for this project was shifted further downstream to Medigadda, about 20 Km downstream of Kaleshwaram village, where the River Pranahitha joins Mid-Godavari. Three barrages and 17 reservoirs were newly proposed to increase the storage capacity of the project. The Kaleshwaram Project proposes to create new CA of 18.26 lakh acres and to supplement water to 4.71 lakh acres of existing CA under other projects.

During re-engineering, the Kaleshwaram and Pranahitha Projects together were estimated to cost ₹85,651.81 crore as against the project cost of ₹38,500 crore of the earlier PCSS Project. While the combined project cost increased by 122 *per cent* due to re-engineering, the targeted CA increased by only 52.22 *per cent*. Even after the initial re-engineering, further additions and changes were made in the scope of Kaleshwaram Project works taking the present likely project cost to ₹1,47,427.41 crore (including the interest during construction), while there is no further increase in the envisaged benefits. Thus, the combined project cost of the two projects now stands at ₹1,51,168.21 crore. This may increase further as the DPR of Pranahitha Project is not yet prepared (March 2022) and its cost is yet to be worked out.

After re-engineering, the annual energy requirement for operation of lifts has increased by 5,643.39 million units (MU) and the cost on electricity has increased by ₹3,555.34 crore per annum, as compared to that of PCSS Project. Due to re-engineering of the PCSS Project and changes made in the project works, certain portions of works already executed had become redundant, resulting in a loss of ₹767.78 crore.

Planning for Kaleshwaram Project

The I&CAD Department entrusted the work of preparation of the Detailed Project Report (DPR) for Kaleshwaram Project to M/s Water and Power Consultants Ltd. (WAPCOS) despite several deficiencies in the earlier work of WAPCOS in preparation of DPR of the PCSS Project, which had led to its re-engineering.

While the earlier PCSS Project envisaged creation of new CA of 2.47 lakh acres in Rangareddy District, this was reduced to 50,000 acres in the Kaleshwaram Project without providing any justification in the DPR. Farmers of the remaining 1.97 lakh acres were denied irrigation benefits as was envisaged in the Project.

As was done in the case of the PCSS Project, the Department showed undue haste in award of works of Kaleshwaram Project works also. The Department awarded 17 works costing ₹25,049.99 crore relating to the project even before approval of the DPR by CWC in June 2018.

Even after approval of DPR, changes have been made in the project works. In the DPR submitted to CWC, water for the project was proposed to be lifted from River Godavari at the rate of 2 TMC per day. The pumping capacity was later increased to 3 TMC per day involving an additional cost of ₹28,151 crore, though not warranted.

The project cost was understated in the DPR due to preparation of estimates at old price levels and non-inclusion of provision for price escalation. This coupled with subsequent changes made in the project works, has resulted in the cost of works increasing from ₹63,352 crore to ₹1,02,267.99 crore as of now. Considering the likely cost on the works yet to be entrusted, land acquisition, rehabilitation and resettlement, interest during construction (IDC), *etc*., 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. The capital cost of irrigation works out to ₹6.42 lakh per acre.

The Benefit-Cost Ratio (BCR) of the project was inflated by overstating the value of project benefits and understating the annual costs. The agricultural benefits were calculated on the assumption that one TMC of water would irrigate 17,668 acres of CA. Data of other projects in the State show that one TMC of water can serve an average of only 10,000 acres. Thus, there is a significant risk that the 169 TMC of water allocated for irrigation under the project will not be sufficient for Kharif season and there is a high risk that no water will be left for irrigation in Rabi season. The revenues from fisheries and from supply of water to industries were also overstated. The annual recurring cost on electricity charges was understated by adopting a lower rate of ₹3/unit whereas the prevailing tariff for lift irrigation schemes was ₹6.40/unit. Even with the understated project cost of ₹81,911.01 crore, the BCR works out to 0.75 (as against 1.51 projected) indicating that the project was, ab-initio, economically unviable. Considering the latest likely project cost (₹1,47,427.41 crore), the BCR works out to 0.52. This means that every rupee spent on the project would yield only 52 paise. The BCR is likely to go much lower considering the possibility of further increase in the cost of works and interest during construction and the likelihood of the actual benefits/revenues from agriculture and industrial/drinking water supply being much lower than those projected by the Department.

The lifts under Kaleshwaram Project require 8,459.10 MW of power, which works out to 46.82 *per cent* of the total installed capacity presently available in the State. The project requires a total of 14,344.39 million units (MU) of energy every year after completion. The peak energy demand, when all the pumps are likely to be operated

simultaneously during pumping season, works out to 203.02 MU per day. This is more than the average daily energy availed (196.06 MU per day) in the entire State in 2021-22. As the State is presently purchasing/importing nearly 60 *per cent* of energy from external sources, providing power to various lift irrigation schemes including Kaleshwaram Project will be a challenge to the State.

The project would require ₹10,374.56 crore towards energy charges every year. In addition, there would also be annual operation and maintenance cost of ₹272.70 crore. Thus, the commitment on the annual operational costs of the project would be ₹10,647.26 crore per annum, which works out to ₹46,364 per acre. In addition, there would be depreciation on project works which works out to ₹2,760.92 crore per annum. In the DPR, it was stated that there were no proposals for water levy 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. Thus, almost the entire operational cost of the project has to be borne by the Government/ Kaleshwaram Irrigation Project Corporation Limited (KIPCL).

The State Government obtained project clearance from CWC and Forest Clearance and Environmental Clearance from the Ministry of Environment and Forests (MoEF) during October 2017 - June 2018. Though the cost of project works has increased from ₹63,352 crore to ₹1,02,267.99 crore, with the major change being the increase in the water drawal capacity from two TMC per day to three TMC per day, the revised DPR is yet to be approved by CWC. The Government also did not communicate the revised scope of project works to MoEF for fresh Environmental Clearance.

Sri Komaravelli Mallanna Sagar is the largest reservoir in the project constructed with a huge capacity of 50 TMC. A preliminary study by the National Geophysical Research Institute (NGRI) revealed that there was a deep-seated vertical fault in the proposed location of the reservoir. However, the Department went ahead and constructed the reservoir with a total expenditure of ₹6,126.80 crore without conducting detailed seismic studies.

Planning of finances

Though the project cost was estimated at ₹81,911.01 crore, the Government of Telangana has not accorded administrative approval for the project as a whole. Instead, the Government has been issuing separate approvals for individual works on piece meal manner. As of March 2022, as many as 73 administrative approvals aggregating to ₹1,10,248.48 crore have been given. There are no orders from the Government about the funding pattern for the project.

In December 2017, the Department submitted a certificate issued by the Finance Secretary that necessary funds for the project would be provided. This is despite the fact that the Government had already formed (August 2016) the KIPCL to raise loans for funding the project. The KIPCL has so far (March 2022) raised market loans of ₹87,449.15 crore with guarantees provided by State Government. These loans carry interest at the rates ranging from 7.8 *per cent* to 10.9 *per cent* per annum. Out of the

total expenditure of ₹86,788.06 crore incurred on the project as of March 2022, an expenditure of ₹55,807.86 crore (*i.e.*, 64.3 *per cent*) was met from the off-budget borrowings (OBBs) raised by KIPCL. Out of the total expenditure incurred after re-engineering (2016-17), as high as 72.82 *per cent* was met from OBBs and only 27.18 *per cent* was met through budgetary allocations.

The KIPCL does not have any sources of revenue and the burden of repayment of the loan and interest is likely to fall on the State Budget. The KIPCL has been paying interest on loans and principal from the funds released by Government in the form of loans/equity. Though repayment of loan in 10 out of the 15 loan agreements was to commence during 2020-21 and 2021-22, KIPCL sought deferment of repayment dates by one-two years in 9 agreements, resulting in an additional interest burden of ₹8,182.44 crore. Loans amounting to ₹1,690.09 crore were diverted/transferred to Government leading to additional interest burden of ₹587.65 crore. Due to failure of Government to provide funds for margin money, the KIPCL diverted the loan amount of ₹4,011.52 crore towards margin money, entailing an additional interest burden of ₹1,381.42 crore. The KIPCL / Government requires a total amount of ₹1,41,544.59 crore (ranging from ₹712.44 crore to ₹14,462.15 crore every year) in the next 14 years for debt servicing. 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. 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 an indication of improper planning and ad-hocism.

Execution of Kaleshwaram Project

The project was divided into 7 links. The works were awarded under 56 contracts. The progress of project works is slow. Out of the 56 works, only 12 works were completed, 40 works were ongoing with progress ranging from 3 *per cent* to 99 *per cent* while 4 works have not even commenced, as of March 2022. As against the total value of civil works of ₹1,02,267.99 crore, the progress achieved was ₹70,666.48 crore (*i.e.*, 69 *per cent*). The delay in completion of works was mainly due to revisions in the scope of works and delays in finalisation of scope of works/designs/drawing and land acquisition. As against the total of 98,110.33 acres of land to be acquired, only 63,972.16 acres was acquired as of March 2022. Further, the lands required for distributary network and some other works are still being identified. Land acquisition had not been completed in 32 works though the original agreement period is over.

Seven new reservoirs under the project were causing submergence and involve Rehabilitation and Resettlement (R&R) of the Project Displaced Families. However, R&R activities in respect of only three reservoirs were completed and in the remaining four reservoirs, the Department was yet to identify the Project Displaced Families (PDFs) fully and R&R was yet to be taken up.

Though a new CA of 18.26 lakh acres was targeted under the project, the works entrusted so far (March 2022) included development of distributary network for only 14.83 lakh acres, out of which the actual command area created so far was only 40,888 acres. Distributary network for the remaining CA of 3,43,148 acres is yet to be awarded, even after six years since re-engineering. Adequate priority was not given to creation of distributary network as was given to the headworks/main canals. While 57 *per cent* of the main canals were completed only 7 *per cent* of distributaries were completed.

Though the Department expects the project completion by June 2024, with the present status of works and the volume of work yet to be done, completion of the entire project in full shape and achievement of full benefits is likely to take many more years to come.

Status of Pranahitha Project

In the last four years, there has been no progress in the four works retained under the Pranahitha project after re-engineering. It took more than six years since the decision on re-engineering was taken in June 2016 to identify the barrage location, the targeted CA and the scope of works, and to prepare and submit the DPR to CWC. The State is yet to obtain all the statutory clearances including the CWC clearance and the concurrence of Maharashtra State for the project. No CA has been developed under the project so far (March 2022) and it may take many more years for construction of the project and deriving any irrigation benefits from it.

The expenditure of ₹878.56 crore already incurred on these works remained unproductive.

Contract Management

The scope of work under 21 contracts, *inter alia*, involved supply and installation of lifts with an aggregate capacity of 8,338.04 MW. The Department provided a total amount of ₹17,653.71 crore towards the cost of pumps, motors and auxiliary equipment in the estimates of these works, without assessing the market rates. Audit verified the actual cost at which the contractors procured the equipment (from M/s Bharat Heavy Electricals Ltd.) in four works and found that amounts (₹7,212.34 crore) provided for this equipment in the estimates was higher by ₹5,525.75 crore than their actual cost (₹1,686.59 crore). Even when 30 *per cent* of the estimated cost is allowed for the items/operations outside the scope of BHEL supply and another 20 *per cent* is allowed towards overheads and contractors' profit, the possibility of undue benefit of at least ₹2,684.73 crore to the contractors of these works cannot be ruled out.

Post tender inclusion of price adjustment clause in five agreements resulted in avoidable payment of price escalation of ₹1,342.48 crore. There were also other cases of inflated rates, undue benefits/excess payments to contractors, *etc*., to the tune of ₹ 612.51 crore.

CHAPTER I

Introduction

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Introduction

The Kaleshwaram Project is a multi-purpose and multi-stage lift irrigation project which seeks to lift water from the River Godavari at Medigadda and convey it across 13 districts of Telangana up to Hyderabad and adjoining areas. Divided into 7 Links and 56 packages, the Kaleshwaram Project comprises of three barrages, 14 reservoirs, 31 lifts and 1,832 kilometres of canals, tunnels and pipelines. The Project seeks to lift 215 thousand million cubic feet (TMC) of water from the River Godavari to irrigate 18.26 lakh acres of new Command Area (CA) in 13 Districts and to supplement water to an already existing CA of 4.71 lakh acres[1] of four other existing projects where water availability is now falling short of requirement. During the process, water is lifted from a height of 100 metres above Mean Sea Level (MSL) at Medigadda and through a series of multiple lifts, carried to a height of 618 metres above MSL at the highest elevation point at the Kondapochamma Sagar reservoir, thus, lifting water by 518 metres, overall. The Project envisages utilisation of a total of 240 TMC of water, with 195 TMC of water lifted from the River Godavari at Medigadda, 20 TMC of Godavari water lifted from the pre-existing Sripada Yellampally reservoir and 25 TMC supplemented through ground water. The Project is intended to provide 169 TMC of water for irrigation, 16 TMC of water for industrial use, 30 TMC of drinking water to Hyderabad and 10 TMC of drinking water to the villages enroute[2]. The cost of the Project as approved by the Central Water Commission (CWC) in June 2018 was ₹80,190.46 crore.

1.1 Background

In May 2007, the Government of the erstwhile combined State of Andhra Pradesh had formulated the Dr. B.R. Ambedkar Pranahitha-Chevella Sujala Sravanthi Lift Irrigation Project (PCSS Project). This project contemplated lifting 160 TMC[3] of water from the River Pranahitha to provide irrigation facilities to 12.21 lakh acres of Command Area (CA) in six districts. The project cost was estimated at ₹17,875 crore. The Government later revised (December 2008) the scope of the PCSS project to enhance the targeted CA to 16.40 lakh acres in seven districts[4] by supplementing 20 TMC of water from

[1] The four existing projects are – 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) thus adding up to 18.83 lakh acres. The Detailed Project Report of Kaleshwaram Project considered 25 *per cent* shortage of water in these projects. Hence, it is deemed that supplementation would be done for 25 *per cent* of 18.83 lakh acres *i.e.*, 4.71 lakh acres under these projects

[2] In addition, there would be evaporation losses of 12 TMC. Utilisation of the remaining 3 TMC of water was not explained in the DPR

[3] TMC means Thousand Million Cubic Feet

[4] The erstwhile Karimnagar, Medak, Warangal, Nalgonda, Rangareddy, Nizamabad and Adilabad Districts

the river Godavari (The original PCSS project line diagram is given at ***Appendix 1.1***). Correspondingly, the project cost was increased to ₹38,500 crore[5]. The project had seven links and 28 packages and these works were awarded to different contractors during 2008-2009. An expenditure of ₹11,642.85 crore (30.24 *per cent*) was incurred up to the end of March 2016, with none of the components completed.

After the re-organisation (June 2014) of the Andhra Pradesh State and the formation of Telangana State, the Government of Telangana reviewed (June 2016) the ongoing irrigation projects, including the PCSS project. Noting deficiencies like short availability of water at the source and insufficient reservoir storage capacities in the original project, the Government decided (June 2016) to re-engineer the PCSS project. Post re-engineering, the project was divided into two separate projects, *viz*. – the Dr. B.R. Ambedkar Pranahitha Project (Pranahitha) and the Kaleshwaram Project.

The re-engineering substantially changed the scope of the command area (CA) to be irrigated as well as the cost of the Pranahitha and the Kaleshwaram Projects. The two projects together planned to provide irrigation to a new CA of 20.26 lakh acres[6] and stabilise[7] 4.71 lakh acres of the CA of four existing projects[8] at an estimated cost of ₹85,651.81 crore.

The PCSS project had 7 links. During re-engineering, the Link-I of the PCSS Project (comprising of five packages) was separated and re-named as Dr. B.R. Ambedkar Pranahitha Project. Package-5 was deleted and the remaining four packages (comprising of three canals and one barrage) were planned to draw 20 TMC of water near Tummidihetti to irrigate two lakh acres of new CA in the erstwhile Adilabad District. The aggregate cost of the 4 packages was ₹2,759.13 crore. As of end of March 2022, an expenditure of ₹1,727.44 crore has been incurred on the Pranahitha project.

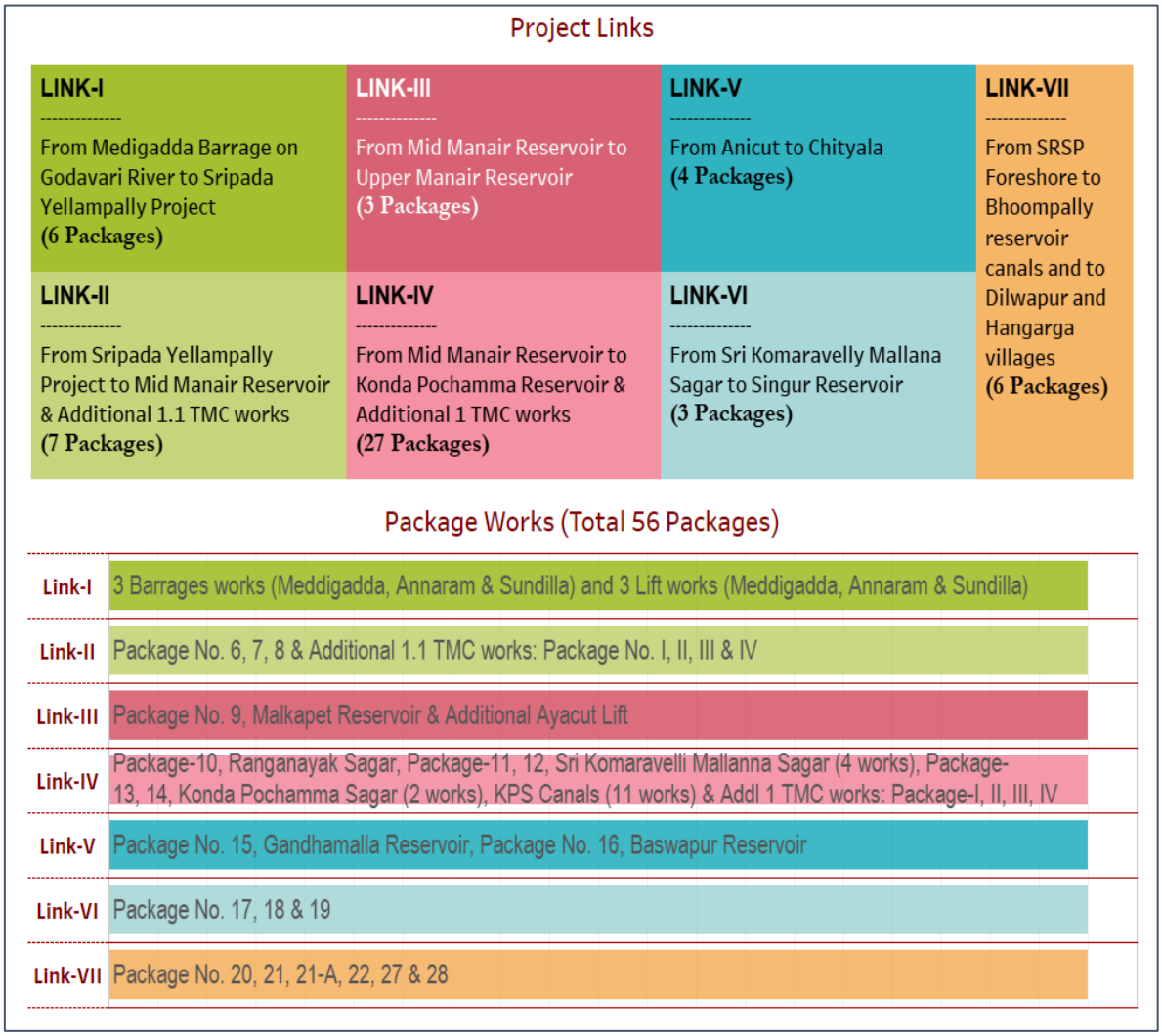
The remaining six Links (Links II to VII) of the PCSS Project, were brought under the new Kaleshwaram Project. Out of the 23 packages in these links, four packages[9] were deleted and the remaining 19 packages, with some changes, were included in Kaleshwaram Project. The source of water of this project was shifted to Medigadda, about 20 Km downstream of Kaleshwaram village where the River Pranahitha joins Godavari. Three barrages and 17 reservoirs were proposed to increase the storage capacity of the project. The Kaleshwaram Project alone proposes to provide irrigation to a new CA of 18,25,700 acres, supplement water to 4.71 lakh acres of pre-existing CA of other projects which were facing water deficit and to provide drinking and industrial water to Hyderabad, Secunderabad and en-route villages.

In addition to the 19 package works of the earlier PCSS Project brought under the Kaleshwaram Project, 28 new works resulting from re-engineering were awarded to

[5] This is the cost as per the administrative approval given in December 2008. In the DPR of the project submitted to CWC later in April 2010, the project cost was worked out at ₹40,300 crore
[6] Kaleshwaram Project: 18.26 lakh acres and Pranahitha Project: 2 lakh acres
[7] Supplement water to the already created irrigation command, which is currently facing a deficit
[8] Please see footnote-1 on page 1
[9] Packages – 23, 24, 25 and 26

various contractors during July 2016 - November 2019. The line diagram of the Kaleshwaram Project as per the Detailed Project Report submitted (February 2017) to the Central Water Commission is given at ***Appendix 1.2***. Even after re-engineering, nine more works were awarded to contractors during March 2019 to June 2020 taking the total number of works awarded to 56 (Chart 1.1).

Chart 1.1 – Details of the 56 works under the seven links of Kaleshwaram Project



Source: Records of the I&CAD Department

The line diagram of the Kaleshwaram Project as being executed now is given at ***Appendix 1.3*** (also refer the map at Figure 1.1). The aggregate cost of the 56 works of Kaleshwaram Project was ₹1,02,267.99 crore. As of end of March 2022, an expenditure of ₹86,788.06 crore has been incurred on the Kaleshwaram Project.

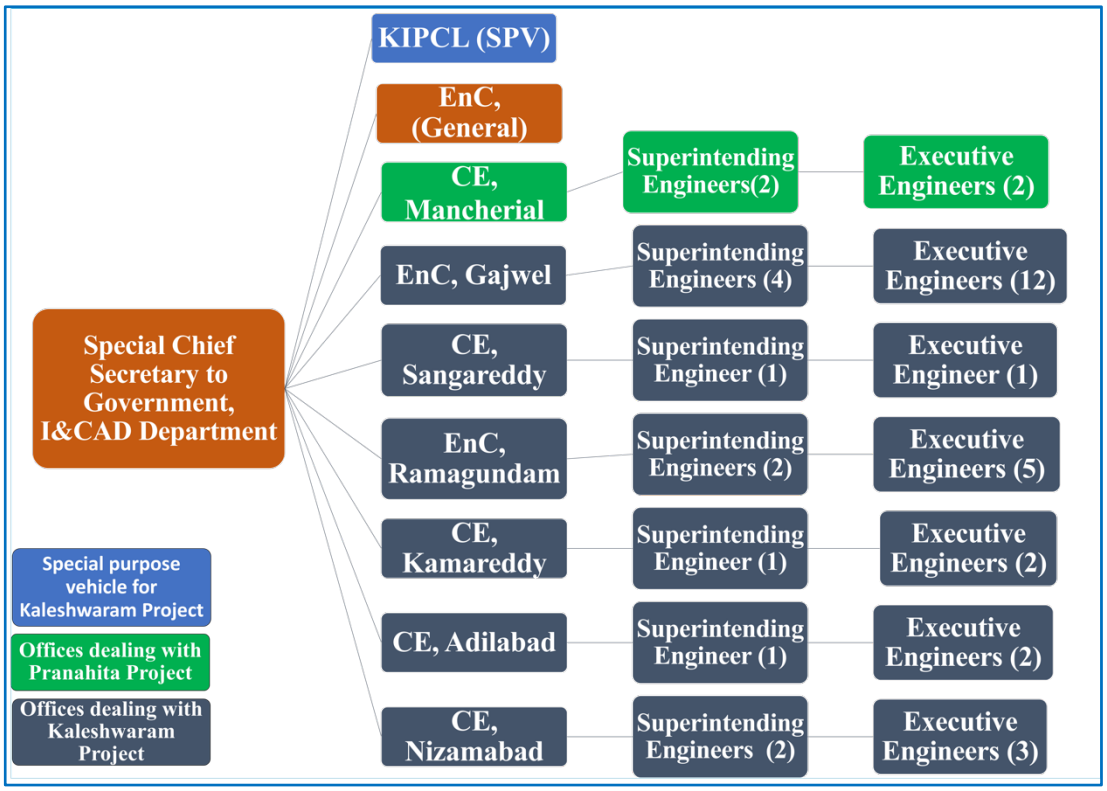
Figure 1.1 – Index map of the seven links of Kaleshwaram Project

Source: Index map prepared by Audit based on the information collected from the Departmental records. Zero point is the location of Medigadda barrage.

1.2 Organizational setup

Irrigation and Command Area Development (I&CAD) Department, headed by the Special Chief Secretary at Secretarial level, is responsible for irrigation related activities in the State. Eight Engineers-in-Chief (EnCs)/Chief Engineers (CEs), 13 Superintending Engineers (SEs) at Circle level and 27 Executive Engineers (EEs) at Divisional level oversee the execution of Kaleshwaram and Pranahitha Projects. A Special Purpose Vehicle (SPV), the Kaleshwaram Irrigation Project Corporation Limited (KIPCL) under the chairmanship of Special Chief Secretary was created to finance the Kaleshwaram Project cost. All the assets created will be capitalised under the ownership of KIPCL. Chart 1.2 depicts the organizational structure of the offices dealing with the Kaleshwaram and Pranahitha Projects.

Chart 1.2 – Organizational chart of the offices of the I&CAD Department dealing with the Kaleshwaram and Pranahitha projects



Source: As per the information collected from the I&CAD Department

CHAPTER II

Audit Framework

CHAPTER II
Audit Framework

Audit had earlier reviewed the PCSS project in 2011 as a part of the Performance Audit on Jalayagnam. The results of audit appeared in the Report of the Comptroller and Auditor General of India on Jalayagnam (Report No: 2 of 2012).

Keeping in view the re-engineering of PCSS project into two projects, the huge scale of investment and contemplated benefits involved in the Kaleshwaram and Pranahitha projects, a Performance Audit of these two projects had been taken up.

2.1 Audit Objectives

This Performance Audit covers the re-engineering of the PCSS project and the planning and execution of the Kaleshwaram and Pranahitha projects. The objective of this Performance Audit was to seek an assurance as to whether:

- *Re-engineering of the PCSS project was done scientifically and transparently and addressed the deficiencies of the project;*
- *The projects were conceived and planned scientifically with well-defined benefits, sound designs and cost considerations and had received all the statutory approvals in a timely manner;*
- *The projects were implemented holistically, timely, economically and have achieved the intended benefits;*
- *Financial management in the projects was prudent, economic and effective; and*
- *Award of works and contract management was transparent and economical.*

2.2 Scope and Methodology of Audit

This Performance Audit covers the events which occurred during the period from April 2013 to March 2022. Audit was carried out in two phases. Phase-1 of audit was conducted during April – August 2018 with focus on the re-engineering process and planning aspects of the two projects. Keeping in view the progress of works and the substantial expenditure already incurred on these projects, it was later decided to cover the project execution and contract management also under Phase-2 of this Performance Audit. The Phase-2 audit was conducted during August 2021 to March 2022.

Audit methodology included examination of records, issue of audit enquiries/ questionnaires and seeking replies in the offices audited as well as field visits to the project sites. The offices visited included the offices of the Special Chief Secretary, 47 out the 48 project offices/Circles/Divisions of I&CAD Department and the Kaleshwaram Irrigation Project Corporation Limited (KIPCL). Audit also visited/ collected relevant information from the offices of other line Departments like Forest

Department, Fisheries Department, Revenue Department, Commissioner (R&R), Telangana Drinking Water Supply Corporation Limited (TDWSCL), Telangana State Power Generation Corporation Ltd. (TSGENCO), Transmission Corporation of Telangana Ltd. (TSTRANSCO), Southern Power Distribution Company of Telangana Ltd. (TSSPDCL) and Northern Power Distribution Company of Telangana Ltd. (TSNPDCL). All the 56 packages under the Kaleshwaram Project and four packages under the Pranahitha project were covered under the Performance Audit.

Audit conducted Entry Conferences in April 2018 (Phase-1) and August 2021 (Phase-2) wherein the Audit objectives, scope, methodology and criteria were discussed with the Special Chief Secretary and other senior officers of I&CAD Department. Exit Conferences at the level of Government was held in February 2019 (Phase-1) and May 2023 (Phase-II) wherein, the major audit findings were discussed. The written replies of the Government (received from I&CAD Department in May and November 2023 and from Finance Department in October 2023) and the responses given during the Exit Conferences have been considered appropriately while finalizing this Report.

2.3 Audit Criteria

Audit used the following sources of audit criteria as benchmarks for this Performance Audit:

- Feasibility Reports and Detailed Project Reports;
- Guidelines of the Central Water Commission (CWC)/Ministry of Environment and Forests (MoEF)/Ministry of Tribal Affairs (MoTA);
- Godavari Water Dispute Tribunal (GWDT) Awards and Inter State Agreements;
- Annual Budgets and Annual Action Plans;
- State Public Works Department Code and State Financial Code;
- Internal Bench Mark estimations;
- Conditions of Tenders/Agreements for respective packages;
- Land Acquisition Act and Rehabilitation & Resettlement policies in force from time to time;
- Guidelines relating to Engineering, Procurement and Construction (EPC) contracts and Government Orders, Memorandums and circulars issued from time to time;
- Quality Control Reports/Vigilance Reports;
- Evaluation / Impact Assessment Reports and Good practices.

2.4 Acknowledgement

Audit acknowledges the cooperation received from the I&CAD Department and other organisations in conducting this Performance Audit.

The audit observations are discussed in the following chapters.

CHAPTER III

Re-engineering of PCSS Project

CHAPTER III

Re-engineering of PCSS Project

SUMMARY

The CAG report on Jalayagnam (Report No.2 of 2012) had pointed out certain deficiencies like non-establishment of water availability for the project and awarding of project works even before the approval of the PCSS project. Central Water Commission had also expressed concerns on the viability of the project because of the low availability of water at Tummidihetti barrage and inter-State issue with Maharashtra State. It had directed the State Government to review the water availability at the proposed location and also storage adequacy at the barrage and the enroute reservoirs. By the time the project was reviewed in June 2016, an expenditure of ₹11,642.85 crore (30.24 *per cent* of the entire PCSS project cost) had already been incurred. PCSS works were thus commenced in a haphazard manner without evaluating the basic project requirements.

Keeping in view the deficiencies, the state has engaged M/s Water and Power Consultants Ltd. (WAPCOS) as a consultant for preparation of Detailed Project Report (DPR) and re-engineered the project into two separate projects *viz.* – the Dr.B.R.Ambedkar Pranahitha Project and the Kaleshwaram Project. The source location of water for Kaleshwaram Project was changed from Tummidihetti to further downstream Medigadda which necessitated lifting of water by additional 48 metres up to Sripada Yellampally Reservoir. The quantity of water to be lifted also increased from 160 TMC to 195 TMC. The likely combined cost of the two projects now stands at ₹1,51,168.21 crore. The annual energy requirement had increased by 5,643.39 million units (MU) and the annual electricity cost by ₹3,555.34 crore. There was wasteful expenditure on the works already executed in PCSS project of around ₹767.78 crore.

3.1 Need for re-engineering

In the Report of the Comptroller and Auditor General of India on Jalayagnam (Report No.2 of 2012), Audit had pointed out certain deficiencies in the PCSS project like – non-establishment of availability of water for the project, awarding of project works even before preparation/approval of DPR and inter-state issues with Maharashtra regarding submergence areas. As seen from the DPR of the Kaleshwaram Project, the same issues which were pointed out by Audit in the Report on Jalayagnam had contributed to the need for re-engineering of PCSS project.

As per the Detailed Project Report (DPR) of Kaleshwaram Project, the need for re-engineering of the PCSS project was necessitated due to the concerns expressed by the Central Water Commission (CWC) about the viability of the project and also due to the inter-state issues with Maharashtra State.

Chart 3.1 – About the Central Water Commission

What is CWC ?

- CWC is a premier technical organization in the field of Water Resources attached to the Ministry of Jal Shakti, Government of India.

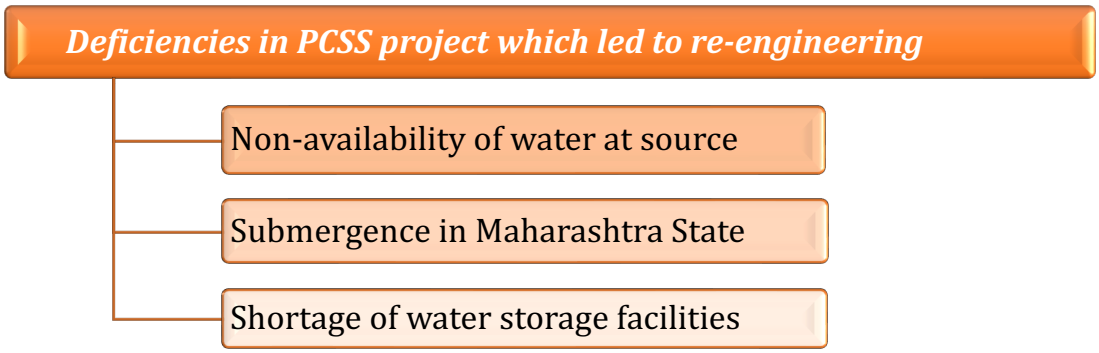
Role of CWC

- CWC is responsible for appraisal of preliminary/detailed project reports pertaining to irrigation projects taken up on inter-state rivers.

Source: Official website of the CWC

The deficiencies in the PCSS project and how they were addressed in re-engineering are explained below:

Chart 3.2 – Deficiencies in the PCSS project



Source: Records of the I&CAD Department

3.1.1 Non-availability of water

The PCSS project proposed earlier envisaged drawing of 160 TMC of water from Pranahitha River by constructing a barrage near Tummidihetti village (the confluence point of rivers Wardha and Wainganga) near the border of the neighbouring State of Maharashtra. The barrage was proposed with Full Reservoir Level (FRL)[10] of +152 M and storage capacity proposed was 5.09 TMC (live storage: 4 TMC).

In the Jalayagnam Report[11], Audit had pointed out that water availability for the ongoing projects on River Godavari including the PCSS project was yet to be established. It was commented therein[12] that the works of the PCSS project were awarded (May 2008 and May 2009) even before preparation of a comprehensive DPR and its approval by CWC.

[10] FRL refers to the maximum level up to which water can be stored. In the instant case, FRL was proposed at 152 metres above the mean sea level
[11] vide Paragraph 3.1.1.2 (iii) of Jalayagnam Report (Report No: 2 of 2012)
[12] vide Paragraph 3.2.4 of Jalayagnam Report

While scrutinising the DPR of PCSS project, the CWC, in March 2015, had expressed concerns on the viability of the project stating that the net availability of water at the proposed barrage location near Tummidihetti was 165.38 TMC which was inclusive of 63 TMC perceived surpluses from the share of upstream States. The CWC opined that the perceived surpluses of 63 TMC of water from the upstream States might not be available in future. As such, the CWC directed the State Government to review the water availability at the proposed barrage location.

The Government replied (November 2023) that in July 2009, the CWC had communicated availability of 236.5 TMC of water at the project site and therefore water availability for PCSS Project was ascertained from CWC. It also added that the CWC had also accorded in-principle approval[13] for the PCSS Project in April 2010.

Audit, however, observed that in reply to a letter written by the I&CAD Department, the CWC clarified (January 2013) that the above-mentioned letter dated July 2009 was not issued by it. This indicates that there was no basis regarding the availability of water and despite that the State Government went ahead with the project. Further, the in-principle approval of the CWC was only a preliminary approval for preparation of DPR for a project and was not a final clearance for commencement of project works.

3.1.2 Submergence in Maharashtra State

In Paragraph 5.3.19.2 (ii) of the Jalayagnam Report, Audit had pointed out (2012) that the PCSS project would cause submergence of 6,140 acres of land, of which 5,247 acres (85.45 *per cent*) submergence would be in Maharashtra State and that the works of the PCSS project had been awarded (2008-2009) without obtaining concurrence of the Government of Maharashtra.

As the State Government could not obtain concurrence of State Government of Maharashtra for the barrage near Tummidihetti due to the submergence issue, the construction work of the barrage, which was a key component of the PCSS project, could not take off till 2015. As seen from the DPR of the Kaleshwaram Project, the Government of Maharashtra had expressed concerns over the submergence caused by the proposed FRL (+ 152 M) of the Tummidihetti barrage and requested (May 2015) to reduce the FRL (to +148 M) to minimise submergence in its territory. The DPR stated that such a reduction in FRL would reduce the live storage of Tummidihetti barrage from 4 TMC to 1 TMC and drawing 160 TMC of water required for the project would not be possible.

The Government replied (November 2023) that Maharashtra and Andhra Pradesh had in-principle agreed (October 1975) to take up the PCSS Project at appropriate time and hence the project works were taken up simultaneously with preparation of DPR to save time. The Government further stated that all efforts were made to sort out the inter-state issue with Maharashtra at Government level and that the Government of

[13] As per CWC Guidelines for submission, Appraisal and Clearance of Irrigation Projects, 2010 in-principle approval is conveyed by CWC based on examination of preliminary report submitted by State Government.

Maharashtra did not give consent for construction of barrage with the proposed FRL of +152 M.

Audit, however, observed that in an inter-state agreement concluded in August 1978, Maharashtra and Andhra Pradesh had agreed that barrages across Pranahitha River were to be taken up only after reaching separate agreement(s) for the same.

3.1.3 Water storage facilities

The PCSS project contemplated utilisation of five existing reservoirs[14] (total capacity 50.2 TMC) pertaining to other existing/ongoing projects and seven reservoirs[15] to be formed newly with an aggregate storage capacity of 14.7 TMC. The existing five reservoirs of other projects had their own commitments and were proposed to be utilised for PCSS only as transit reservoirs and also when there was a deficiency in flows. Thus, only 14.7 TMC of dedicated storage was available for the PCSS project whereas the total water utilisation proposed was 160 TMC.

The CWC, in March 2015, had also directed the project authorities to review, *inter alia*, the storage of the barrage and also the en-route storages. The Government stated (November 2023) that the storage capacities had been increased as suggested by the CWC.

It is clear from the above-mentioned issues that the I&CAD Department took up the PCSS project and commenced the project works in a haphazard manner without properly evaluating and addressing the basic project requirements like availability of water, inter-state issues, storage facilities, *etc*. that were critical to achieving the intended objectives of the project.

By the time the project was reviewed by the Government of Telangana in 2015-16, an expenditure of ₹11,642.85 crore (*i.e.*, 30.24 *per cent* of the project cost) had already been incurred on the PCSS project to the end of March 2016, with none of the components completed.

The Government replied (November 2023) that the expenditure incurred up to 2015-16 was useful as the same package works, with slight changes, were involved in Kaleshwaram Project after re-engineering.

The fact however remains that taking up the PCSS project works without establishing availability of water, sorting out inter-state issues and proper planning led to re-engineering and several major changes in the project works, increase in the capital and operational costs of the project and wasteful expenditure (refer Paragraph 3.2.2(iii)).

[14] Sripada Yellampally Barrage (20 TMC), Medaram Tank (0.58 TMC), Mothe Vagu Reservoir (1.65 TMC), Mid-Manair Reservoir (25.87 TMC) and Upper-Manair Reservoir (2.1 TMC)

[15] Barrage at Tummidihetti (5 TMC), Anantagiri Reservoir (1.7 TMC), Imamabad Reservoir (1.5 TMC), Thadkapalli Reservoir (1.5 TMC), Tipparam Reservoir (1 TMC), Pamulaparthy Reservoir (1 TMC) and Chevella Reservoir (3 TMC)

3.2 Changes made during re-engineering and its impact

The PCSS project had 7 links, of which the Link-I was converted to Dr. B.R. Ambedkar Pranahitha Project and the remaining six links were brought under Kaleshwaram Project.

3.2.1 Changes in the project components

Keeping in view, the above-mentioned deficiencies, the following changes were made in re-engineering of PCSS project:

Dr. B.R. Ambedkar Pranahitha Project

- Link-I of the PCSS project which comprised of 5 packages was re-engineered with Package-5 being deleted. The remaining Packages-1 to 4 (Tummidihetti barrage and three canal packages) were separated and re-named as Dr. B.R. Ambedkar Pranahitha Project (Figure 3.1 below).

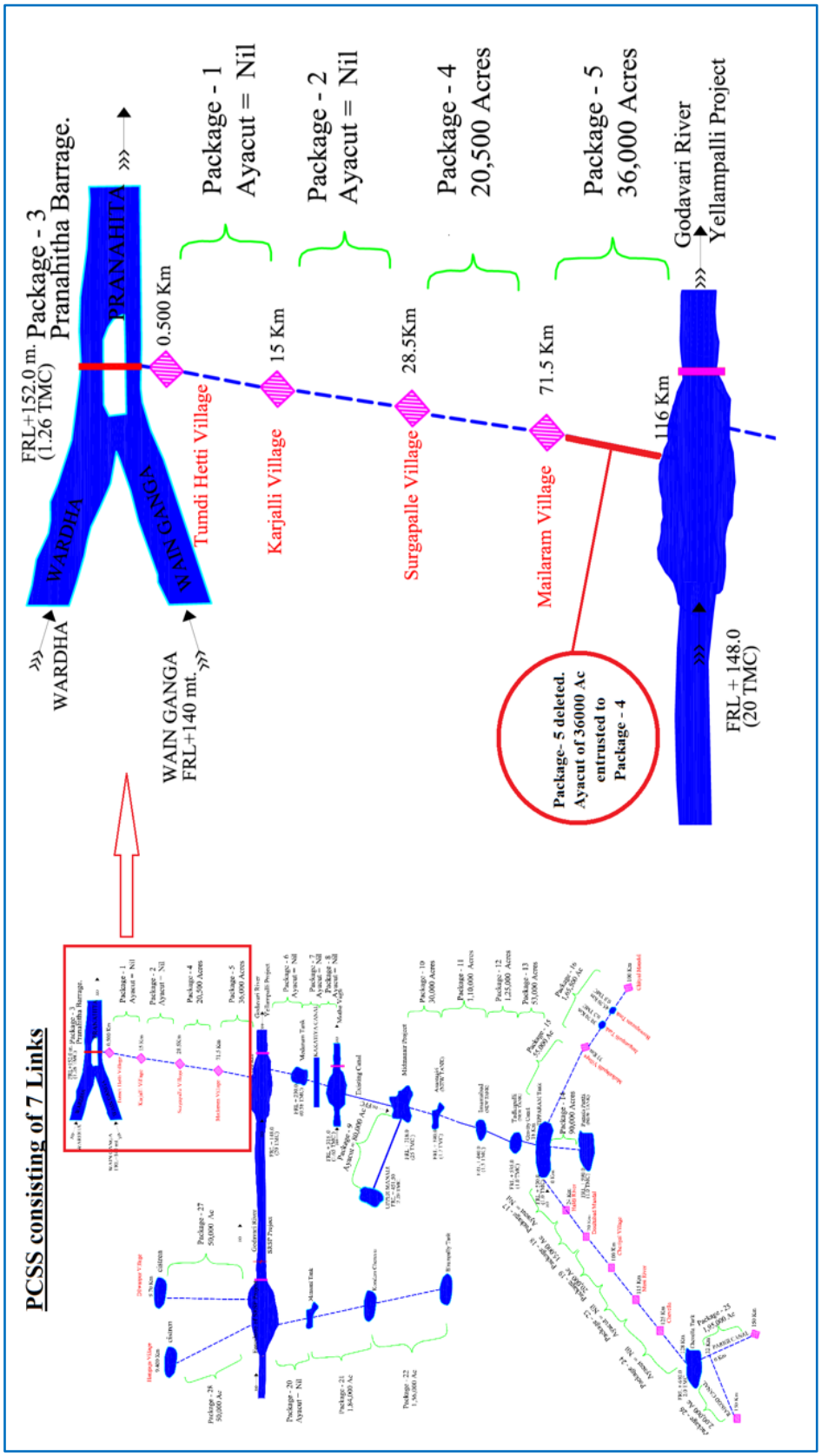


Figure 3.1 – Link-I of the erstwhile PCSS project

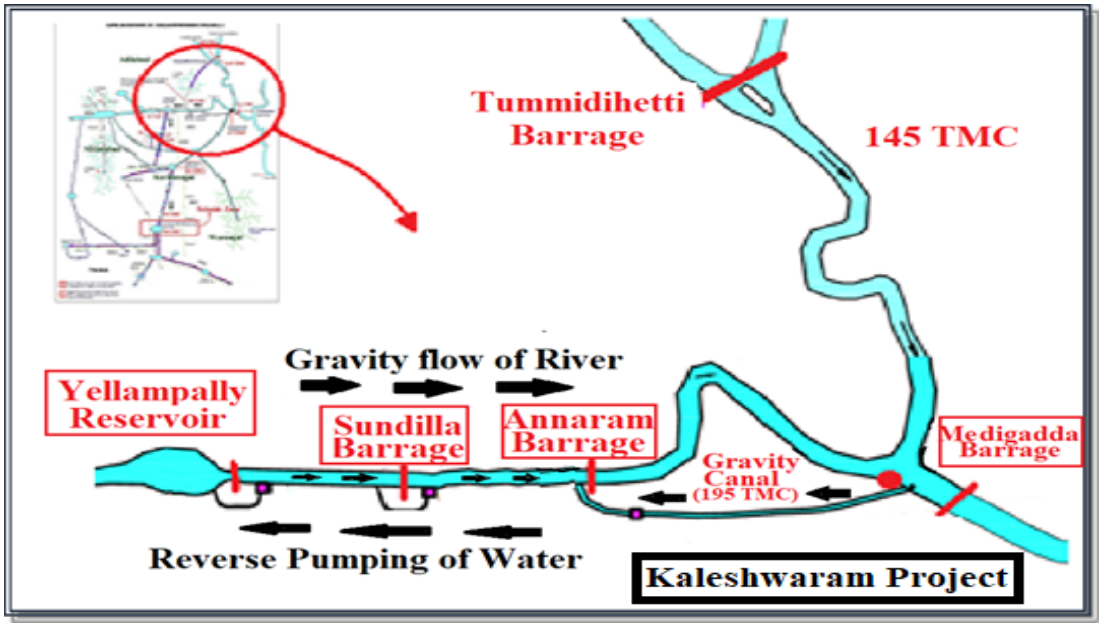
Source: Records of the I&CAD Department

- The height of the barrage near Tummidihetti was proposed to be reduced from +152 M to + 148 M to reduce the submergence in Maharashtra from 5,247 acres to 3,990 acres. Out of 165 TMC of water anticipated at Tummidihetti, it was now proposed to draw 20 TMC of water for providing irrigation to two lakh acres of new CA to be identified and created in erstwhile Adilabad District.

Kaleshwaram Project

- The remaining 6 links of the PCSS project lying below the Yellampally Reservoir, with some changes (Package No. 23, 24, 25 and 26 were deleted) were brought under the newly named Kaleshwaram Project.
- The source of water for the Kaleshwaram Project was shifted from Tummidihetti to further downstream to Medigadda where a new barrage was proposed to be constructed to draw water for the project. This location is about 20 Km downstream of Kaleshwaram village, where the River Pranahitha joins Middle-Godavari. The CWC assessed the water availability at Medigadda at 284.3 TMC[16] with the addition of water yield from the catchment area located between Tummidihetti and Medigadda. Out of this, it was proposed to draw 195 TMC of water for the Kaleshwaram Project[17] (Figure 3.2 below).
- The Kaleshwaram Project envisaged reverse pumping of water (*i.e.*, pumping of water from downstream to the upstream of Middle-Godavari River against gravity) from Medigadda up to the Yellampally reservoir (Figure 3.2), by constructing two more barrages at Annaram and Sundilla (Figure 3.3) and three pump houses at Medigadda, Annaram and Sundilla.

Figure 3.2 - Change of source location



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

[16] Annual yield at 75 *per cent* dependability. The monsoon yield was assessed at 271.8 TMC
[17] Over a period of 90 days at 2 TMC per day.

Figure 3.3 – Barrages built at Medigadda, Annaram and Sundilla

Medigadda Barrage
Location - Medigadda Village
FRL - 100 m
Length - 1632 m
Gates - 85
Discharge - 80,000 cubic metres per second (cumecs)
Storage Capacity - 16.17 TMC

Annaram Barrage
Location - Annaram Village
FRL - 119 m
Length -1270 m
Gates - 66
Discharge – 65,000 cumecs
Storage Capacity - 10.87 TMC

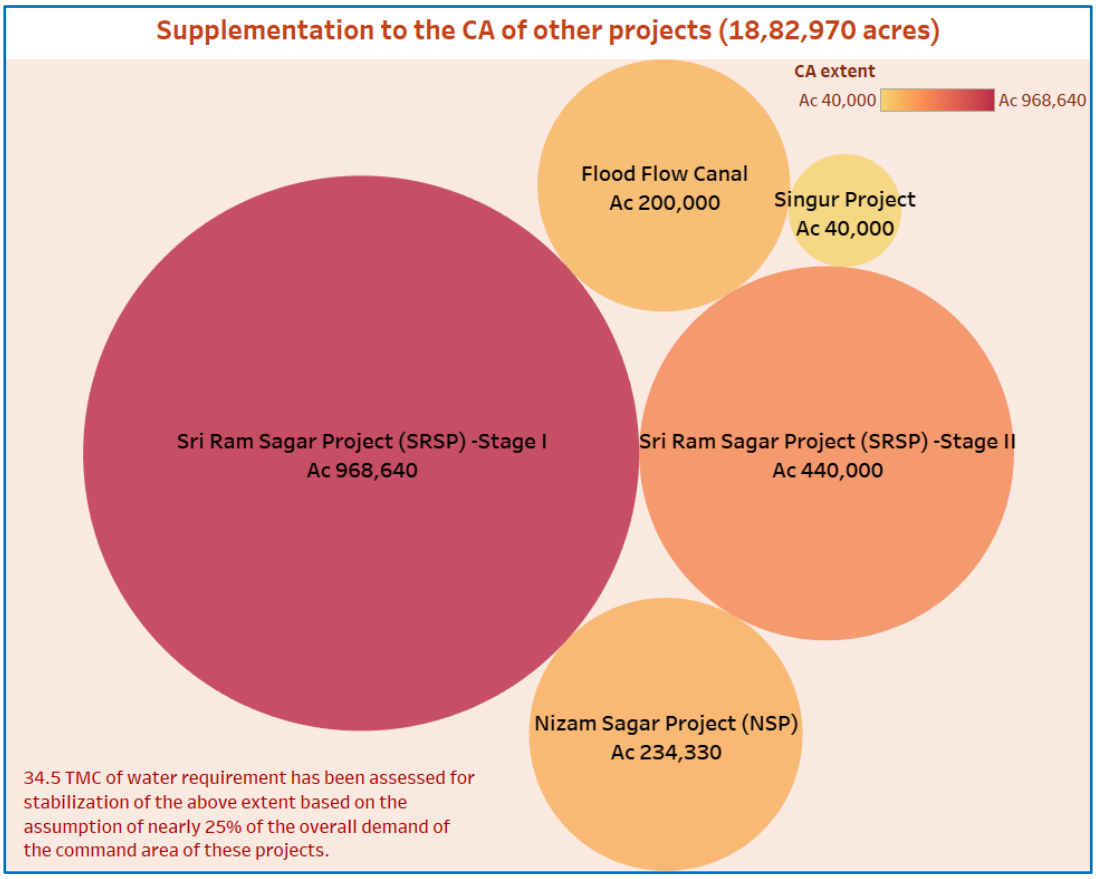
Sundilla Barrage
Location - Sundilla Village
FRL - 130 m
Length - 1426 m
Gates - 74
Discharge - 57,000 cumecs
Storage Capacity - 8.83 TMC

Source: Photographs provided by I&CAD Department. Details of the barrages as per the Departmental records

In addition to the barrages at Medigadda, Annaram and Sundilla (total storage capacity: 33.18 TMC[18]), 17 reservoirs[19] were proposed to be newly constructed, taking the total storage capacity to 147.71 TMC (live storage[20]: 125.18 TMC). The re-engineered project also proposes to utilize five existing reservoirs[21] of other projects as transit reservoirs.

- The targeted CA under the project was increased to 18.26 lakh acres. In addition, it was also proposed to supplement water to 25 *per cent* (4.71 lakh acres) of the CA of 18.83 lakh acres under four existing projects[22] that were facing shortage of water (Chart 3.3).

Chart 3.3 – Proposed supplementation of water to the CA of other projects



Source: DPR of the Kaleshwaram Project

[18] As per the DPR, the storage capacities proposed were - Medigadda: 16.17 TMC, Annaram: 11.9 TMC and Sundilla: 5.11 TMC (Total: 33.18 TMC). The final storage capacities as per actual construction are - Medigadda: 16.17 TMC, Annaram: 10.87 TMC and Sundilla: 8.83 TMC (Total: 35.87 TMC). Thus, the final storage capacity is more by 2.69. TMC than the storage envisaged in the DPR

[19] This is as per the DPR. In actual execution, only 14 new reservoirs are proposed

[20] Live storage denotes the water that would be available for utilization. The water below the level of the lowest outlet is called dead storage which cannot be accessed/put to use

[21] Yellampally, Mid-Manair, Upper-Manair, Kaddam and Masani reservoirs. These are proposed to be used as transit reservoirs

[22] 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)

- 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 uses.

Table 3.1 - Comparison between the PCSS project and the re-engineered Pranahitha and Kaleshwaram Projects

S. No.	Details		PCSS Project	After Re-engineering		
				Pranahitha Project	Kaleshwaram Project[23]	Total
1	Project Cost (₹ in crore)		38,500	3,740.80[24]	81,911.01[25]	**85,651.81**
2	Targeted command area		16.40 lakh acres	2 lakh acres	18.26 lakh acres	**20.26 lakh acres**
3	Supplementation to the existing CA of other projects		--	---	4.71 lakh acres[26]	**4.71 lakh acres**
4	Source of water (Rivers)		Pranahitha & Godavari	Pranahitha	Godavari	**---**
5	Source location and water to be diverted		Tummidihetti (160 TMC) & Yellampally (20 TMC)	Tummidihetti (20 TMC)	Medigadda (195 TMC) & Yellampally (20 TMC)	**235 TMC**
6	No. of barrages		1	1	3	**4**
7	No. of storage reservoirs		7	0	17	**17**
8	Total storage (TMC)		14.7	0	147.71	**147.71**
9	Length of water conveyor system		1055 Km	DPR not yet prepared	1832 Km	@
10	Length of Gravity Canals		849 Km		1629 Km	@
11	Length of Tunnels		206 Km		203 Km	@
12	Number of Lifts		22		20	@
13	Total capacity of Pumps and Motors		3466 MW		4627 MW	@
14	Annual energy requirement		8701 MU		13558 MU	@
15	Extent of submergence	Maharashtra	5,247 acres	3,990 acres	746 acres	**4,736 acres**
		Telangana	893 acres	434 acres	949 acres	**1,383 acres**

[23] The details in respect of Kaleshwaram project are as per the DPR/proposal approved by CWC

[24] This includes the aggregate value of the four agreements retained under the present Pranahitha project (₹2,759.13 crore), the value of work done under the deleted Package-5 (₹897.72 crore) and the expenditure incurred on land acquisition and mobilisation advance in the five packages so far (₹83.95 crore). The other works necessary for achieving the intended objective are yet to be finalised and the project cost is yet to be worked out, as of March 2022

[25] The project was approved (June 2018) by CWC with a cost of ₹80,190.46 crore. However, for the purpose of calculating the BCR, the CWC had considered the project cost as ₹81,911.01 crore by adding cost of land development (₹1,477.70 crore) and the one-third cost of Yellampally project for using its 20 TMC of water (₹242.85 crore)

[26] The DPR considered 25 *per cent* shortage of water in the projects to which water was proposed to be supplemented. Hence, it is deemed that supplementation would be done for 25 *per cent* of the total CA (18.83 lakh acres) under these projects

S. No.	Details	PCSS Project	After Re-engineering		
			Pranahitha Project	Kaleshwaram Project[23]	Total
16	Districts benefited[27]	7[28]	Erstwhile Adilabad	13[29]	@
17	Packages	1 to 28	4 (Pkg. Nos. 1 to 4 of PCSS Project)	56 (19 Pkgs. of PCSS with revisions + 37 new Pkgs.)	**60**
18	Industrial use (TMC)	16	DPR not yet prepared	16	@
19	Drinking water (TMC)[30]	40		40	@

@ Totals could not be given as the DPR of Pranahitha Project is yet to be prepared and the project designs, districts benefiting and quantum of water proposed for industrial/drinking purposes is yet to firmed up

Source: Records of the I&CAD Department

Shifting of water source from Tummidihetti (FRL: +152 M) to Medigadda, which is at a lower elevation (FRL: + 100 M), meant that 195 TMC of water required for the project now needed to be lifted to a net height of 48 metres, so as to reach Yellampally reservoir (FRL: + 148 M). This necessitated installation of very high-capacity pumps and motors besides construction of pumphouses and barrages. This, coupled with the additional cost involved in creation of additional storage capacities and other changes made under the project, has led to huge increase in the combined cost of the re-engineered Pranahitha and Kaleshwaram Projects. A comparison between the earlier PCSS project and the re-engineered Pranahitha and Kaleshwaram Projects is shown in Table-3.1 (above).

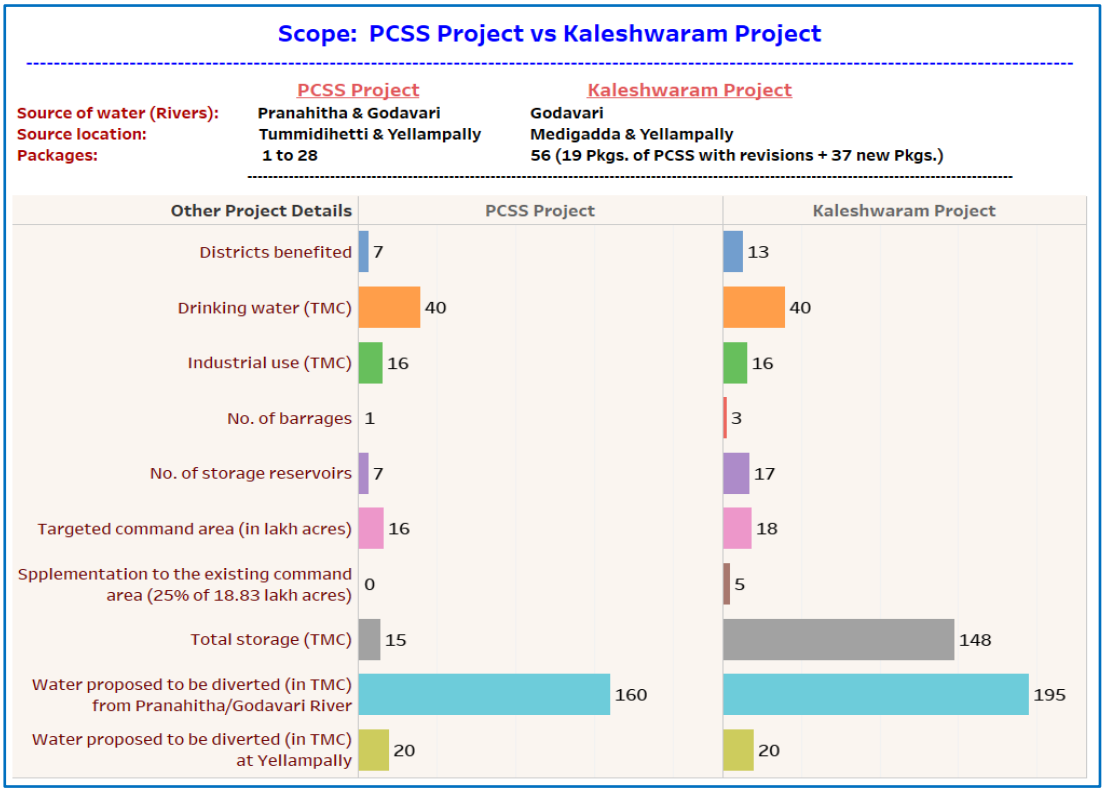
[27] The figure in column No.3 shows the number of districts prior to re-organisation of districts. The figure in column No.5 shows the number of districts post re-organisation

[28] The erstwhile Karimnagar, Medak, Warangal, Nalgonda, Rangareddy, Nizamabad and Adilabad districts

[29] Karimnagar, Rajanna-Sircilla, Siddipet, Medak, Yadadri-Bhongir, Nalgonda, Sangareddy, Nizamabad, Jagityal, Kamareddy, Nirmal, Medchal and Peddapalli (re-organized districts)

[30] 30 TMC to Hyderabad and Secunderabad and 10 TMC to villages enroute

Chart 3.4 – Comparison between the PCSS Project and the Kaleshwaram Project



Source: Records of the I&CAD Department

3.2.2 Impact of re-engineering

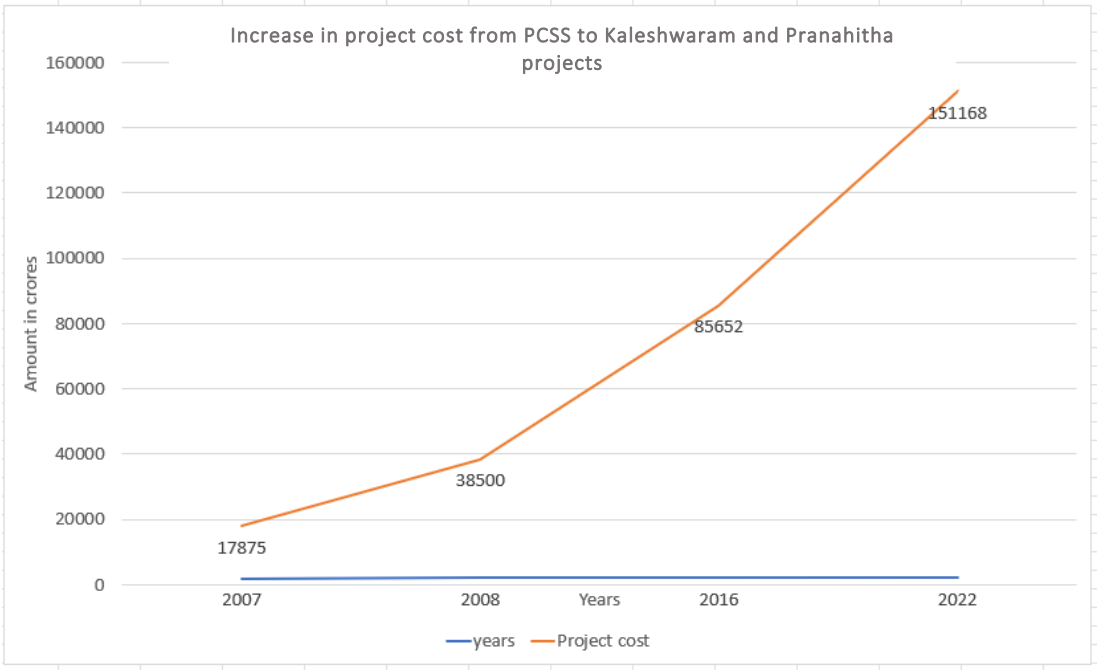
(i) Impact on the project costs and benefits: The earlier PCSS project contemplated providing irrigation to 16.4 lakh acres. The re-engineering substantially changed the scope of the command area (CA) proposed to be irrigated and the cost of the project(s). The Kaleshwaram Project proposes to create new CA of 18,25,700 acres. In addition, it also proposes to supplement water to 4,70,750 acres (*i.e.*, 25 *per cent* of 18.83 lakh acres) of existing CA under other projects. On the other hand, the Pranahitha project now proposes to serve a CA of two lakh acres. Thus, together, both these projects aim to provide irrigation to a total of 24,96,450 acres, which is an increase of CA by 52.22 *per cent*. As against the estimated project cost of ₹38,500 crore of the earlier PCSS project, the combined estimated cost of the two projects after re-engineering was ₹85,651.81 crore (*i.e.*, increase by 122 *per cent*). Thus, while the targeted CA increased by only 52.22 *per cent* after re-engineering, there is an increase in the combined project cost by 122 *per cent*. Moreover, even after the initial re-engineering, further additions and changes were made in the scope of the Kaleshwaram Project works (discussed later in Paragraphs 4.1.2 and 4.4) taking the present likely project cost to ₹1,47,427.41 crore, while there is no further increase in the envisaged project benefits.

As such, the present combined cost of Kaleshwaram and Pranahitha projects works out to ₹1,51,168.21 crore (Likely project cost of Kaleshwaram Project: ₹1,47,427.41 crore and the present cost of Pranahitha Project: ₹3,740.80 crore).

The additional cost due to re-engineering will likely increase further as the works necessary for achieving the intended objective under the Pranahitha Project have not yet been identified, DPR is yet to be finalised and the final cost of project yet to be firmed up (as on March 2022 and further discussed in Chapter - VII).

Thus, the cost of the project (PCSS) which started at ₹17,875 crore in May 2007 has increased multi-fold and now stands at ₹1,51,168.21 crore, with possibility of further increases by the time the project works are completed.

Chart 3.5 – Increase in project cost from PCSS Project to Kaleshwaram and Pranahitha projects



Source: Information as per the Departmental records. Present likely project cost as worked out by Audit based on information collected from the Departmental records

The Government replied (November 2023) that increase in the project cost was due to increase in the proposed CA, capacity of reservoirs, pumping capacity, new barrages, land acquisition, R&R, sub-stations, tender premium, price escalation, *etc*.

(ii) Impact on the recurring costs on electricity consumption: As per the DPR prepared for the earlier PCSS Project, the aggregate capacity of the pumps and motors needed for lifting water for the project was assessed at 3,466 Mega Watts (MW) and the energy consumption was assessed at 8,701 million units (MU) per annum.

As per the DPR prepared for the Kaleshwaram Project after re-engineering, the total capacity of pumps and motors was assessed at 4,627 MW and the power consumption was worked out at 13,558 MU per annum. However, there were subsequent increases in the scope of project works even after re-engineering and more lifts were added under the project (discussed in the subsequent paras in this Report) taking the total capacity of pumps and motors to 8,459.10 MW. Based on the CA proposed to be irrigated in each Link of the project and the quantum of water to be lifted in each

pumphouse to serve the CA, Audit computed the total electricity energy likely to be consumed for operation of lifts under the project which works out to 14,344.39 MU per annum (details in ***Appendix 3.1***). Considering the tariff[31] of ₹6.30/unit chargeable for Government lift irrigation schemes, the cost on electricity consumption of the project works out to ₹9,036.97 crore per annum.

As compared to that of the earlier PCSS Project, annual energy requirement has now increased by 5,643.39 MU (*i.e.*, by 64.86 *per cent*) and the annual cost on electricity has increased by ₹3,555.34 crore[32]. On the other hand, the energy requirement, if any, of the revised Pranahitha Project was yet to be assessed as the scope of project works was not yet finalized and DPR was yet to be prepared (as of March 2022).

The Government replied (May and 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 to account for unforeseen fluctuations in load and other exigencies and that the actual power consumption would be much less than 13,558 MU with power rating of 4,627 MW. It was further replied that power consumption also depends on the factors like water to be pumped and period of pumping.

The reply is contrary to the fact that in the DPR, the Department itself had worked out the energy requirement of Kaleshwaram Project as 13,558 MU for lifting 180 TMC of Godavari water. Later, when the CWC advised (March 2018) to increase the quantum of water to be lifted from Medigadda to 195 TMC, the Department had re-worked out the energy requirement as 13,829.3 MU[33]. Even in the revised DPR submitted by the Department to CWC in March 2022 and also in the further revised BCR calculations furnished to Audit (November 2023), the Department has shown the same 13,829.3 MU energy consumption and the energy cost was shown as ₹8,712.47 crore. Further, in its reply (November 2023), though the Government furnished documents showing that 20 *per cent* margin was provided while calculating the power rating of pumps/motors in some of the packages, it did not furnish any documentary evidence/analysis to establish that the actual power consumption would be lesser than the rated capacity of the pumps. The reply also did not specify as to by what percentage the actual energy consumption would be less than the rated capacities. Moreover, in the DPR of the earlier PCSS Project and also in the original and revised DPRs of Kaleshwaram Project, WAPCOS/the Department considered full rating of motors for computing the energy requirements and did not deduct any margin. Even when it is assumed that the energy consumption would be 20 *per cent* less than the rated

[31] The DPR of Kaleshwaram project was submitted to CWC in February 2017 and CWC approved the project in June 2018. The tariff fixed by the Telangana State Electricity Regulatory Commission (TSERC) for lift irrigation schemes was ₹6.40/unit for the years 2016-17 and 2017-18 and ₹6.30/unit from 2022-23. Audit on a conservative basis considered the present tariff of ₹6.30/unit for calculation of energy charges

[32] (14,344.39 MU *minus* 8,701 MU = 5,643.39 MU) X ₹6.30 per unit

[33] Energy requirement for lifting of 195 TMC: 13,702.43 MU and for drawal of groundwater: 126.9 MU. Total: 13,829.3 MU. There is a variation of 515.09 MU between the energy requirement calculated by Audit and that of the Department. This variation is due to the fact that Audit has considered the fact that the additional one TMC lifts (whose energy requirement is higher) also would be operated for lifting of water.

capacities, the energy requirement of Kaleshwaram Project would still work out to 11,974.81 MU (***Appendix 3.1***) and the annual energy cost works out to ₹7,544.13 crore, which would still be higher by ₹2,962.78 crore[34] as compared to the earlier PCSS Project.

(iii) Wasteful expenditure on the works already executed before re-engineering: By the time re-engineering of the PCSS Project was done, an expenditure of ₹11,642.85 crore had already been incurred on the project works (to the end of March 2016). Due to re-engineering of the PCSS project and changes made in the project works already under execution, certain portions of works already executed and paid for had become redundant in the present scenario and an expenditure of ₹767.78 crore (Table 3.2) incurred thereon has been rendered wasteful, as shown below:

Table 3.2 – Wasteful expenditure in the works already executed under PCSS Project

S. No.	Pkg. No.	Item of work	Wasteful expenditure (₹ in crore)	
1	7	Payment towards survey and investigation for the work which was not taken up/deleted	25.53	**428.91**
2	9	Construction of surge pool	26.34	
3	12	Surge pool and pump house	174.19	
4	13	Gravity canal and relocation of reservoir	50.43	
5	14	Tunnel	53.82	
6	16	Structures on canal to Baswapur reservoir and construction of surplus weir	42.43	
7		Canal of 2.15 Km already executed under Baswapur reservoir but later submerged after re-engineering	23.15	
8	17	Adit tunnel	2.63	
9	21	Link canal, improvement of tanks and land acquired	30.39	
10	23	Survey & investigation, earthwork, insurance and banker's charges	88.15	**170.59**
11	24	Survey & investigation and banker's charges	21.28	
12	25	Survey & investigation and insurance charges	28.73	
13	26	Survey & investigation and banker's charges	32.43	
14	5	Survey & investigation, insurance, banker's charges, excavation of adit tunnel and land acquisition	168.28[35]	**168.28**
		Total		**767.78**

Source: Records of the I&CAD Department

[34] 14,344.39 MU *minus* 8,701 MU = 5,643.39 MU. Energy requirement after considering 20 *per cent* margin = 5,643.39 MU X 100/120 = 4,702.825 MU. Increase in energy cost = 4,702.825 MU X ₹6.30 per unit = ₹2,962.78 crore

[35] Out of ₹897.72 crore under Package-5, ₹168.28 crore was rendered wasteful. The balance amount was utilised for purchase of machinery and MS Pipes

From the above table it may be seen that an expenditure of ₹428.91 crore incurred on some of the works executed under Package Nos. 7, 9, 12, 13, 14, 16, 17 and 21 prior to re-engineering became wasteful.

The entire expenditure of ₹170.59 crore incurred in Package Nos. 23 to 26 and partial expenditure of ₹168.28 crore incurred in Package No. 5 became wasteful due to deletion[36] of these works after re-engineering.

In its reply (November 2023), the Government, while accepting the facts that some of the works already executed had become redundant due to re-engineering, stated that the PCSS Project was re-engineered due to short-availability of water at Tummidihetti, inadequate storage capacity proposed earlier and the inter-state dispute with Maharashtra regarding submergence and that due to re-engineering, the Government had avoided wasteful expenditure by duly utilising the already executed works to the maximum extent possible. Package-wise replies and audit remarks are as under:

Package-12: The Government stated that the location of pump house and surge pool were shifted to a different location (*i.e.*, about 5.5 Km downstream) during re-engineering and that the pump house and surge pool constructed in the upstream location would be used as an intermediate surge pool due to which, the load on the new surge pool has been reduced, thereby reducing its size and cost. It was further replied that the adit tunnel has been utilised for extension of main tunnel and the earlier pumphouse has been utilised for design of the new surgepool.

Audit, however, observed that in its correspondence the Department itself had stated that the expenditure of ₹174.19 crore incurred on the pump house and surge pool in Package-12 was infructuous.

Package 16: In respect of the wasteful expenditure of ₹23.15 crore incurred on the canal portion in Package-16, the Government agreed that canal of a length of 2.15 Km came under submergence of Baswapur reservoir but stated that this would be utilised as an approach channel to feed the reservoir and hence, the expenditure incurred thereon is useful.

The reply is not acceptable since the Government itself has accepted the fact of submergence of canal of a length of 2.15 Km. Approach channel is required only up to the foreshore of the reservoir and not 2.15 Km within the submergence area.

[36] Details of the five deleted packages:

Package No.	Agreement value (₹ in crore)	CA proposed as per Agreement (acres)	Expenditure (₹ in crore)
5	3,626.11	36,000	897.72
23	1,059.98	0	88.15
24	937.33	13,200	21.28
25	1,144.13	1,81,800	28.73
26	1,042.21	2,00,000	32.43

Package-17: The Government gave contradictory replies. In its reply (November 2023), the Government on one hand accepted that the already executed portions of 125 metres of adit tunnel-2, 75 metres of adit tunnel-4 and 25 metres of main tunnel could not be utilised in the revised scope of works but on the other hand contended that the expenditure was not wasteful in view of the larger benefits contemplated under the revised scope of work.

The fact however remains that the wasteful expenditure could have been completely avoided, had the Department planned and designed the project properly in the initial stages itself.

Package-21: The Government replied (November 2023) that wasteful expenditure of ₹30.39 crore pointed out by audit included an expenditure of ₹1.26 crore incurred on the land acquired for canals and that this land would be used for raising plantations or as compensatory afforestation lands. It was further replied that proposals for write-off of ₹23.68 crore had already been submitted to the SLSC and that a revised proposal for write-off of the full amount of ₹29.13 crore (*i.e.*, ₹30.39 crore – ₹1.26 crore) would be submitted.

The reply is contrary to the fact that the land has not been put to use for the purpose for which it was acquired. Thus, the expenditure incurred on acquisition of land for canal remained wasteful.

The Government further stated that earlier, it was proposed to provide irrigation under Package-21 through conventional canal system and later it was decided to implement Pressurised Piped Irrigation System (PPIS) in place of open canal system to save water and to increase the targeted CA. The Government stated that as compared to the benefits of implementing the PPIS, the wasteful expenditure was meagre.

The reply is not tenable as the wasteful expenditure could have been totally avoided had the project been planned and designed properly in the initial stages itself.

Package-5: The Department replied that orders on write-off proposals for ₹157.55 crore would be obtained from the Government and that the amount of ₹10.73 crore incurred on land acquisition cannot be treated as wasteful as the acquired land would be utilised for other Government needs.

The fact, however, is that the land has not been put to use for the purpose for which it was acquired and therefore, the expenditure incurred thereon remained unproductive.

Recommendation - 1

Government should ensure that in future, irrigation projects are taken up only after complete survey and investigations to establish the availability of water and viability of the project and after obtaining the statutory clearances.

3.2.3 Deficiencies in the DPR of PCSS project

The task of preparation of DPR for PCSS project was entrusted to M/s Water and Power Consultants Ltd. (WAPCOS)[37] in February 2006. As per the agreement, the agency was to complete the investigations and submit the DPR by November 2006. During the feasibility studies, the Government increased the targeted CA under the project from 12.20 lakh acres to 16.40 lakh acres. The CWC accorded In-principle consent for the project in April 2010. The DPR was submitted to the CWC in October 2010. The DPR prepared by WAPCOS was found to be deficient on several accounts. Some of the deficiencies are discussed in Table 3.3 below:

Table 3.3 – Deficiencies in the DPR of PCSS Project

Sl. No.	What the DPR states	Deficiency
1	In the DPR, WAPCOS had estimated the water availability at Tummidihetti at 236.53 TMC[38].	The CWC later stated (in March 2015) that the water availability at Tummidihetti would only be 102 TMC (after deducting future utilisation of 63 TMC by upper riparian States).
2	The DPR proposed dedicated storage reservoirs (seven reservoirs to be newly constructed) with a total capacity of only 14.7 TMC.	The water requirement for Rabi season was estimated at 21.28 TMC. The project also aimed to supply 56 TMC of water for drinking and industrial needs every year. Since the project would have inflows only in monsoon season, the proposed storage capacity of 14.7 TMC would not be sufficient to meet the water demands during the non-monsoon season. The CWC suggested (March 2015) to review the storage proposed under the project.
3	Though the DPR had estimated that 5247 acres of land in Maharashtra State would be submerged due to the project, the number of villages under the submergence was shown as 'Nil'.	Government of Maharashtra later requested the GoTS to reduce the height of the barrage at Tummidihetti to +148M to prevent submergence of 30 villages in that State.
4	The DPR proposed construction of Barrage near Tummidihetti which is 1.50 Kms downstream of confluence point of Wardha and Wainganga rivers. There was no mention in the DPR about the possibility of submergence of any Wildlife Sanctuaries due to the project.	After re-engineering, the location of barrage is now proposed to be shifted 1.50 Kms upstream on the ground that construction of barrage at the earlier proposed location would cause submergence of Chaprala Wildlife Sanctuary in Maharashtra on the left bank of proposed barrage.

[37] A Public Sector Enterprise under the Union Ministry of Jal Shakti, Government of India
[38] At 75 *per cent* dependability after accounting for the upstream present and committed utilisation

Sl. No.	What the DPR states	Deficiency
5	The works under Link-I (From Pranahitha River to Sripada Yellampally Barrage) of PCSS project, *inter alia*, included excavation of twin tunnels for a length of 18 Km (under Package-5). The DPR stated that detailed topographical, geological and reconnaissance surveys were conducted for the water conductor system of the project including tunnels.	It was later found (March 2013) that the tunnel alignment was passing through coal deposits of Singareni Collieries Company Limited (SCCL) and the package work was pre-closed (June 2016) after incurring an expenditure of ₹897.73 crore on the ground that the SCCL objected to the execution and insisted on a detour. This package now stands deleted and is not included either in the Pranahitha Project or in the Kaleshwaram Project.

Source: Records of the I&CAD Department

As per the Guidelines for 'Submission, Appraisal and Clearance of Irrigation and Multipurpose Projects' issued (2002 and 2010) by CWC, the appraisal of project proposals by CWC/Planning Commission would normally be completed within six months. However, it took nine years since entrustment of DPR work to WAPCOS, and more than four years since submission of DPR to CWC, to come to a conclusion about the non-availability of required water for PCSS project at Tummidihetti location. By the time the re-engineering of PCSS project was done, an expenditure of ₹11,642.85 crore had already been incurred (as of March 2016) on the project works. Out of this, expenditure of ₹767.78 crore was rendered totally wasteful (refer Paragraph 3.2.2 - iii), which could have been avoided had the project works been taken up only after thorough investigations regarding its technical viability.

The Government replied (May 2023) that the DPR was scrutinised over a period of time and that various points raised by the CWC during scrutiny were attended to by the Department. It further replied that after constant persuasion, the water availability was finalised in March 2015. The reply is silent on the other deficiencies pointed out by Audit in Table 3.3 above.

3.3 Process of re-engineering

3.3.1 Review of water availability at Tummidihetti

As already stated, the PCSS project proposed earlier contemplated diversion of 160 TMC of water from River Pranahitha by constructing a barrage at Tummidihetti. The primary reason for re-engineering the project was stated to be non-availability of adequate water at Tummidihetti.

Audit, however, observed that the CWC had accorded in-principle consent for the project in April 2010. The DPR of PCSS project had been prepared by WAPCOS and was submitted to the CWC in April 2010 itself. In the DPR, the WAPCOS estimated the net availability of water at Tummidihetti at 292.62 TMC. The DPR stated that this

was based on a communication (July 2009) from the Hydrology Directorate of CWC[39] that a total of 273.02 TMC of water would be available at Tummidihetti and after accounting for the upstream utilisation, 236.53 TMC of water would be available. However, in January 2013, in reply to a letter written by the I&CAD Department, the CWC clarified that the above-mentioned letter was not issued by it.

In March 2015, the CWC stated that the net availability of water at Tummidihetti was 165.38 TMC which was inclusive of 63 TMC perceived surpluses from the share of upstream States. By this time, a substantial expenditure of ₹8,603.41 crore had already been incurred on PCSS project (as of March 2015). In such a situation, administrative prudence required that the State Government/Irrigation Department order for a review of the water calculations and identify reasons for such abnormal variations in the water calculations between WAPCOS and the CWC. However, there was no record to show that any such exercise was done. It appears that the Department hastily entrusted the work of 'preparation of DPR for Medigadda barrage and the lift/canal system from Medigadda to Mid-Manair Reservoir' to WAPCOS in April 2015 (*i.e.*, within one month from the CWC's letter). This shows that due diligence was not shown while deciding to re-engineer the project.

In reply (May and November 2023), the Government has only narrated the sequence of events and stated that on both occasions, *i.e.*, in July 2009 and in March 2015, the CWC had accepted and approved the water availability at Tummidihetti after detailed studies/ calculations.

The Government, however, did not furnish the reasons for such huge variation in the water calculations done by WAPCOS and CWC. Further, as has already been pointed out in Paragraph 3.1.1, the letter dated July 2009 from CWC, which has been frequently cited by the State Government/I&CAD Department to justify water availability at Tummidihetti has not been issued by CWC (as stated in CWC's reply).

3.3.2 Recurring cost of drawal of water from Medigadda

As already stated, the major change in re-engineering was the shifting of source location from Tummidihetti which is at a higher elevation (FRL: +152 M) to Medigadda which is at a lower elevation (FRL: +100 M). This meant that 195 TMC of water is now needed to be lifted to a net height of 48 M from Medigadda barrage to Yellampally reservoir (FRL: +148 M). This necessitated the construction of three new barrages and three pumping stations at Medigadda, Annaram and Sundilla, involving a huge extra capital cost of ₹21,897 crore[40].

Further, drawing of water from Tummidihetti to Yellampally reservoir, as originally proposed under the earlier PCSS project, involved lifting water at only one location (under Package-5). The total power requirement for lifting 160 TMC water to

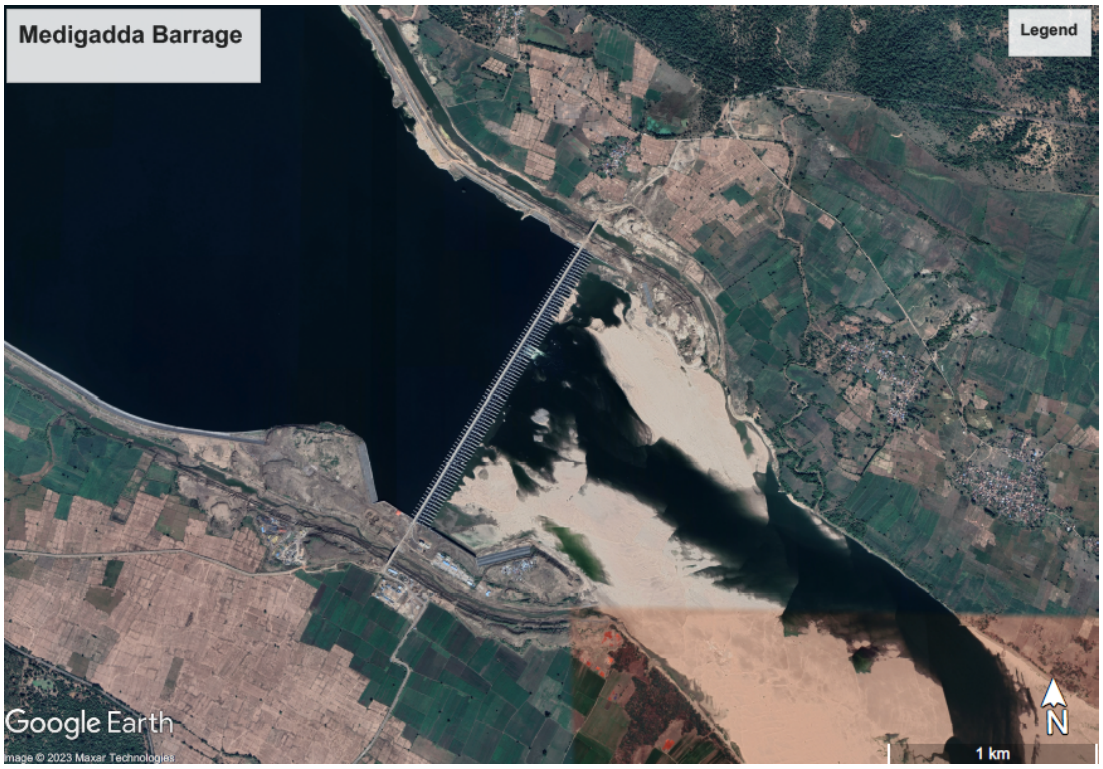
[39] vide UO. No.7/AP-87-Hyd(S)/312 dated 27 July 2009

[40] The value of the initial agreements for the three barrages and lifts was ₹10,783.30 crore. However, due to subsequent changes and additions to the scope of these works, total value of these works has now increased to ₹21,897 crore

Yellampally was assessed at 332.64 MU. Considering the tariff of ₹6.40/unit[41] chargeable for Government lift irrigation schemes, the cost on electricity charges for lifting water from Tummidihetti to Yellampally in the earlier PCSS project works out to ₹212.89 crore per annum *i.e.*, ₹1.33 crore per TMC. However, due to change in source location to Medigadda, the annual power requirement for lifting 195 TMC water from Medigadda to Yellampally (*i.e.*, Link-I of the project) now works out to 2,623.68 MU. The annual cost on electricity consumption under the Link-I of the project alone works out to ₹1,679.16 crore[42] *i.e.*, ₹8.61 crore per TMC.

Thus, on account of shifting the source of water from Tummidihetti to Medigadda alone, there is an additional capital cost of ₹21,897 crore besides an increase of annual recurring costs of ₹1,679.16 crore on electricity charges (*i.e.*, an increase of ₹7.28 crore per TMC).

Figure 3.4 - Satellite image of Medigadda (Laxmi) Barrage



Source: Google Earth Pro image as on 17th April 2023

The Government replied (May 2023) that the PCSS Project was taken up to provide permanent irrigation facilities to the CA in drought prone areas and that in view of the objections of Maharashtra and insufficient water availability near Tummidihetti, there was no other option but to propose barrages and lifts at Medigadda, Annaram and Sundilla in order to make the project functional.

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

[42] 2623.68 MU X 1000000 X ₹6.40 = ₹1679.16 crore

However, Audit did not find any evidence to show that the Department had explored the possibility of any other alternative arrangements for diversion of Pranahitha river flows for the PCSS project as discussed in Paragraph 3.3.3.

3.3.3 Non-evaluation of alternative options to draw water from Pranahitha River

In its letter dated March 2015, the CWC stated that the net availability of water at Tummidihetti was 4,683 million cubic metres (MCM) or 165.38 TMC. The CWC further stated that this was inclusive of 63 TMC planned to be utilized by the upstream States. This indicates that even in case the upstream States utilize their share of water, the remaining 102 TMC of water would still be available for the PCSS Project. As seen from the DPR of the Kaleshwaram Project, the Government of Maharashtra did not agree for construction of barrage at Tummidihetti with FRL of +152 M due to the concerns over submergence at this level and requested to reduce the FRL to +148 M. However, Audit could not find any evidence that the Department had made any assessment of the quantity of water that can be diverted in case the barrage near Tummidihetti is constructed with an FRL of +148 M at the time of re-engineering of PCSS Project.

Audit is of the opinion that had the Government had explored the quantity of water that could have been utilized from the reservoir at Tumidihetti with reduced FRL along with examining feasibility of the same, there was a potential for reducing the quantity of water to be lifted from Medigadda, the capacity/number of pumps and motors to be installed and the related capital and recurrent cost thereon.

The Government replied (November 2023) that all efforts were made by Government of Telangana to convince Government of Maharashtra to resolve the inter-state issue to make the project functional by detailed evaluation of all the alternative options.

The reply, however, is silent as to which alternative options were considered before deciding to shift the barrage to Medigadda and no documentary evidence in support of the same were provided to Audit.

CHAPTER IV

Planning for Kaleshwaram Project

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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 WAPCOS[43] 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/ Pamulaparthy/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 – Pamulaparthy,
   - Tadkapally - Gandhamalla - Baswapur,
   - Tadkapally – Nizamsagar, Pamulaparthi - Bhumpally.

b) *Topographical survey of water conductor system from*
   - Mid Manair Reservoir to Tadkapally – Pamulaparthy,
   - Tadkapally - Gandhamalla - Baswapur,
   - Tadkapally – Nizamsagar,
   - Pamulaparthy - 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, DGPS[44] and ETS[45].*

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 Order[46] (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 crore[47] 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 TMC[48]. 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 crore[49] 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 though 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 crore[50] 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 crore[51], 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 instructions[52] 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 acre[53].

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) crops[54] 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 conveyor 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 crore[55] 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 Canal[56].

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)

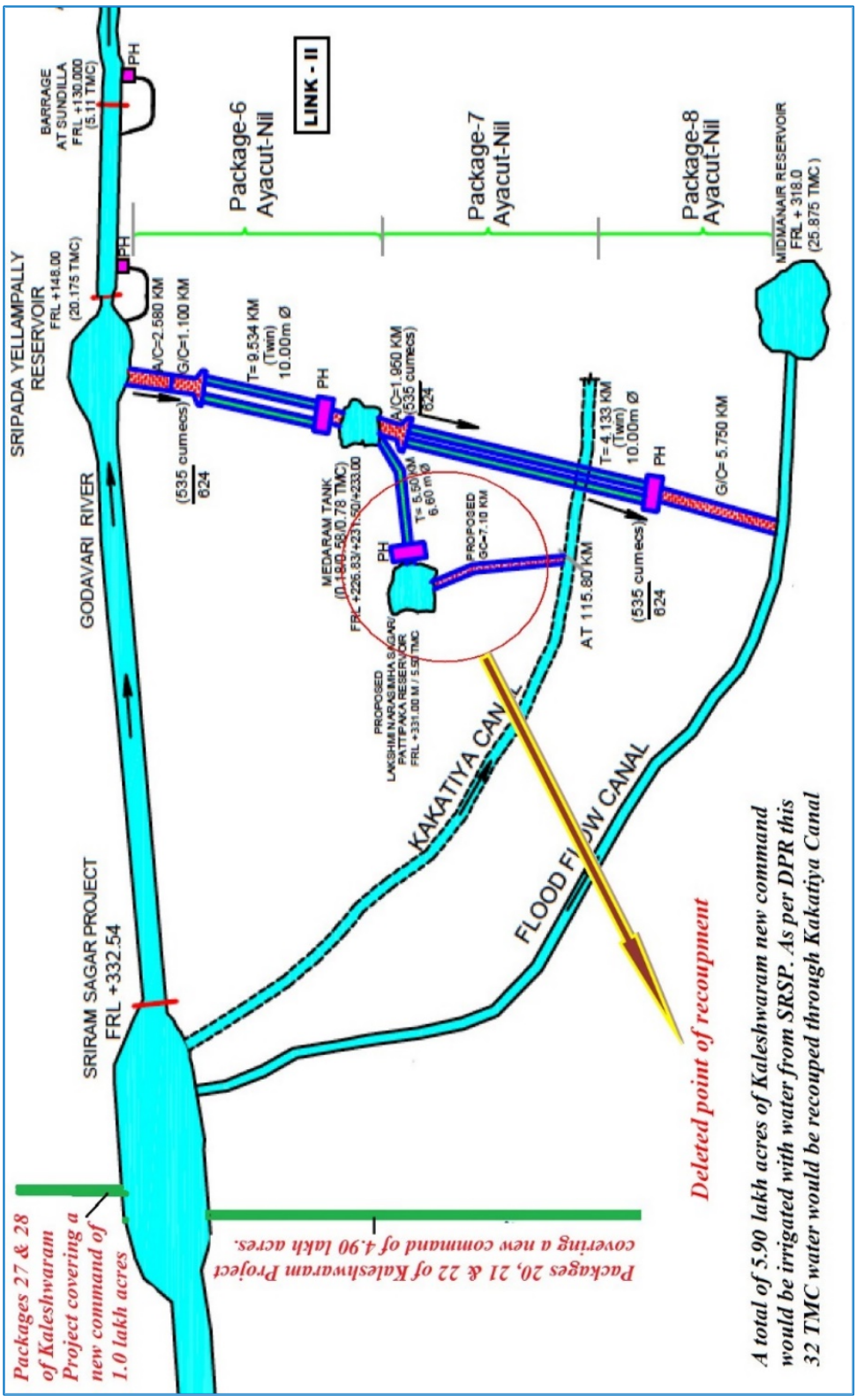


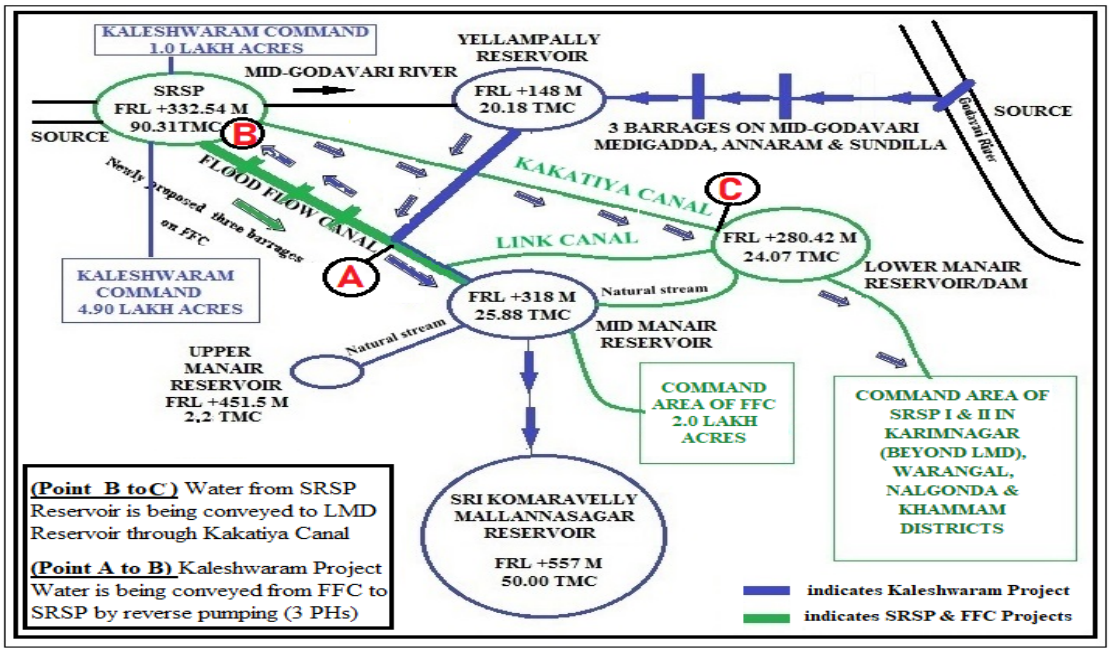
Figure 4.1 – Deleted proposal for recoupment of water in Kakatiya Canal of SRSP

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 projects[57], 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 Project[59]. 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 crore[60] 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 SRSP[61] 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), Jagitial, 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 Weir[62] 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.

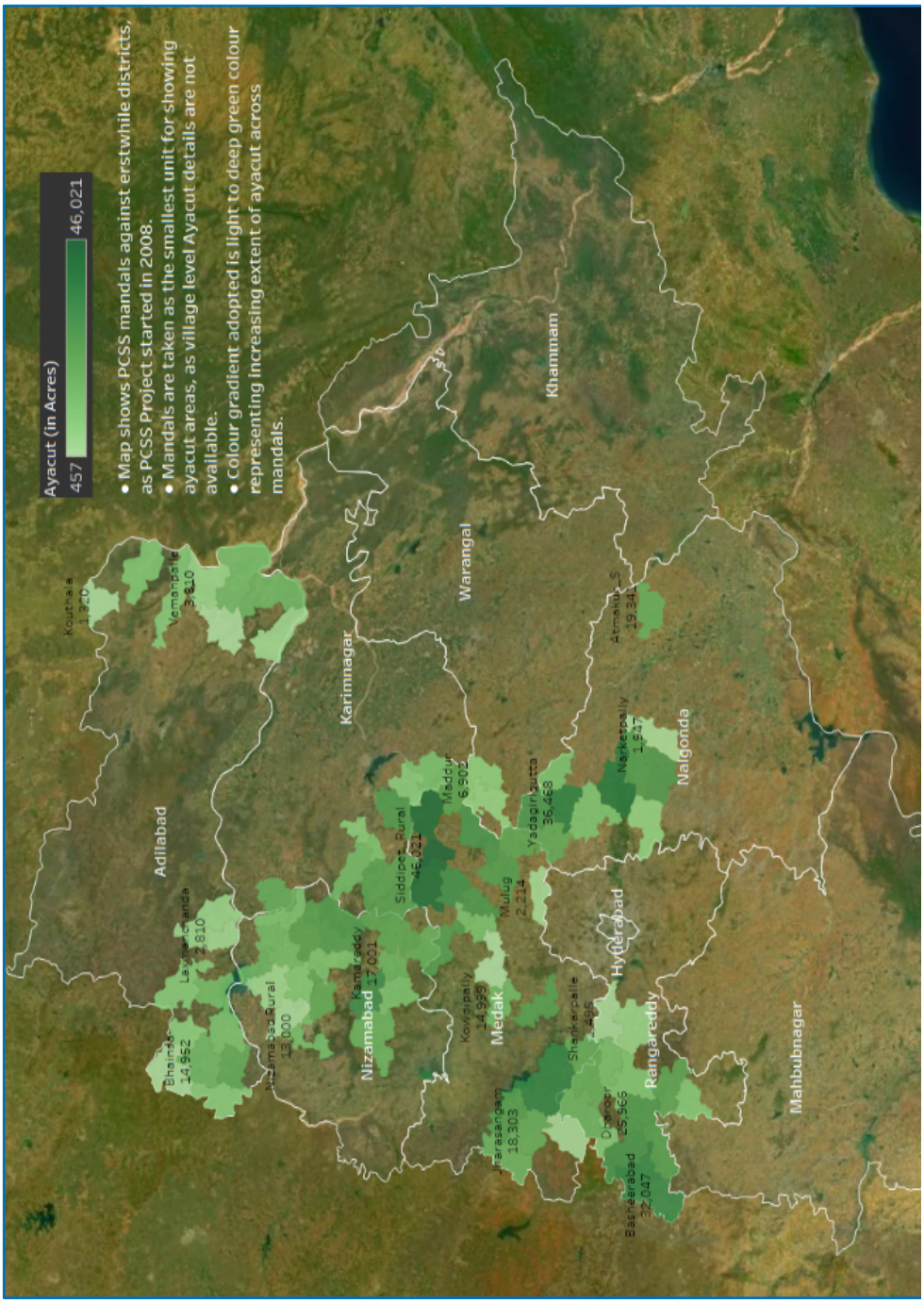
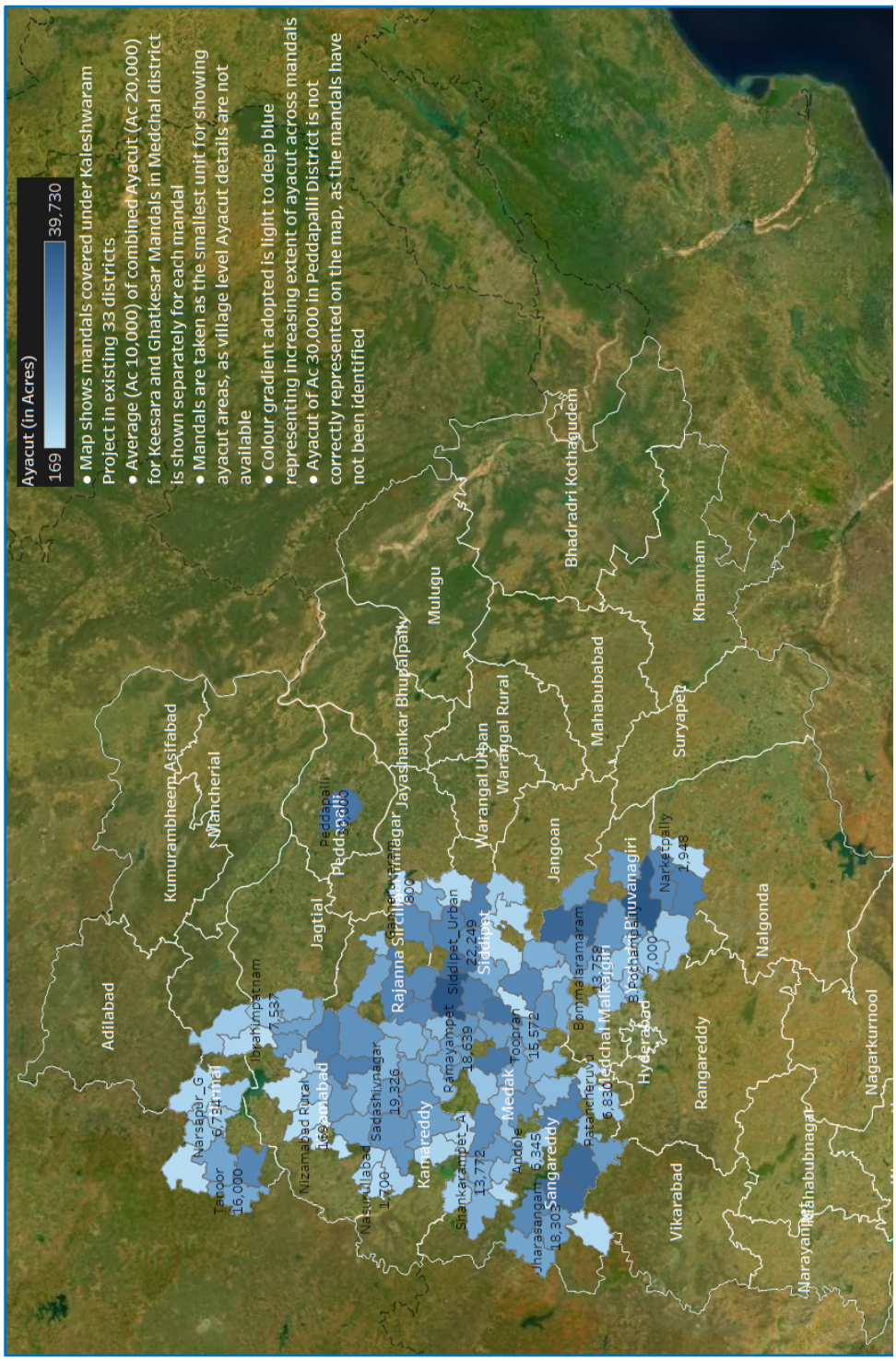


Figure 4.5 - PCSS Project mandal wise Command Area (old districts) Year: 2008

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

Figure 4.6 - Kaleshwaram Project mandal wise Command Area (new districts after re-organisation) Year: 2016



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

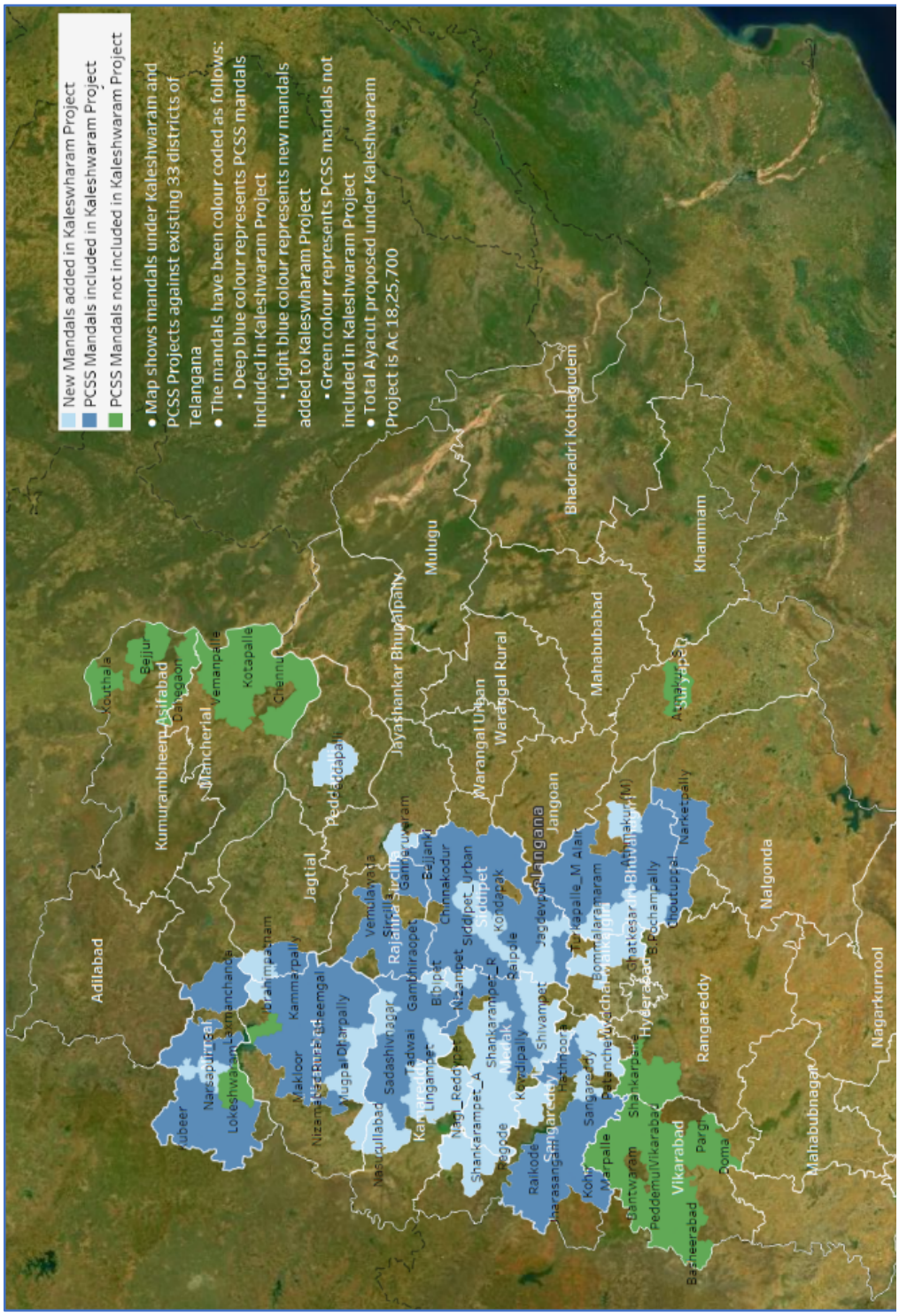


Figure 4.7 - PCSS and Kaleshwaram mandal wise Command Area (new districts after re-organization) Year: 2016

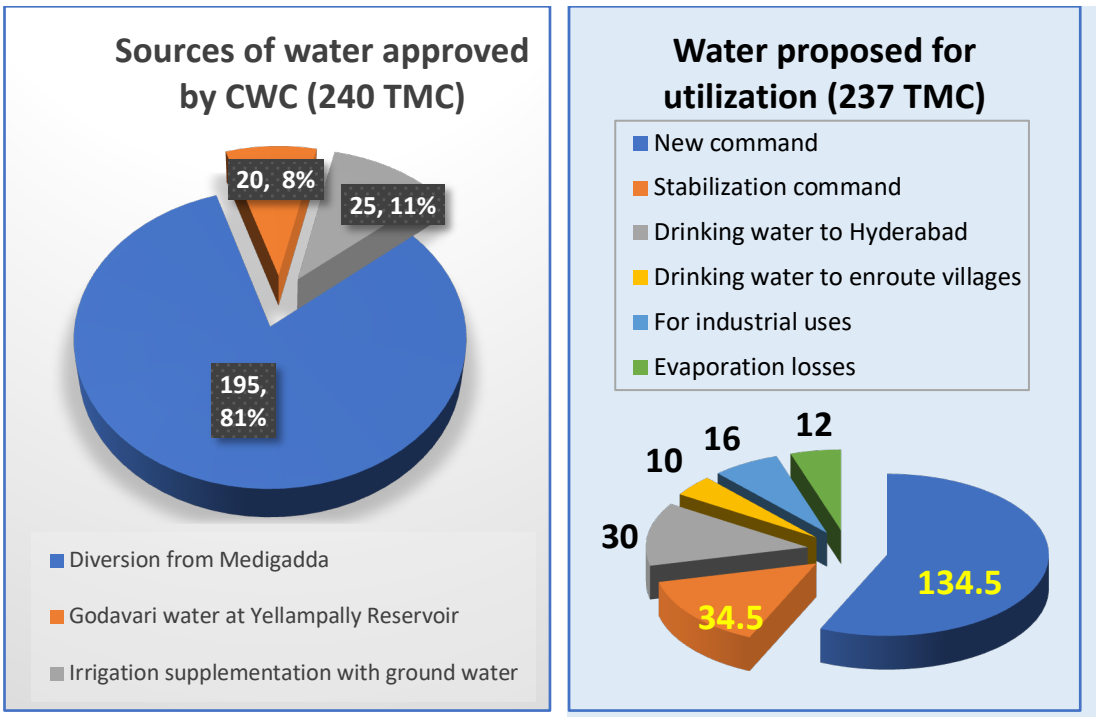
Source: Map prepared by Audit based on the information collected from the records of the I&CAD Department

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 acres[63]) 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 seasons[64].

[64] as per the information furnished by the Chief Engineer (Irrigation), Jagitial

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 TMC[65]. The Kharif water requirement for the new CA of 18,25,700 acres alone works out to 168.39 TMC[66]. 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 season[67] 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 MW[68] (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 LISs[69] 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 approved[70] 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 data[71] 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/import[72] 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 acres[73] 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 acres[74] 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 reservoirs[75] 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 reservoirs[76]. Out of these seven reservoirs, R&R activities in respect of only three reservoirs[77] 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 reservoirs[78]. Considering the expenditure incurred on already relocated PDFs, the Department will require an amount of ₹409.77 crore[79] 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 acres[80] 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 Government[81], 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 crore[82]. 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 crore[83] 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 crore[84]

[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 MU[85]. 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 tariff[86] 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 MU X 195 TMC ÷ 180 TMC =14,687.83 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	
	Less: Income of farm produce in pre-project scenario	682.65	682.65	As per Department
	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 rate[87] 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 crore[88].

[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 crore[91] 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	
	Less: Income of farm produce in pre-project scenario	682.65	682.65	As per Department
	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 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 crore[93] 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 crore[94], 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 crore[95] 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-imbursements

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 KIPCL[96] 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 orders[97] 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.

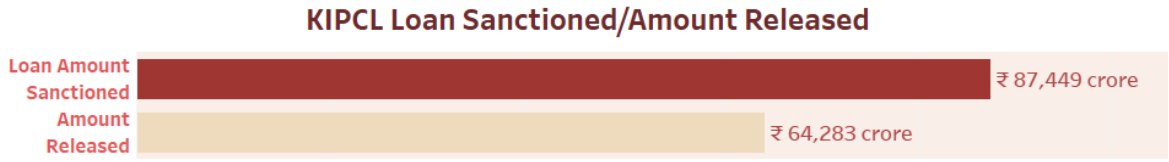
4.7.2.1 Huge loans taken for Kaleshwaram Project

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 crore[99], 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 cost[100]: ₹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 byAndhra Bank (now Union Bank of India): ₹7,400 crore; (ii) Consortium led by Punjab National Bank: ₹11,400 crore; (iii) Consortium led byVijaya 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 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 worksof 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 Reservoi 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 issued[101] 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, agreements[102] for loans amounting to ₹30,536.08 crore[103] (*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 orders[104] 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 three[105] 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 crore[106].

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 crore[107].

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 acre[108] 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 crore[109] 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 acre[110] 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

(₹ in crore)

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

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.

CHAPTER V

Execution of Kaleshwaram Project

CHAPTER V

Execution of Kaleshwaram Project

SUMMARY

The DPR of Kaleshwaram Project was approved by the CWC in June 2018 at an estimated cost of ₹81,911.01 crore. The Project was expected to be completed by June 2022. As of March 2022, the project is still under progress and the project cost is likely to exceed ₹1,47,427.41 crore by June 2024, the revised estimated date of completion. Works under the project had been awarded in 7 links and 56 works. After award of works, changes/revisions were made in the scope of work which increased the project cost and also increased the completion time. Of the 56 works, the original stipulated date had lapsed in 48 works while the remaining 8 works were stipulated for completion by June 2022. Delay in the progress of works was on account of delay in firming up the scope of works, as well as changes in the scope of work; delays in land acquisitions and approval of designs/ drawings, *etc*. R&R work was also to be commenced in some of the villages affected under the Baswapur, Medaram, Gandhamalla and Kondemcheruvu reservoirs.

The distributary network which is critical for carrying water to farmers and achieving the intended benefits had also not been completed. Contracts for 14,82,552 acres had been awarded, but works for creation of the remaining 3.43 lakh acres have not yet been entrusted. Even after six years since re-engineering and incurring an expenditure of ₹86,788.06 crore, the project has been able to create only 40,288 acres of new CA as against the targeted CA of 18.26 lakh acres. The project has not been able to provide water for drinking/industrial purposes as intended. Though the Department now expects the project to be completed by June 2024, with the present status of works and the volume of work yet to be done, completion of all the works and achievement of full benefits contemplated under the project is likely to take many more years to come.

5.1 Progress of project works

The Kaleshwaram Project was divided into seven Links for the purpose of planning and execution convenience. Each link is further sub divided into various works. In all, a total of 56 works with an aggregate agreement value of ₹82,252.75 crore[112] were awarded to various contractors. Due to changes in the scope of works, the total value of work to be executed under these agreements has now increased to

[112] These include 19 works pertaining to the erstwhile PCSS Project brought under Kaleshwaram Project after re-engineering with revised scope of work; 28 new works were taken up consequent to re-engineering and 9 more additional works awarded subsequently

₹1,02,267.99 crore, as of March 2022. Against this, the total value of work done and paid as of March 2022 was ₹70,666.48 crore (progress: 69 *per cent*).

At the time of approval of its DPR by the CWC, the total cost of the Kaleshwaram Project was assessed at ₹81,911.01 crore. As discussed in Paragraph 4.4, the total project cost is now likely to exceed ₹1,47,427.41 crore by June 2024, the revised estimated date of completion. As of March 2022, the project was still under execution and a total expenditure of ₹86,788.06 crore had been incurred on the project as shown in Table 5.1 below:

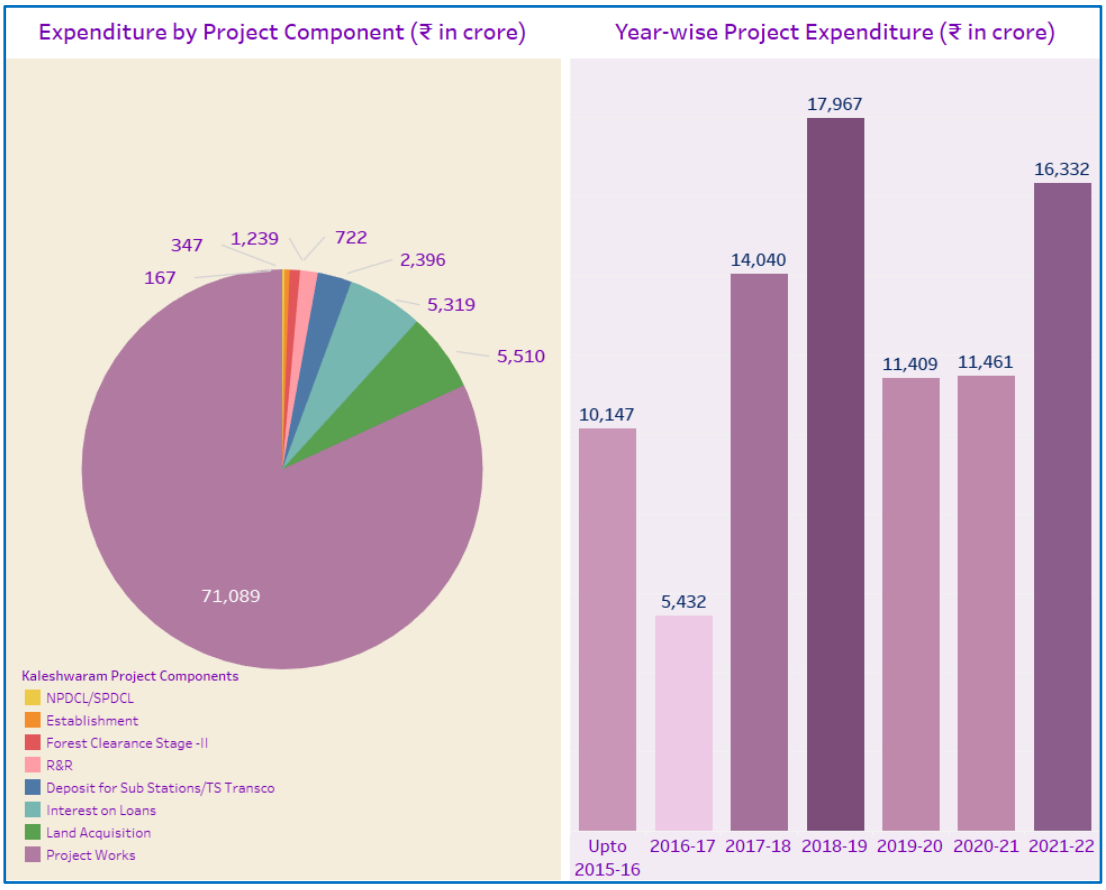
Table 5.1 – Expenditure incurred on Kaleshwaram Project as of March 2022

(₹ in crore)

S. No	Component	Expenditure
1	Works	71,088.67[113]
2	Land acquisition	5,510.32
3	R&R	1,238.60
4	Others	8,950.47
	Total	**86,788.06**

Source: Information furnished by the I&CAD Department

Chart 5.1 – Expenditure pattern in Kaleshwaram Project



Source: Information furnished by the I&CAD Department

[113] This includes expenditure of ₹70,666.48 crore incurred on the 56 works and ₹422.19 crore incurred on the deleted works, consultancy/building works and other miscellaneous expenditure on works

Audit observations on the execution of Kaleshwaram Project are discussed below:

5.1.1 Non-completion of works

As per the agreements, all the 56 works were stipulated to be completed between February 2018 and June 2022. The position as on 31 March 2022 was that of these 56 works, in 48 works the original stipulated completion date had lapsed while the remaining 8 works were stipulated to be completed by June 2022. However, as of March 2022, only 12 works had been completed, while in 4 works the execution had not even commenced due to non-firming up of the scope of work and non-acquisition of land. Out of the 56 works, only one work had been completed in time and the time overrun in the remaining 55 works as of March 2022 ranged between 10 months to 41 months, as shown in Table 5.2 below:

Table 5.2 – Time over-run in the 56 works of Kaleshwaram Project

S. No.	Details of works	Awarded during	Targeted for completion by	Progress range	Time over run
1	***Works where the initial agreement period is over: 48***				
a.	Works completed: 12	July 2016 to January 2018	February 2018 to June 2019	Completed	15 months to 41 months (one work completed in time)
b.	Works ongoing: 34	January 2017 to July 2019	April 2019 to January 2021	3% to 99%	14 months to 35 months
c.	Works not commenced: 2	November 2017 to November 2019	November 2019 to May 2021	0	10 months to 28 months
2	***Works where the agreement period not yet over: 8***				
a.	Works ongoing: 6	June 2020	June 2022	17 to 73%	--
b.	Works not commenced: 2	June 2020	June 2022	0	--

Source: Records of the I&CAD Department

The details of package wise status of works are given in ***Appendix 5.1***. The link wise details of works entrusted and the progress thereof is given in Table 5.3 below.

Table 5.3 – Link wise status of works

S. No.	Link No.	Particulars	No. of Pkgs.	CA to be created as per DPR (in acres)	Value of work to be done (₹ in crore)	Revised value of work to be done (₹ in crore)	Financial progress as of March 2022	
							₹ in crore	In %
1	I	From Medigadda Barrage on Godavari River to Sripada Yellampally Project	6	30,000	10,783.30	21,297.11	17,941.75	Works completed[114]
2	II	From Sripada Yellampally Project to Mid-Manair Reservoir	3	0	11,292.05	13,832.10	12,539.84	Works completed
		Additional one TMC works	4		9,989.52	9,989.52	3,785.17	38
3	III	From Mid-Manair Reservoir to Upper Manair Reservoir	3	86,150	1,522.34	1,737.28	1,258.00	72
4	IV	From Mid-Manair Reservoir to Konda Pochamma Reservoir	23	5,95,754	22,883.69	27,294.13	22,311.81	82
		Additional one TMC works	4		11,975.89	13,895.58	5,342.66	38
5	V	From Anicut to Chityala	4	2,43,500	4,202.09	4,324.61	2,202.45	51
6	VI	From Sri Komaravelli Mallanna Sagar to Singur Reservoir	3	2,80,296	2,506.72	2,506.72	1,216.42	49
7	VII	From SRSP foreshore to Bhoompally reservoir Canals and to Dilwapur and Hangarga villages	6	5,90,000	7,097.15	7,390.94	4,068.38	55
	TOTAL		**56**	**18,25,700**	**82,252.75**	**1,02,267.99**	**70,666.48**	**69**

Source: Records of the I&CAD Department

The reasons for slow progress of works were delays in firming up the scope of works, changes to the scope of works, delays in land acquisition and approval of designs / drawings. Slow progress of works carries the avoidable risk of additional liability on account of price escalation. Besides, the risk of litigations and payment of compensation to contractors for delays also cannot be ruled out. These are discussed in detail in the subsequent paragraphs.

The Government replied (May 2023) that due to objections of Maharashtra for barrage location at Tummidihetti, re-engineering of the PCSS project, delay in acquisition of

[114] Financial progress not mentioned as final bills are yet to be settled despite completion of works

land, involvement of Forest land and various other reasons the work was delayed. It was further stated that all the project works are now in brisk progress and all efforts are being made to complete at the earliest.

5.1.2 Non-commencement of works

Audit observed that four works which were awarded during November 2017 to June 2020 have not even commenced till date, as discussed below:

(i) Additional TMC works Packages III & IV of Link-II: Under the additional one TMC works (discussed in Paragraph 4.1.2.1), two works of Packages III and IV in Link-II were awarded to contractors in June 2020 with a stipulation to complete in 24 months. Audit observed that both the works had not commenced yet due to change in scope of the works and non-acquisition of lands. As per the original scope of both the works, the Flood Flow Canal (FFC) of Sri Ram Sagar Project was to be widened to increase its discharge capacity to accommodate the additional flow. However, after award of works, the Department decided (July 2021) to excavate a parallel canal instead of widening the FFC. The alignments of parallel canal were approved in November 2021. The lands to the extent of 294.48 acres and 344.93 acres, respectively, required for execution of works were yet to be acquired, as of March 2022. As a result, both the works were yet to commence even after a lapse of 21 months since award of works.

The Government replied (November 2023) that Packages-III and IV of the additional 1 TMC works were delayed due to LA and R&R issues and related court cases. It was further replied that out of the 693 acres of land required, an extent of 603 acres has been acquired, the works are now in progress and the financial progress as of October 2023 in Packages-III and IV is 52 *per cent* and 50 *per cent*, respectively.

(ii) Sangareddy Canal System Reach-II: In Link-IV of the project, the work of Sangareddy canal Reach-II, which contemplates creation of 32,401 acres of new CA, was awarded in November 2019 for completion by May 2021. The work was awarded without finalizing the alignments and designs/drawings of the canal and without acquiring lands required for execution. The Department approved the canal alignment and designs only in June 2021 *i.e.*, after completion of the agreement period. Further, a total of 1,197.73 acres of land was required for the work. Though the land acquisition authorities had requested (September 2021 and February 2022) to deposit amounts of ₹25 crore and ₹36.94 crore for payment of land compensation, the Department did not deposit the same pending clearance from Government. As a result, not a single acre of land had been acquired so far (October 2022) and the work had not commenced even after 35 months since award of work.

The Government replied (May 2023) that the Land Acquisition process is in brisk progress and soon after completion of LA, the work would be taken up.

(iii) Gandhamalla Reservoir: The work of construction of Gandhamalla Reservoir did not commence due to changes in the scope of work, non-finalisation of designs and non-acquisition of lands (discussed in Paragraphs 5.2 and 5.3).

The Government replied (May 2023) that the survey work in the submergence area could not be started as the land compensation offered was not accepted by the land losers who demanded higher rates for LA and R&R. The District Administration has been appraised about the ground condition and the same is under active consideration at the highest level for resolution at the earliest to commence the work.

5.2 Land acquisition (LA)

In the DPR, the total extent of lands required for execution of project works was assessed at 1,06,751 acres (43,200.53 Ha). However, as seen from the records, the Department has so far identified a total requirement of 98,110.33 acres out of which an extent of only 63,972.16 acres (65.2 *per cent*) was acquired as of March 2022 leaving a balance of 34,138.17 acres (34.8 *per cent*) yet to be acquired. The work-wise details of the land requirement identified, requisitioned, acquired and yet to be acquired are given in ***Appendix 5.2***.

The major portion of the lands pending acquisition was in Link-V (11,455.73 acres), Link-VII (7,986.24 acres), Link-IV (7,810.95 acres) and Link-VI (3,451.71 acres) of the project where a total extent of 17.1 lakh acres of new CA (*i.e.*, 93.64 *per cent* of the total contemplated new CA of 18.26 lakh acres) was to be created.

The delays in land acquisition were mainly due to delays in finalisation of as well as changes in scope of work, delays in identification of lands and sending LA requisitions to the LA authorities and delays in providing funds sought by the LA authorities.

5.2.1 Delays in identification of lands

Out of the 56 works where land acquisition was involved, 17 works were entrusted through Engineering, Procurement and Construction (EPC) Turnkey contracting system and 39 works were awarded under the conventional unit price contract system (locally called as lumpsum or LS contracts). Under the EPC contracts followed in the State, the contractors were required to conduct detailed survey and investigations, submit proposed alignments, designs and drawings to the I&CAD Department for approval. After receiving these approvals, the contracting agencies were required to identify the lands required for execution of works and submit the land plan schedules to the Department. The Department would conduct survey of the identified land jointly with the LA authorities and contracting agencies and thereafter, would place indents with the LA authorities for initiating the LA process. The Department would provide funds necessary for land acquisition to the LA authorities. After acquisition, the Department would hand over the lands to the contractors for executing the works. As per the EPC agreements, the contractors were required to submit the land plan schedules within three or six months, as the case may be, from the date of agreements. On the other hand, in LS contracts, the responsibility for designs and identification and acquisition of lands rests solely with the Department. As per the existing instructions[115] of Government, administrative approval/technical sanction for

[115] GO Ms. No.94 of I&CAD (PW-COD) Department, dated 01.07.2003

irrigation works would be issued only after designs are finalized, detailed investigation is completed, and necessary lands are acquired for taking up works without interruption for the first two years.

The Department, however, awarded all the 39 LS contracts without acquiring lands. In the EPC contracts, there were delays in identification of land required for works and in placing requisitions to the LA authorities. The LA indents were being sent to the LA authorities in a piecemeal manner. As a result, even though the originally stipulated period of agreements is over in 48 out of the 56 agreements, the land acquisition had not been completed in 32 works. In the eight works which were stipulated for completion by June 2022, LA was completed in three works and was pending in five works as of March 2022, despite a lapse of 21 months since concluding the agreements.

Further, the Department has so far (March 2022) placed LA indents with LA authorities for only 85,745.88 acres out of the total assessed requirement of 98,110.33 acres. It was yet to complete the survey of the balance lands and send indents in 12 works.

Moreover, the Department is yet to fully assess the lands required for the ongoing works. It was still assessing the land requirements and sending indents to the LA authorities. During 2021-22, additional land requirement of 3,487.40 acres was assessed and LA indents for an extent of 7,477.17 acres were sent to the LA authorities as shown in Table 5.4 below:

Table 5.4 - Change in land requirement during March 2021 and March 2022

(extent in acres)

S. No.	Details	Total land requirement	Total land requisitioned	Total land acquired
1	Status to the end of March 2021	94,622.93	78,268.71	56,488.57
2	Status to the end of March 2022	98,110.33	85,745.88	63,972.16
3	Change during 2021-22	3,487.40	7,477.17	7,483.59

Source: Records of the I&CAD Department

Delays in identification of the lands required for execution of works and acquisition thereof contributed to delays in completion of project works.

Some of the works where maximum LA is pending are discussed below:

Link-V

(i) Package-16 (pending LA: 4,746 acres): Package-16 work (under Link-V) was awarded in the earlier PCSS project. After re-engineering, some changes were made in the scope of work under the package and the target date for completion was stipulated as June 2019. A CA of 1.66 lakh acres was to be created under this package. Audit observed that the Department approved the canal alignments and designs between 2009 and 2019. Audit, however, observed that out of the total land requirement of 5,911 acres, LA indents for only 2,686 acres were sent to LA

authorities as of March 2022. Out of this, only 1,165 acres (19.71 *per cent*) was acquired. Indents for 3,225 acres were yet to be sent as survey of the lands required for branch canal[116] and distributaries was still in progress even after more than two years from the target date of completion of work. Only 51 Km (59.75 *per cent*) out of the proposed 85.36 Km of main canal could be completed due to delay in finalization of canal alignments and acquisition of lands. There was meagre progress in the work of branch canal as only 8.15 Km (7.77 *per cent*) out of total of 104.83 Km was completed. The work relating to distributaries was yet to be taken up. The financial progress in this work was only 54 *per cent* (March 2022).

The Government replied (November 2023) that the alignment of main canal, left main canal and right main canal have been approved (before re-engineering) and the land plan schedules were submitted to the District Collector, Nalgonda. It was further replied that out of the 1,671 acres of land required for the main canal, 1,437 acres has been acquired and 234 acres was yet to be acquired. Further, the earth work, CC lining and structure works relating to branch canals are completed to the extent of land acquired. The Survey and Investigation work for distributary and minors was completed and Hydraulic Particulars are under scrutiny for approval. It was further replied that out of 87.648 Kms of main canal (including the left and right main canals) 70.898 Km has been completed. The present progress of the work was stated to be around 65 *per cent*. It was also stated that the investigation work of field channels is in progress and will probably be completed by the end of March 2024.

The fact, however, remains that the Government has not been able to complete the works within intended timelines.

(ii) Gandhamalla Reservoir (pending LA: 2,379 acres): The Department entrusted (November 2017) the work of construction of Gandhamalla reservoir in Yadadri-Bhongir District (under Link-V of the project) to a contractor under LS contract at an agreement value of ₹719.08 crore for completion by November 2019. As per the agreement, the reservoir was to be formed with a capacity of 9.86 TMC.

The Department later decided (March 2018) to reduce the capacity of the reservoir by half and construct it with a reduced capacity of 4.28 TMC to avoid submergence areas. As per the reduced scope of the work, private lands to the extent of 2,379 acres were required. LA indents for acquisition of these lands were sent to the LA authorities during June 2017 to September 2018. The LA authorities issued notifications for acquisition of lands during September 2018 – January 2019. Audit observed that despite request (June 2019) by the LA authorities, the funds (₹75 crore) required for land acquisition were not deposited. As a result, not a single acre of land was acquired as of March 2022. Due to non-acquisition of lands, the work of construction of Gandhamalla reservoir has not commenced even after more than four years since the work was awarded.

[116] A canal receiving its water supply from the main canal and acting as feeder for distributaries

The Division replied (December 2021) that higher authorities had been requested for funds which were yet to be sanctioned and released by Government.

The water from Gandhamalla reservoir was proposed to be supplied to 55,000 acres of CA under Package 15, the works of which were underway (progress: 74 *per cent*). Unless the construction of Gandhamalla reservoir is completed, the CA under Package-15 cannot be brought under irrigation.

The Government replied (November 2023) that the survey work in the submergence area could not be started as the land compensation offered was not accepted by the land losers who demanded higher rates for LA and R&R. The District Administration has been appraised about the ground condition and the same is under active consideration at the highest level for resolution at the earliest so as to commence the work.

(iii) Baswapur reservoir (pending LA: 2,212.73 acres): The work of formation of Baswapur reservoir (in Link-V of the project) was awarded (November 2017) to a contractor under LS contract system for completion by November 2019. For execution of work, a total of 4,230.73 acres of land under five villages was to be acquired. However, the Department awarded the work without finalising the alignments/designs of the reservoir and without even identifying the land to be acquired. The Department approved the alignment of reservoir bund in June 2018 and the designs during February 2019 to February 2020. Further, the Department has been sending LA indents to the LAOs in a piecemeal manner. There were also inordinate delays in submitting/resubmitting the LA requisitions. For example, the Department submitted requisitions to District Collector, Yadadri-Bhongir District for 1,693 acres in Thimmapur village in September 2019, for 256 acres in Rustapur village in June 2020 and for 608 acres in Jangampally village in November 2021. In case of the lands in Rustapur village, the Department submitted a revised indent for 233 acres (for bund portion and submergence lands) in May 2021. Due to delays in identification of lands and submission of LA indents, only 2,018 acres (*i.e.*, 48 *per cent*) out of the total requirement of 4,230.73 acres was acquired after more than four years, as of March 2022.

Audit further observed that though the District Collector had requested (June and September 2021) for funds of ₹43.46 crore for 113 acres in Baswapur village and ₹52.11 crore for acquisition of 160 acres in Wadaparthy village, the funds were yet to be deposited (December 2021). Due to delays in land acquisition, the work in some portions of the bund has not commenced as of March 2022 and the Department granted extension of time to the contractor up to May 2024. Non-completion of Baswapur reservoir would impact a CA of 23,000 acres proposed under it.

The Government replied (November 2023) that the balance land (1,176 acres as of November 2023) is proposed to be acquired by the end of December 2023 and water

would be released by the end of January 2024. At present the progress of Baswapur Reservoir is about 93 *per* cent (as on November 2023)[117].

The fact however remains that 28 *per cent* land (1,176 acres out of 4,230.73 acres) is yet to be acquired, which has resulted in delays in execution of works.

(iv) Package-15 (pending LA: 2,118 acres): Package-15 (under Link-V) involves excavation of canals and creation of distributary network to irrigate a CA of 63,300 acres (8,300 acres under the main canal and 55,000 acres through the right and left main canals of Gandhamalla Reservoir). The work was originally stipulated for completion by June 2019. However, the canal alignments were approved between August 2017 to April 2019 and out of a total land requirement of 3,841 acres, LA indents for only 2,277 acres (59.28 *per cent*) were sent to the LA authorities as of March 2022. LA indents for 1,564 acres were yet to be sent as survey of the lands was not completed even after more than two years from the target date of completion of work.

Out of the total 3,841 acres of land required for the work, 1,979 acres was for main canal and distributaries and balance 1,862 acres was for canals of Gandhamalla Reservoir. Though 1,723 acres of land pertaining to main canal and distributaries was acquired as of March 2022, not a single acre of land was acquired for the canals of Gandhamalla Reservoir. Audit observed that though Department made requisitions for 407.37 acres of land for canals of Gandhamalla Reservoir, it did not deposit land compensation amount of ₹36.75 crore sought (November 2020) by the LA authorities as Government approval for funds was not received. Due to poor progress of land acquisition, only 74 *per cent* of work was completed as of March 2022.

The Government replied (November 2023) that the requisition of LA for balance land pertains to minors and sub-minors and is under progress. The earth work for the distributary canal was also completed for 10.05 Kms and the balance work is under progress. Soon after payments are released towards the balance LA, the works in the remaining canal system would be taken up.

Link-VI

(v) Package-19 (pending LA: 2,647 acres): In Package-19 (under Link-VI), which was stipulated for completion by June 2019, a CA of 78,000 acres was to be created. Out of the total land requirement of 3,100 acres in this work, only 453 acres (14.61 *per cent*) of land was acquired and 2,647 acres was yet to be acquired as of March 2022. While 89 *per cent* of land required for main canal was acquired, not a single acre of land required (2,593 acres) for the branch canal was acquired. LA indents were yet to be sent to LA authorities for 1,746 acres as of March 2022 as survey of the lands required for branch canal was still in progress even after more than two years from the target date of completion of work. So far, excavation of main canal in only 5.6 Km out of the total of 12 Km has been completed and the work of branch canal has not commenced (March 2022). The financial progress in this work was only

[117] The progress shown in ***Appendix 5.2*** in respect of all packages is upto March 2022.

13 *per cent*. During a joint site inspection (December 2021), Audit observed that there was no construction activity, and the camp office of the contracting agency was deserted. Audit further observed that the Department had paid the last bill to contractor in June 2021 and two bills submitted in June and September 2021 for a total amount of ₹17.95 crore were pending with the Pay and Accounts Officer for want of clearance from Government for payment to contractor.

The Government replied that land acquisition was in process.

Link-VII

(vi) Package-22 (pending LA: 3,170 acres): The earlier PCSS project, *inter alia*, proposed to draw water from SRSP reservoir up to Bhumpally reservoir via Masani, Manchippa and Kondemcheruvu tanks. Under Package-22 (under Link-VII), it was proposed to create a new CA of 1.56 lakh acres. The work was awarded to a contractor in November 2008 for completion by November 2012.

In the DPR of Kaleshwaram Project after re-engineering, it was proposed to draw water for the CA under Package 22 from Sri Komaravelli Mallanna Sagar (SKMS) reservoir (instead of SRSP), carry it to Bhumpally reservoir and provide irrigation to 3.06 lakh acres. However, the Department did not implement this change, for reasons not on record.

In April 2018, a high-power committee approved a proposal to increase the targeted CA under the package work from 1.56 lakh acres to two lakh acres and to make changes in the works components of the existing package work to accommodate the additional CA. No change in the source of water (as proposed in the DPR) was discussed in this meeting. The committee directed the Department to prepare revised estimate to accommodate the additional scope of work. However, the Department has not prepared any such revised estimate so far (March 2022) and no changes were made in the scope of work of already existing contract. This indicates that the scope of work proposed to be executed under this package has not been firmed up even after nearly four years since the high-power committee recommendations.

As of March 2022, as against the total land requirement of 4,426 acres, requisitions for 2,926 acres were sent to the LA authorities and only 1,256 acres (28.38 *per cent*) of land was acquired, leaving a balance of 3,170 acres still to be acquired. Further, survey of the lands required for the minors/sub-minors under the package was yet to be completed. Due to delays in firming up the revised scope of work and non-acquisition of lands, the progress of work as of March 2022 was only 24 *per cent*.

The Government replied that land acquisition was in process.

(vii) Package-27 (pending LA: 978.74 acres): The work under Package-27 (part of the earlier PCSS project) was originally awarded under EPC system to a contractor in February 2009 at an agreed value of ₹714 crore for completion by February 2013. However, in August 2009, the Department initiated proposals for certain changes in the project components, location of pumphouses, *etc*. The Department took four more

years to finalize the scope of work and obtain (February 2016) approval of Government for the changes in the scope of work. Thus, it took seven years for finalisation of scope of work since award of contract.

The Department obtained Forest Clearance and acquired 797 acres of forest lands in the year 2018. In addition to the forest land, another 2,500 acres of private land was to be acquired for execution of work. However, even after a lapse of six years since finalisation of scope of work, LA indents were sent to the LA authorities for only 1,824.26 acres in piecemeal manner. Out of this, an extent of 1,521.26 acres (60.85 *per cent*) was acquired as of March 2022. Due to non-acquisition of lands, the contactor, after executing work valuing ₹447.34 crore, requested the Department for pre-closure of the contract. Accordingly, the Department pre-closed (February 2021) the contract without penalty and entrusted (May 2021) the balance work to another contractor for ₹298.51 crore with SoR 2020-21 rates. Due to change in schedule of rates, there was a cost increase of ₹31.85 crore. Further, the Department had also paid an amount of ₹39.52 crore to the first contractor towards price escalation, which could have been minimised had the finalisation of scope of work and acquisition of lands were done in a timely manner.

While the major hurdle in completion of the work by the original contractor was non-acquisition of lands, the Department entrusted the balance work without acquiring the balance lands. Audit observed that even after re-entrustment, there was no further progress in sending LA indents to the LA authorities or in acquisition of balance lands since March 2021 for reasons not on record. As a result, the new contractor was yet to commence the execution of balance work.

The Government replied that the remaining land would be acquired, and work would be completed within the stipulated agreement period.

(viii) Package-28 (pending LA: 2,471 acres): The work under Package-28, which was a part of the earlier PCSS project, was awarded under EPC system to a contractor in February 2009 at an agreed value of ₹486.68 crore for completion by February 2013. For execution of work, a total extent of 3,026 acres of land was required. As per the agreement conditions, the contractor was to complete the detailed survey and investigations, obtain approval of alignments/designs and submit land plan schedules to the Department for taking up the LA process with the LA authorities. However, there was delay in approval (August 2013 to October 2016) of the designs/drawings of the canals. There were also abnormal delays in acquisition of lands. As against the total land requirement of 3,026 acres, LA indents for only 981 acres were sent to the LA authorities out of which 555 acres (18.34 *per cent*) land was acquired, as of March 2022. The progress of work was only 48 *per cent*. The EPC contractor was yet to submit land plan schedules for 2,045 acres even after 13 years since the date of agreement. Because of delays in completion of sub-works, irrigation has not commenced. Despite failure of the contractor in submitting the land plan schedules, the Department did not take any penal action on the contractor and to pre-close the contract and entrust the balance work to any other contractor.

The Government replied (May 2023) that the estimate for the balance work is under approval.

Thus, delays in identification and acquisition of lands required for execution of works has not only contributed to the delays in completion of project works and achievement of contemplated benefits but also carries the significant risk of price escalation payments to contractors.

Recommendation - 5

The Department should take steps to identify the lands required for the ongoing project works including distribution channel works and complete land acquisition so as to achieve intended objective of the project in time.

5.3 Rehabilitation and Resettlement activities

Filling of water in reservoirs, in some cases, would cause submergence of villages requiring Rehabilitation and Resettlement (R&R) of the affected families/persons. In such cases, water cannot be filled to the full reservoir level (FRL) without relocating the Project Displaced Families (PDFs) from the submergence areas. Thus, it is imperative that the implementing agency completes the implementation of R&R package by the time the reservoir construction is completed and water is let into it.

Under Kaleshwaram Project, 17 new reservoirs were proposed to be constructed. In the DPR, it was assessed that five new reservoirs[118] would cause submergence of villages and involve R&R of the PDFs. However, as per the departmental records, two more reservoirs[119] were causing submergence and required R&R.

As per the information furnished by the Commissioner (R&R), the R&R activities in respect of Sri Komaravelli Mallanna Sagar (SKMS), Konda Pochamma Sagar and Anantagiri reservoirs were completed and all the identified 8,947 PDFs were relocated as of March 2022 by incurring a total expenditure of ₹1,238.60 crore. The R&R activities were yet to commence in the remaining four reservoirs, as discussed below.

5.3.1 Non-commencement of R&R

(i) Baswapur reservoir: As per the DPR, construction of Baswapur reservoir would affect three villages. The work of this reservoir was entrusted to a contractor in November 2017 without even identifying the PDFs. The work was stipulated for completion by November 2019. The Department approved the alignment of reservoir bund in June 2018 and the designs during February 2019 to February 2020. However, as seen from the records of the Commissioner (R&R), the District Collector, Yadadri-Bhuvanagiri district had submitted proposal for R&R scheme only in September 2021. The proposal was for payment of R&R benefits to the 1,085 PDFs in B.N.Thimmapur

[118] Sri Komaravelli Mallanna Sagar (SKMS), Konda Pochamma Sagar, Anantagiri, Baswapur and Gandhamalla reservoirs
[119] Medaram and Kondemcheruvu reservoirs

village of Bhongir Mandal at a cost of ₹82.63 crore. This was approved (September 2021) by the Commissioner (R&R). In March 2022, the District Collector submitted another proposal for taking up infrastructure facilities like drinking water and electricity supply at a cost of ₹4.20 crore in the R&R colony proposed at Hussainabad village where house sites were proposed to be given to the PDFs. The proposal was approved by the Commissioner (R&R) in the same month. Though the District Collector had sent a request for release of funds in September 2019 and September 2021, the Irrigation Department was yet to release funds and implementation of R&R could not commence as of June 2022.

In respect of Lakshminayakudi Thanda, the socio-economic survey was stated to be conducted (during 2021) and approval of R&R plan was yet to be approved by Government as of January 2022. In case of the third village *viz*. Chonglanayak Thanda, there is no evidence that even the socio-economic survey was conducted.

The Government replied (November 2023) that due to involvement of various line Departments for conducting socio-economic survey, considerable time was taken for approval and in implementation of R&R policy. At present, the work for infrastructure development and amenities are in progress and the R&R Package benefits were also disbursed to the PDFs. It was also stated that the socio-economic survey in Chokla Nayak Thanda has been completed and identification of R&R site is under progress. The R&R Development works for Lappa Nayak Thanda are in progress (November 2023).

(ii) Medaram reservoir: Under the earlier PCSS project, it was proposed to increase the storage capacity of the already existing Medaram reservoir to 0.58 TMC by raising the FRL from +226.83 M to + 231.5 M. The work was entrusted to a contractor in November 2008 as part of Package-7 (in Link-II). During re-engineering, under Kaleshwaram Project, it was proposed to further increase the capacity of the reservoir to 0.78 TMC by raising the bund to +233 M. As the progress of work by the existing contractor was very slow, the Department deleted the work of enhancing the capacity of Medaram reservoir and entrusted it to another contractor in October 2017 for completion by June 2019.

Audit observed that in September 2016 itself, the Department had assessed that increase in FRL of the reservoir would lead to partial submergence of Chamanpalli village and affect 42 houses. This issue was discussed in the meeting (May 2017) of the State Level Standing Committee (SLSC)[120] and the SLSC directed that a decision in this regard would be taken after formation of reservoir as it is a post reservoir formation effect.

In May 2019, the SLSC decided that, if required, construction of a head regulator on right flank of the reservoir and construction of flood banks around Chamanpalli village would be taken up to avoid submergence of the village. It was stated in the meeting

[120] SLSC is a committee constituted by Government for examination and approval of the estimates for EPC contracts taken up by the Irrigation Department

that these works would cost ₹18.53 crore which would be more economical than providing R&R which was estimated to cost ₹225 crore. The SLSC further directed to take up these works after observations in the forthcoming seasons by maintaining water inflows and outflows of the reservoir. The construction of Medaram reservoir was completed in 2018 and water storage commenced. During 2018-2021, water could be filled in the reservoir only up to a level of +230.700 M as against the maximum intended level of +233 M to avoid submergence of Chamanpalli village. The Department has submitted proposals (October 2021) to the EnC for acquisition of houses in Chamanpalli village saying that formation of flood banks to avoid submergence of the village might not be possible and that 83 houses would be affected due to submergence. The R&R proposals in respect of Chamanpalli village were yet to be prepared and submitted as of September 2022.

It is evident from the above that the Department had failed in assessing the submergence effects of construction of Medaram reservoir and the feasibility of avoiding submergence of houses through construction of protective banks in the initial stages of construction. This has resulted in delay in initiating the R&R process which is yet to take off. As submergence commences from + 231.5 M level, the Medaram reservoir cannot be put to optimum use till the R&R process is taken up and completed.

The Government replied (November 2023) that the works of distributary network system beyond MMR was yet to be developed and hence, the need to fill the Medaram Reservoir to its full level did not arise so far. It was further replied that proposals for acquisition of 83 houses of Chamanpalli village were submitted to the Commissioner (R&R) and that a Committee was also formed to finalise the R&R issue. It was also stated that the R&R of Chamanpalli would be completed before the entire distribution network system beyond MMR is developed. The Government accepted that the reservoir was being filled up to only +231.5 M level since 2018 and that all the pumps in Packages-6 and 8 were not being operated, but stated that there is no effect on the CA developed so far and stabilization of existing CA.

The fact remains that the R&R process which takes a lot of time to complete has not even started, whereas the targeted date for the completion of project including distributary system is June 2024.

(iii) Gandhamalla reservoir: As per the DPR, Gandhamalla reservoir was to be newly formed in Yadadri-Bhongir district (under Link-V of the project) with a capacity of 9.87 TMC. However, the Department, without finalising the designs, assessing the submergence villages and initiating the R&R process, entrusted (November 2017) the construction work to a contractor under LS contract at an agreement value of ₹719.08 crore for completion by November 2019.

During a review meeting, the Chief Minister directed (January 2018) the Department to reduce the capacity of the reservoir to 4.28 TMC to avoid submergence of Veerareddypally village and power grid lines on the upstream side of the proposed reservoir. Accordingly, the Department proposed the revised scope of work with reduced capacity which was approved by Government in March 2018. Though the

alignment of reservoir bund was approved by the EnC in August 2018, the designs of bund sections were yet not approved, for reasons not on record. Further, as per preliminary estimation, a total of 1,145 houses in three[121] villages were coming under the submergence areas of the reservoir. However, even the detailed study of the submergence areas and socio-economic survey were not conducted and R&R proposals were not initiated as of September 2022.

The Government replied (November 2023) that the survey work in the submergence area could not be started as the land compensation offered was not accepted by the land losers and they demanded higher rates for LA and R&R. The District Administration had been apprised about the ground condition and the same is under active consideration at the highest level for resolution at the earliest so as to commence the work.

(iv) Kondemcheruvu: Under Link VII of the project, it was proposed to combine two existing tanks Kondemcheruvu and Manchippa tank in Nizamabad district and construct a new reservoir with a storage capacity of 3.5 TMC with an FRL of +454.1 M. This reservoir was critical to provide irrigation to 2.85 lakh acres under Packages 21(A) and 22. There was no mention in the DPR about any requirement of R&R under the new reservoir. The work of construction of the tank was included in Package 21(A) and awarded to a contractor in April 2018 for completion by October 2020. As per the preliminary assessment made by the Department, about 647 houses in nine habitations were likely to come under submergence under the new reservoir. However, the Department was yet to finalise the alignments/designs of the proposed Kondemcheruvu reservoir and yet to conduct socio-economic survey of the submergence areas due to resistance from the villagers. As such, no R&R plan has been prepared and the reservoir work has not commenced.

The Government replied (November 2023) that there was no provision for R&R in the sanctioned estimate of Package-21A. It further stated that as per the preliminary survey, an amount ₹334.52 crore is required for LA and R&R for the reservoir and that the same would be incorporated in the project. It was further stated that after clearance of court case (details not furnished), socio-economic survey of the submergence area would be conducted and R&R action plan would be prepared. The Government also stated that even without raising and clubbing the Manchippa and Kondemcheruvu reservoirs, water can be released to some extent in the contemplated CA.

However, the fact remains that due to the delay in taking up of R&R activities, the construction work of Kondemcheruvu Reservoir did not take off and without formation of Kondemcheruvu Reservoir with 3.5 TMC capacity, irrigation cannot be fully achieved in the targeted CA.

[121] Gandhamalla, Indira Nagar and Tettekunta villages

5.4 Finalisation of alignments/designs/drawings

In irrigation projects, the alignments of canals and bunds of reservoirs, and designs and drawings of canals, pumphouses, reservoir bunds, spillway, gates, weirs and other structures are a critical part of engineering. Conducting detailed investigations and finalisation of designs and drawings is a pre-requisite for execution of an irrigation project and achievement of the intended benefits.

5.4.1 Delay in finalisation of designs

It had been pointed out in Paragraph 4.1.1 that the Department showed undue haste in getting the DPR for the Kaleshwaram Project prepared. However, in respect of designs/drawings for the same, Audit observed that there were delays in finalisation of designs/drawings for the works under the Project.

In the works awarded under LS contract system, the responsibility for providing designs and drawings rests with the Department. As per the existing instructions[122] of Government, administrative approval/technical sanction for irrigation works would be issued only after finalization of designs.

On the other hand, in the EPC contracts followed in the State, the contractors were required to conduct detailed survey and investigations, submit the proposed alignments, designs and drawings to the Department for approval. On approval of the same, the EPC contractors are required to execute the works as per the approved designs. As per the EPC agreements concluded in this project, the contractors were required to submit the designs within three/six months from the date of agreements.

The Department has furnished only partial information (32 out of 56 works) on the status of designs in respect of some of the works (LS and EPC), which is summarised in Table 5.5 below:

Table 5.5 – Status of approval of designs in LS and EPC contracts as of March 2022

S. No.	Description	LS contracts	EPC contracts	Total
1	Total number of works	39	17	56
2	No. of works completed	9	3	12
3	No. of works yet to be completed	30	14	44
4	No. of works for which information was furnished by the Department	23	9	32
5	Of these, the No. of works where designs are pending	12	5	17
6	Total number designs involved in these works	2216	617	2833
7	No. of designs finalised as of March 2022	1397	343	1740
8	No. of designs pending finalisation	819	274	1093
9	Of these, the No. of designs yet to be submitted	562	187	749

Source: Information furnished by the I&CAD Department

[122] GO Ms. No.94 of I&CAD (PW-COD) Department, dated 01.07.2003

Out of the 39 works awarded under LS contract system, 9 works have been completed and 30 works are yet to be completed. Against these 30 works, the Department has furnished the status of designs in respect of only 23 works. Of these, designs were not finalised fully in 12 works[123]. As against the total of 2,216 designs involved in these 12 works, only 1,397 designs were finalised as of March 2022 and 819 designs were pending finalisation, despite time overrun of 10 months to 35 months since target date of completion in these works. Of these, 562 designs were yet to be prepared and submitted by the Department to the design approving authority in seven works.

Out of the 17 works entrusted under EPC system of contracting, 3 works were completed and 14 were yet to be completed. Out of these 14 works, the status of designs in respect of only nine works was furnished to Audit. Of these nine works, designs were yet to be finalised fully in five works[124]. As against the total of 617 designs involved in these works, only 343 designs were finalised as of March 2022 and 274 designs were pending, despite time overrun of 33 months. Of these, 97 designs were pending with the Department and the EPC agencies were yet to submit 187 designs to the Department.

Non-finalisation of designs and drawings in a timely manner was one of the factors for non-completion of the project works.

The Government replied (May 2023) that the Kaleshwaram Project consists of works involving major components such as barrages, reservoirs, underground/open pump houses, tunnels, main canals, distributaries, *etc*., and involve major structures such as aqueducts, NH crossings, State Highway crossings, *etc*., which would be taken up after finalization of Hydraulic Particulars. Further, wherever required, model studies are to be carried out after finalizing the design. All this process takes a lot of time. It was also stated that the submission, scrutiny and approvals of necessary designs are now in brisk progress for the distributary network system in most of the packages of Kaleshwaram Project. The finalization of designs is a continuous process. As and when the designs are completed, the LA process and subsequently works are being taken up.

The Government accepted the delay in finalization of designs. The fact remains that 40 to 50 *per cent* of the designs are yet to be finalized by the Department.

[123] Of these 12 works, 11 works were targeted for completion during April 2019 to May 2021 and one work was stipulated for completion by June 2022

[124] These works were targeted for completion by June 2019

5.4.2 Defective designs

Audit observed cases of improper surveys and investigations and defective designing of project components, which are discussed below.

5.4.2.1 Defective design resulting in inadequate provision of energy dissipation works at the barrages

Under Link-I of the project, three barrages were newly constructed at Medigadda, Annaram and Sundilla during July 2016 to December 2021. These barrages were designed considering the Maximum Flood Discharge of 80,000 cumecs, 65,000 cumecs and 57,000 cumecs, respectively. Designs of the barrages and other related components were approved by the Chief Engineer, Central Designs Organisation of the I&CAD Department.

In November 2019, these barrages received flood water and water was released downstream by lifting the gates. After closing the gates, it was found that the RCC wearing coat, part of CC curtain walls, CC blocks constructed on the downstream side were washed away, resulting in a loss of ₹180.39 crore[125] being the expenditure incurred on these works.

Figure 5.1 – Damaged CC Blocks and apron at downstream side of Annaram barrage

Source: Photograph taken by Audit during joint site visit on 25 January 2022

[125] Medigadda: ₹83.83 crore, Annaram: ₹65.32 crore and Sundilla: ₹31.24 crore

Figure 5.2 – Damaged CC Blocks and apron at downstream side of Sundilla barrage

Source: Photograph taken by Audit during joint site visit on 21 January 2022

Figure 5.3 – Sinking of Piers of Medigadda barrage in October 2023

Right: Crack in Pier No. 20 & Left: Deck slab deflection at Pier No. 20 (Medigadda Barrage)

Source: Photo taken by the Committee to examine the reasons for sinking of piers in Medigadda Barrage in October 2023.

Studies by the Department revealed that the reason for this damage was high discharge velocities of the water released and inadequate provision of the energy dissipation works. When the Department approached the contracting agencies for attending to the damages, the agencies rejected the request citing that the work was executed strictly as per the designs and drawings approved by the Department and under supervision of departmental engineers and that the quality certification had also been issued. Later, after duly conducting revised model studies, the Department prepared estimates for a

total amount of ₹476.03 crore[126] for rectification of damages in the three barrages and incorporated in the revised estimates.

Thus, due to the defective designing of launching apron and Cement Concrete blocks, these works could not withstand the discharge velocities and got washed away, resulting in a loss of ₹180.39 crore being the cost of works damaged with a further commitment of ₹476.03 crore for rectification of the same.

Additional Issues pertaining to defective designs

A six-member committee was constituted (October 2023) by the National Dam Safety Authority (NDSA), Ministry of Jal Shakti to examine the reasons for the sinking of piers of Medigadda Barrage in October 2023.

As per the Committee findings, the piers had sunk due to a combination of issues involving planning, design, Operation and Maintenance (O&M), *etc*.

The Committee *inter alia* observed that the I&CAD Department was responsible for undertaking sounding and probing in the apron area every year immediately after the monsoon to assess the scours and launching of aprons in the vicinity of structures. The non-launching portion should also be carefully examined, particularly downstream, to ensure the effectiveness of the inverted filter. The upstream floor should be inspected every year early in the fair-weather season by probing and using underwater lamps. A careful inspection of joints is also to be carried out. The Committee observed that the Department had not inspected or maintained the cement concrete blocks or launching aprons since the commissioning of the barrage in 2019-20. In this regard, this maintenance deficiency of the dam owners has progressively weakened the barrage, leading to its failure. In its present condition, the barrage is rendered useless until fully rehabilitated as considering the commonalities, the likelihood of failure of other blocks exists. The Committee also commented on deficiencies in the project planning and design as well.

Further, the Committee pointed out that the two barrages constructed upstream of Medigadda under the Kaleshwaram Project, viz; Annaram and Sundilla barrages, have similar designs and construction methodologies, making them prone to similar failure modes.

The Government replied (November 2023) that the flexible protection works are subject to displacement/dislocation during operation of flood discharge and needs to be relocated/restored to original condition. During operation of gates, the flexible aprons were dislocated in all the three barrages during Defect Liability Period and the contractors have agreed to restore them soon after depletion of water from the barrages. It was also replied that the estimates amounting to ₹476.03 crore for rectification works were not sanctioned.

The contention of the Government that contractors accepted to restore the damage is not correct as more than three and half years have elapsed, and no restoration work

[126] Medigadda: ₹212.03 crore, Annaram: ₹139.50 crore and Sundilla: ₹124.50 crore

has been taken up. Audit had observed from the records that the contractor of the Medigadda barrage had informed (May 2020) the Department that the works were executed strictly as per the approved drawings and under the supervision and quality certification of the Department, and therefore, the contractor was no way responsible for the damages. The Government has not provided any documents to show that the contractor has agreed to restore the dislocated flexible aprons.

Further, post incident, in a meeting held by the EnC (Irrigation) with Telangana State Engineering Research Laboratory and contractors, it was decided to re-conduct the model studies with various options for reducing the discharge velocity of water duly re-designing the wearing coat, CC aprons, stone aprons and other associated downstream apron structures. Model studies were conducted to decide the revised parameters and estimates were prepared accordingly. Thus, there is a risk that due to defective designs, the cost of repair may have to be borne by the Department.

5.4.2.2 Extra expenditure due to specification of higher diameter of tunnel

The Indian Standard IS: 4880 (Part III) – 1976 (Code of practice for design of tunnels conveying water – Part-III Hydraulic Design) states that the average velocity of water in a concrete lined tunnel may be about 6 metres/second. It further stipulated that in the case of water carrying abrasive material, a reduced velocity of 2.5 metres/second is recommended.

The scope of work under Package-9 included excavation of a 12.035 Km long concrete lined tunnel with a discharge capacity of 16 cumecs to convey six TMC of water in 120 days. The diameter of tunnel was fixed at 5 metres. Post re-engineering, the Department proposed to carry 11.635 TMC of water (instead of 6 TMC) in 120 days through this tunnel by increasing its discharge capacity from 16 cumecs to 31.777 cumecs. For this purpose, the Department increased the diameter of tunnel from 5 metres to 5.80 metres and concluded with a contractor for ₹67.35 crore.

Audit observed that in the original estimate, the diameter of tunnel was fixed as 5 metres by considering velocity of water as 0.72 metres/second instead of 2.5 metres to 6 metres/second recommended in the IS Code. Even in the revised estimate prepared after increasing the discharge capacity of tunnel, the Department adopted a velocity of only 1.044 metres/second.

In case the minimum velocity of 2.5 metres/second, as recommended in the IS Code had been adopted, a concrete lined tunnel (D shape) with 5 metres diameter could have achieved a discharge capacity of 56.56 cumecs which was more than the required discharge of 31.777 cumecs. Thus, the original diameter of 5 metres was higher than what was necessary and further increase in the diameter (from 5 metres to 5.80 metres) was unwarranted. This resulted in avoidable expenditure of ₹67.35 crore.

The Government replied (November 2023) that during re-engineering of the project, the tunnel was designed for a discharge capacity of 31.777 cumecs with 5.80 metres diameter tunnel against 5 metres diameter considering the velocity to the extent

possible and keeping in view of already finalised Pump Parameters, Pump Centre Line and MWL in surge pool, *etc*. In this circumstance, the only left-over option is to increase diameter of the tunnel without affecting the design parameters for pumps and motors of which manufacturing was already in progress.

The reply is not acceptable since both the capacity of pumps and motors and also the discharge capacity of water conveyor system were increased during re-engineering. Therefore, the design parameters of these two components should have been fixed accordingly in sync with each other as this would have avoided the need for increasing the tunnel diameter during re-engineering process.

5.4.2.3 Avoidable expenditure on construction of earthen approach bunds

The work of formation of a new reservoir at Malkapet was entrusted to a contractor in September 2017 for ₹472.28 crore. As part of the reservoir formation, the contractor was to build hoist bridges from the reservoir bund to the off-take sluices of left and right main canals to enable maintenance staff to operate the sluice gates to release water into canals. An amount of ₹0.66 crore was provided in the agreement for this item of work. However, the Department later decided to form earthern bunds instead of hoist bridges. Accordingly, the designs were approved and the work was executed. The change in the specification from hoist bridges to earthern bunds were not supported by any justification. The Department provided an amount of ₹13.79 crore in the revised estimate for this item of work and payment was yet to be made. This resulted in avoidable extra expenditure of ₹13.13 crore.

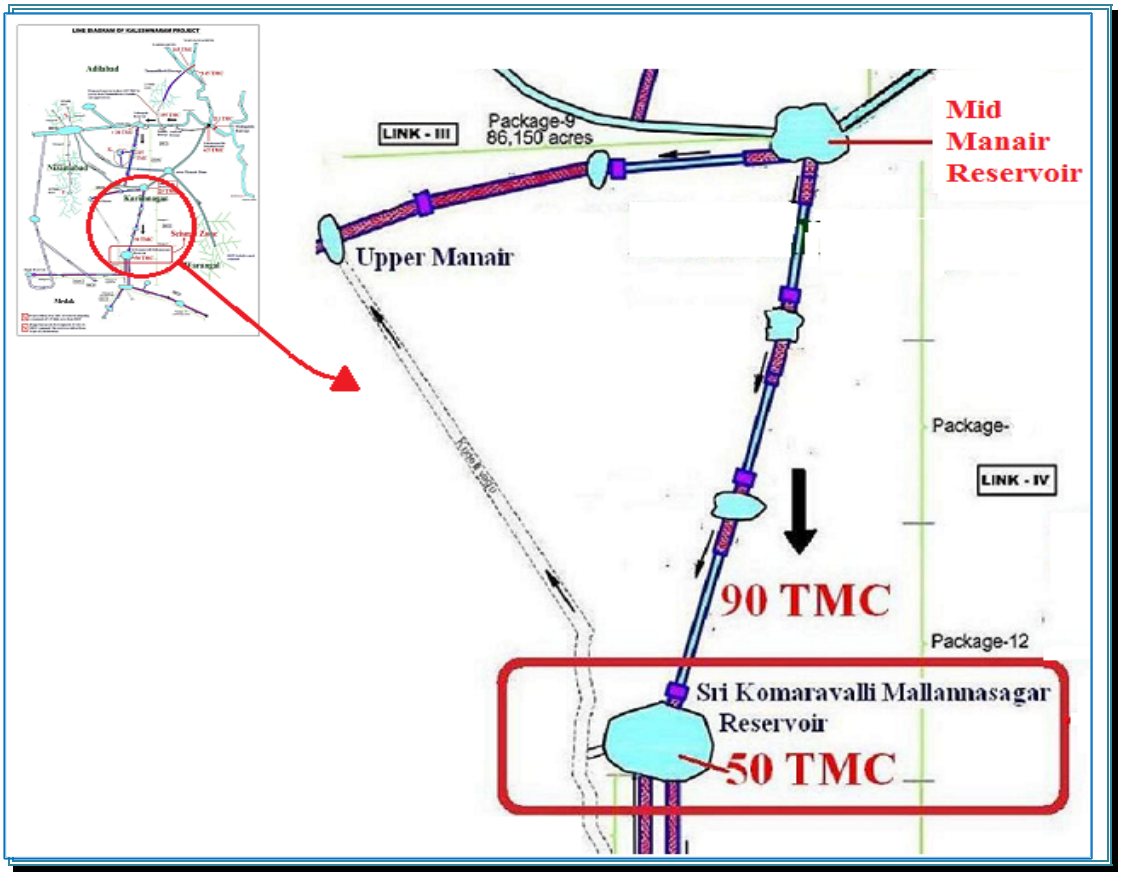
In response to the above, the Government stated (May 2023) that in the approved drawings for off-take sluice, the approach bridges (walkways) were provided from top of road at Top Bund Level to off-take Sluice. The Malkapet Reservoir is considerably huge and the work has to be tackled with heavy earth moving machinery. The column rows which are provided perpendicular to the bund alignment will be a hurdle for vibromax roller which will move parallel to the bund. The columns are a hurdle for earth moving equipment like dozers, dumpers and graders also. Generally, hoist bridges (approach bridges) are proposed to off-take sluices. But, keeping in view the ease in erection, commissioning and Operation and Maintenance of off-take sluice gates, the proposals were modified with earthen bunds for the movement of heavy machinery to the off-take sluice well points and the same were approved by Chief Engineer, Chief Designs Organisation, Hyderabad. The Government stated (November 2023) that the net increase in cost due to taking up earthen bunds instead of hoist bridges is only ₹8.04 crore.

The reply is not acceptable, as even in construction of a big reservoir like Konda Pochamma Sagar (KPS), a hoist bridge was proposed even though the height of bund is more than the Malkapet reservoir. Further, the Department was aware of the challenges posed by hoist bridges at the time of preparation of estimates and thus substitution of hoist bridges with earthen bunds at a later stage also reflects poor planning of the Department.

5.4.3 Construction of Mallanna Sagar Reservoir without conducting detailed seismic studies

The Project aimed to construct three barrages and 14 reservoirs with a total storage capacity of 141 TMC of water. Of these, Sri Komaravelli Mallanna Sagar (SKMS) reservoir in Link IV of the project (Figure 5.4) is the largest, constructed[127] with a storage capacity of 50 TMC.

Figure 5.4 – SKMS reservoir in Link-IV of Kaleshwaram Project



Source: As per the records of the I&CAD Department

This is the most important reservoir under the project since it is the source of water for a total CA of 10.30 lakh acres (*i.e.*, 56.42 *per cent* of the total CA) proposed under the project. The construction work of the reservoir was taken up in October-December 2017 and was largely completed with a total expenditure of ₹6,126.80 crore (up to March 2022). The reservoir was filled with 10.6 TMC of water in August / September 2021 and was inaugurated in February 2022.

[127] By increasing the capacity of the existing Imamabad reservoir from 1.5 TMC to 50 TMC

Figure 5.5 - SKMS reservoir constructed with a storage capacity of 50 TMC

Source: Photograph provided by the I&CAD Department

Considering the large capacity of the reservoir and the extent of CA covered under it, the engineering soundness and stability of this reservoir is critical in achievement of the intended benefits under the project. Audit, however, observed that the drawings of SKMS reservoir were got approved and the reservoir was constructed in undue haste without conducting the necessary investigations/studies fully, as discussed below:

Existence of faulty zone at the reservoir location: While approving the preliminary drawing of the reservoir, the Chief Engineer, Central Designs Organization (CE, CDO) advised (August 2016) the Department to get a site-specific seismic studies conducted through an expert agency like the National Geophysical Research Institute (NGRI) before approval of drawings. Accordingly, the Department addressed (December 2016, August 2017 and October 2017) the Director NGRI, Hyderabad to take up site specific seismic analysis in the reservoir area. However, without waiting for a report from NGRI, the Department awarded (December 2017) the construction work of SKMS Reservoir to contractors, with a stipulation to complete the work by December 2020. In March 2018, the NGRI submitted its preliminary study report which stated that:

- The Telangana State in the Southern Peninsular shield falls in Seismic Zone-II (*i.e.*, lowest seismic activity). However, the occurrence of Koyna earthquake in 1967 and Latur earthquake in 1993 (both of 6.3 magnitude) has led to the realisation that the Southern Peninsular shield is conspicuous with stable continental region earthquakes.
- Recent moderate earthquakes occurring in Ongole region of Andhra Pradesh and Latur region of Maharashtra had caused considerable ground shaking and minor damage to structures in Telangana region.
- In 1969, a moderate earthquake of 5.7 magnitude struck Bhadrachalam region (200 Kms away from SKMS reservoir site) in Telangana which was felt in the entire South India Peninsular shield and there were reports of damage to structures in the epicentral region. The SKMS reservoir was located along the Intensity-VI[128] contour of this earthquake.
- In June 1983, the Medchal area near Hyderabad experienced an earthquake of 4.9 magnitude. This earthquake had a depth of more than 15 km and was felt significantly up to a distance of 200 Km because of its deep-seated origin. The epicentre distance of this earthquake is about 20 Km from the SKMS reservoir site.

[128] The effect of an earthquake on earth's surface is called the intensity. The intensity scale consists of a series of certain key responses such as people awakening, movement of furniture, damage to chimneys, and finally – total destruction.
The modified Mercalli Intensity value assigned to a specific site after an earthquake has more meaningful measure of severity to the non-scientist than the magnitude because intensity refers to the effects actually experienced at that place. The lower numbers of the intensity scale generally deal with the manner in which the earthquake is felt by the people. The higher numbers of the scale are based on the observed structural damage.

- Keeping in view the historical seismicity status of the region, an earthquake of magnitude 5 or more is likely to cause damage to non-engineered structures. Hence, any installation planned should be in standards to withstand to the levels of respective ground shaking.
- There was a deep-seated vertical fault with significant strike slip motion in the proposed location of the reservoir and that the rocks in the fault zone were highly sheared and fractured.

The NGRI report further stated that there are at least three sets of dominant lineaments[129] with distinct geomorphic signatures observed in the region. The NGRI suggested that it would be appropriate to conduct detailed survey with planned profile orientations to characterize their effect on shallow surface and understand their mutual relationship.

Despite the recommendation of the NGRI, the Department did not conduct any detailed survey of the location and went ahead with the construction of the reservoir.

Considering the seismicity of the region and the presence of three sets of dominant lineaments in the area mentioned in the preliminary report of NGRI, non-conducting of further detailed studies as advised by NGRI, gives rise to concerns about the soundness of the reservoir and the safety hazard it can pose in the event of an earthquake in the region. Audit observed that the DPR prepared by WAPCOS did not discuss any seismic studies conducted in the project location and the potential risks involved in construction of a large reservoir.

Audit further observed that the CE, CDO while approving (during April 2018 to May 2020) the construction drawings of earth dam sections of reservoir, repeatedly stated that in the absence of site-specific seismic studies, the approvals were being given with the available data/information in view of the urgency. The CE, CDO also suggested that the drawings should be got vetted by apex organisation like the Central Water and Power Research Station (CWPRS)[130], Pune or the Indian Institute of Technology, Roorkee. However, there was no record to show that any such expert organisation was engaged for vetting the drawings of SKMS reservoir before construction.

However, after executing about 95 *per cent* of construction work, the Government, in January 2021, constituted[131] a Technical Committee[132] to resolve the technical issues like designs, stability analysis and vetting of designs relating to SKMS reservoir.

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[129] A lineament is a linear feature in a landscape which is an expression of an underlying geological structure such as a fault

[130] Functioning under the Ministry of Jal Shakti, GoI

[131] vide G.O. No 49 of I&CAD (project-IV) Department, dated 28 January 2021

[132] with EnC (General); EnC (Irrigation), Gajwel; professors of the Indian Institute of Technology, Hyderabad and Osmania University, Hyderabad; a Geo-technical expert from the Central Water and Power Research Station (CWPRS), Pune; and a Senior Engineering Geologist of Geological Survey of India as members

While the purpose of constituting this committee at such a late juncture was not clear, the Committee neither held any meetings nor submitted any report as of February 2022. In response to an audit enquiry, the Executive Engineer (EE), Irrigation Division No.6, Gajwel replied (February 2022) that the Committee had visited the site thrice in September/October 2021. However, the EE did not furnish details of technical issues referred to the Committee.

The Government replied (May/November 2023) that as per IS Code 1893-Part-1, the SKMS Reservoir falls under Seismic Zone-II (lowest seismicity level) category. Hence, specific seismic studies are not required. However, during the design of earth bund, basic horizontal seismic coefficients as per relevant code were considered and designed accordingly. It was further replied that during execution of the cut-off trench of SKMS Reservoir, the Director, Geological Survey of India (GSI), Hyderabad had inspected all along the 22.6 Km bund and the 0.62 Km saddle bund. As per the observations and suggestions of the Director, GSI from time to time, all the measures were taken and the cut-off trench was filled with impervious soils. It was also replied that a geo-technical study for seepage and stability of zoned earth dam of SKMS was conducted by the CWPRS in March 2022. The report of CWPRS concluded that the cross sections of the reservoir are safe from slope stability point of view and that pseudo-static earthquake analysis indicate that all three sections are safe for steady seepage and full reservoir conditions. The Government added that it had constituted (January 2021) a Technical Committee to resolve technical issues related to designs, stability analysis, vetting of the designs pertaining to SKMS Reservoir. Hence, all the detailed studies for SKMS were conducted and specific study, if any required in future would be conducted as per the recommendation of the Committee.

The reply is not convincing as the competent authority (CE, CDO) itself had advised (August 2016) the Department to conduct site specific seismic studies before approval of drawings. Accordingly, the study was taken up by the NGRI and in its preliminary study report, it suggested that the Department take up a detailed survey. The same was, however, not done. The other studies conducted by the Department were on the geo-technical, structural, seepage and stability aspects of the reservoir and not a detailed study on the lineaments observed in the region and their effect on shallow subsurface, which was suggested by NGRI.

Non-preparation of Emergency Action Plan: In the Environmental Management Plan (EMP) submitted to the MoEF for obtaining Environmental Clearance, the Department got a dam break analysis of SKMS reservoir conducted (October 2017) by the CWPRS, Pune. The report submitted by CWPRS contained an assessment of the possible impact and the likely submergence areas in the worst-case scenario of dam break. The report also contained guidelines for preparation of Emergency Action Plan (EAP) for different emergency situations. Though the Department has started filling the SKMS reservoir in August/September 2021, it has not prepared the EAP so far (February 2023). Till March 2022, water to the extent of 10.637 TMC had been filled up in the reservoir. Non-preparation of EAP increases risk to the life and

properties of the people near the reservoir due to delayed/inadequate response in case of a dam break scenario.

Thus, the Department neither got detailed seismic studies conducted nor prepared EAP for SKMS reservoir leaving the reservoir and the lives of the people nearby at increased risk.

The Government replied (May 2023) that the Dam Break analysis and Emergency Action Plan were also conducted for Sri Komaravelli Mallanna Sagar Reservoir by Central Water and Power Research Station (CWPRS), Pune. The Government further replied (November 2023) that the guidelines of the CWPRS, Pune on EAP would be followed before utilizing the reservoir at full capacity.

The reply is not tenable since the report prepared by the CWPRS contains only the guidelines for preparation of EAP and not the EAP as such. The report discussed the inputs to be considered for formulation of EAP. However, no such EAP for SKMS reservoir was furnished by the Department to Audit.

Recommendation - 6

Detailed seismic study with planned profile orientation of the SKMS reservoir as suggested by NGRI should be conducted and emergency action plan should be prepared before utilizing the reservoir at full storage capacity so as to have assurance about its stability and safety.

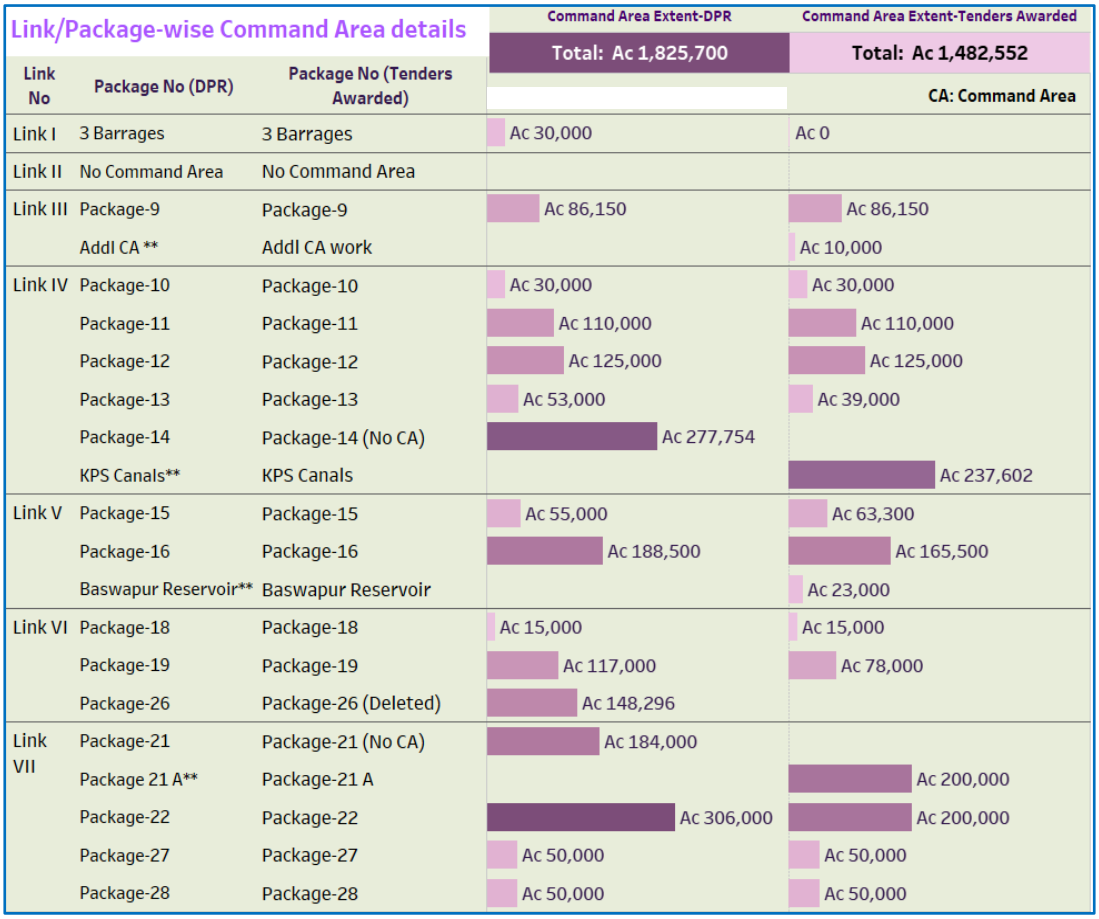
5.5 Status of creation of distributary network

In irrigation projects, while the headworks and main/branch canals form the main water conveyor system, the distributary network consisting of major/minor canals and field channels is critical for carrying the irrigation water to the fields of farmers. Thus, creation of distributary network is vital for achieving the targeted irrigation benefits.

5.5.1 Non-taking up of distributary network

The Kaleshwaram Project envisaged providing irrigation to a total CA of 18,25,700 acres to be newly created as part of the project works. The DPR submitted to the CWC contained details of extent of CA proposed to be created under each Link/package work. The DPR also identified the extent of CA proposed in each mandal in each district. However, after approval of the project by CWC, the Department made changes to the CA to be developed under some of the Links/package works. Further, the works awarded by the Department as of March 2022 included development of distributary network for a total of only 14,82,552 acres, as shown in Chart 5.2 below:

Chart 5.2 – Link wise and package wise distributary network entrusted



Source: Records of the I&CAD Department
*(**: Command Area not contemplated)*

The works of creation of distributary network for a CA of 3.43 lakh acres had not been included in any of the contracts entrusted so far, as shown in Table 5.6 below:

Table 5.6 - Link wise details of CA contemplated as per the DPR and the extent of distributary works entrusted as of March 2022

(extent in acres)

S. No.	Link	As per DPR	As per contracts entrusted	Difference
1	I	30,000	0	(-) 30,000
2	III	86,150	96,150	10,000
3	IV	5,95,754	5,41,602	(-) 54,152
4	V	2,43,500	2,51,800	8,300
5	VI	2,80,296	93,000	(-) 1,87,296
6	VII	5,90,000	5,00,000	(-) 90,000
	Total	**18,25,700**	**14,82,552**	**(-) 3,43,148**

Source: Records of the I&CAD Department

The Links in which there was reduction in the targeted CA are discussed below.

Link-I

As per the DPR, a CA of 30,000 acres was proposed to be developed under the Annaram and Sundilla barrages in Link-I of the project. Audit observed that the Department did not include this CA in the scope of any of the six package works under Link-I. The Department stated (September 2021) that a separate estimate has been prepared and submitted to Government for administrative sanction.

The Government replied (May 2023) that an estimate for creation of CA of 30,000 acres was under approval and soon after the approval, the work would be taken up.

Link-IV

Package-13: The work of Package 13 was awarded (November 2008) under the earlier PCSS Project. The scope of work included lifting of water from a new reservoir at Tadkapally village to a new reservoir to be formed at Thipparam village in Medak District and creation of a new CA of 53,000 acres. The DPR of Kaleshwaram Project after re-engineering also contemplated creation of 53,000 acres of CA under this package. During re-engineering, the Department revised the scope of work under this package, closed the existing contract and entrusted (November 2017) the revised work to a new contractor. As per the departmental records, the revision was necessitated due to formation of SKMS reservoir in place of Tadkapally reservoir. In the revised scope of work, formation of Thipparam reservoir was deleted and it was proposed to create 40,000 acres of CA in Kondapaka Mandal of Siddipet District. Audit further observed that even under the revised work, the Department could finally identify only 39,000 acres leaving a further shortage of another 1,000 acres. Thus, as compared to the DPR, there is a reduction of 14,000 acres of CA under this work.

The Government replied (May 2023) that due to re-engineering of Package-13, the scope of work was changed and due to this, the Hydraulic Particulars and alignments were also changed. The original contemplated CA under Package-13 (53,000 acres) is now arrived as 40,000 acres as per new Package-13, due to submergence and change in alignment of Package-13.

The fact remains that there was reduction in contemplated CA from 53,000 acres (as per DPR) to 39,000 acres. Though, the reply stated the reason of reduction in CA from 53,000 acres to 40,000 acres as change in alignment, it is silent regarding reduction in the revised CA from 40,000 acres to 39,000 acres.

Package-14: The Package-14 entrusted under the earlier PCSS project contemplated lifting of water from Thipparam reservoir (of package-13) to a new reservoir to be formed at Pamulaparthy (capacity: one TMC) and to create a CA of 90,000 acres. In the DPR of Kaleshwaram Project post re-engineering, it was proposed to form a new reservoir *viz*., Kondapochamma Sagar (KPS) at Pamulaparthy with a higher capacity (7 TMC).

Figure 5.6 - Kondapochamma Sagar reservoir in Link-IV

Source: Photograph provided by the I&CAD Department

It was also proposed to increase the CA under Package-14 to 2,77,754 acres. The Department deleted the work of formation of Pamulaparthy reservoir and creation of 90,000 acres of CA from the scope of Package-14. It entrusted the work of construction of KPS reservoir to a new contractor. Later, the capacity of KPS reservoir was increased (July 2017) to 15 TMC. As against the 2,77,754 acres of CA proposed in the DPR, the Department entrusted works of creation of only 2,37,602 acres (to 11 different contractors) under KPS canal system.

In addition, Government had accorded (January 2019) administrative approval for ₹426.79 crore for one more work (*viz*., Sangareddy canal system Reach-III) which contemplated creation of new CA of 38,307 acres. However, the work was yet to be entrusted even after three years for the reasons not on record.

The Government replied (May 2023) that administrative approval for the revised estimate of Sangareddy canal is under consideration and the work would be taken up after its approval.

Link-VI

Package-19: This package lies in the third (last) reach of the main canal from Mallanna Sagar reservoir to Singur (under Link-VI). This package work, which was originally taken up under the earlier PCSS project, envisaged creating 25,000 acres of new CA (in Hathnoora Mandal). After re-engineering, the DPR of Kaleshwaram Project proposed to create an additional new CA of 92,000 acres (in eight Mandals) taking the total CA to 1.17 lakh acres. In addition, the DPR also proposed to supplement water to the existing Singur project. In July 2016, a high-power

committee[133] recommended (i) to extend the main canal (from SKMS reservoir) up to Km 107.90; (ii) increase the length and the discharge capacity of the branch canal-1 to serve a new CA of 78,000 acres (as against 25,000 acres proposed under PCSS project); (iii) to create a further new CA of 39,000 acres through newly proposed branch canal-2; and (iv) to construct a lift system to supplement water to Singur project. However, in June 2017, the high-power committee again recommended another revised proposal restricting the work of main canal up to Km 82.00 (instead of Km 107.90) and excavation of branch canal-1. Government approved (July 2017) the proposal and accordingly, the work was being executed.

In the revised proposal, there was no mention about the branch canal-2 and the lift system to Singur project. The minutes of the meeting did not specify any reasons for deleting these components but only stated that the modifications were proposed during various review meetings held by the Chief Minister and the Irrigation Minister after detailed discussions. Also, no further proposals about taking up the leftover works were found in the departmental records. Thus, due to non-taking up the works of branch canal-2 and the lift system to Singur there is a shortfall of 39,000 acres in the targeted CA and also non-achievement of the intended objective of supplementation to Singur project.

Further, Audit observed that the entire 78,000 acres of CA under Package-19 was being created under branch canal-1 which was designed with a discharge capacity of only 15.60 cumecs. However, the main canal, from which the branch canal takes off, was designed and being executed with a discharge capacity of 78.10 cumecs. The discharge capacity of main canal was fixed considering the requirements of branch canal-2 (7.90 cumecs) and lift system to Singur reservoir (54.70 cumecs). Thus, non-taking up the works of branch canal-2 and the lift system to Singur resulted in over designing of the 82 Km long main canal from SKMS reservoir.

The Government replied that the balance works to feed Singur Reservoir and the CA of 39,000 acres of the earlier proposed branch canal No.2 are now proposed under Package-19A. The proposals for survey & investigation for preparation of estimate of Package- 19A with alternate alignment duly minimizing the area of land acquisition were submitted to State Level Standing Committee for obtaining approval.

However, the fact remains that the proposal to feed the Singur Reservoir from Package-19 remained as a proposal only. No execution has taken place.

Package-26: This package work (under Link-VI) awarded under the earlier PCSS project, *inter alia*, contemplated creation of two lakh acres of new CA. The DPR of Kaleshwaram, post re-engineering, mentioned that 1.48 lakh acres of CA would be created under Package-26. However, the Department dropped this package from

[133] High power committee constituted vide GO Ms. No.10 dated 27 July 2014 for resolving technical, commercial and design issues relating to three irrigation projects including the PCSS project

Kaleshwaram Project. No alternative CA was identified in place of the CA of deleted package.

The Government replied (November 2023) that the Package-26 with a targeted CA of 1,48,296 acres of CA was closed due to certain technical reasons and that the CA is being covered in the Sangameswara Lift Irrigation Scheme under Kaleshwaram Project and the works are in progress.

The Government, however, did not furnish any details of the entrustment of work and its progress. Further, the reply is also silent as to why this CA has not been included in any other package till date even after re-engineering (November 2023).

Link-VII

Package-22: As already discussed in Paragraph 5.2, Package-22 which was taken up (November 2008) under the earlier PCSS project, proposed to create a new CA of 1.56 lakh acres, by utilizing the water from Sriram Sagar Project (SRSP) reservoir via Bhumpally reservoir. After re-engineering, the DPR of Kaleshwaram Project proposed to provide irrigation to 3.06 lakh acres by drawing water from Sri Komaravelli Mallanna Sagar (SKMS) reservoir (instead of from SRSP). However, the Department did not implement this change, for reasons not on record. In April 2018, a high-power committee approved a proposal to increase the targeted CA under Package-22 from 1.56 lakh acres to 2 lakh acres. Thus, as compared to the new CA of 3.06 lakh acres contemplated under this package as per the DPR, there is a shortfall of 1.06 lakh acres.

The Government replied (November 2023) that the shortfall in CA of 1.06 lakh acres under Package-22 is being catered from other packages of Kaleshwaram project like Packages-15, 21, 26 and Ramayampet canal keeping the total CA under the project as 18,25,700 acres as per the DPR.

The reply does not appear to be factually correct since it mentions Package-26 also which was deleted during re-engineering. Further, during audit, it was observed that as compared to package-wise CA proposed in the DPR, the targeted CA under Package-15 (in Link-V) was increased by only 6,300 acres and the CA of 1.84 lakh acres proposed earlier under Package-21 was deleted and a CA of 2 lakh acres was included in Package-21A (*i.e.*, an increase of only 14,000 acres). The Government did not furnish the details of further changes made, if any, in the targeted CA included in each of the package works, details of entrustment of the additional works and their progress.

Reasons for not taking up the works relating to the remaining distributary network so far were not on record. Non-taking up the balance distributary network and reduction in the CA in the works already entrusted will lead to short achievement of intended benefits from the project.

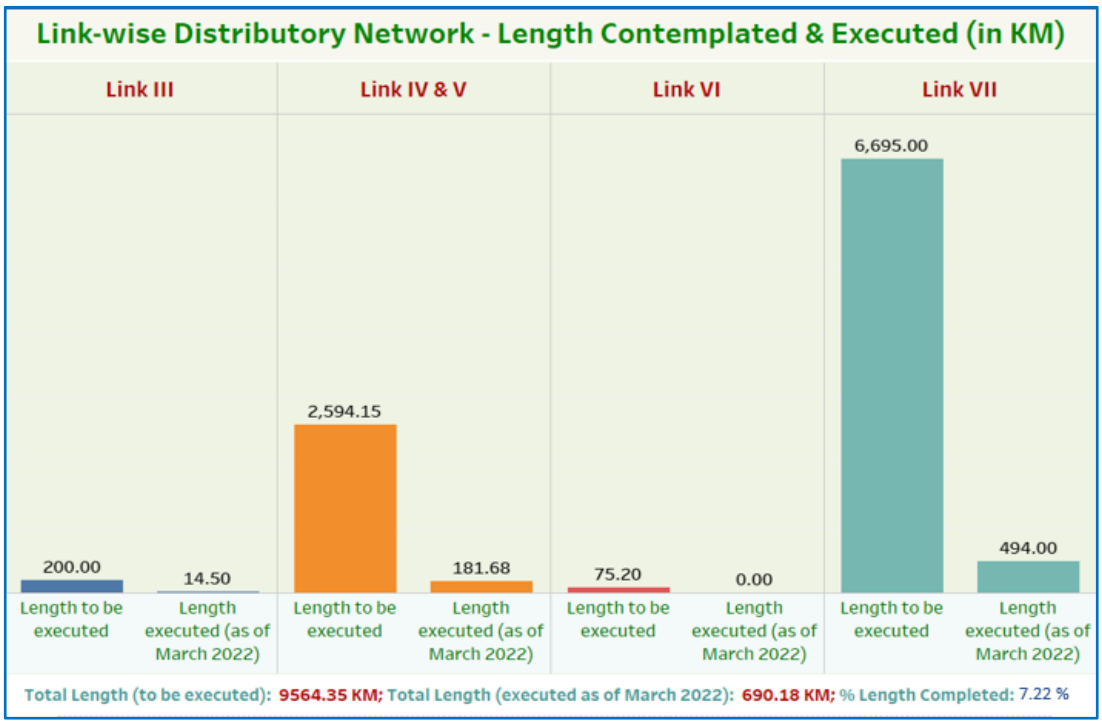
Recommendation - 7

The Department should take up the works relating to the distributary network to cover the remaining command area of 3.43 lakh acres to derive the intended project benefits fully.

5.5.2 Poor progress in creation of distributary network

The scope of work under the existing contracts included creation of distributary network for a total of 14.83 lakh acres in addition to the headworks/main canals. Audit observed that there was no synchronization to ensure that both these components are completed simultaneously so as to derive timely irrigation benefits. As per the information furnished by the Department, a total of 1,566.04 Kms of main canals and 9,564.35 Kms of distributaries were to be excavated under the project. Out of this, while 57 *per cent* (897 Km) of the main canals were completed only seven *per cent* (690.18 Km) of distributaries were completed as of March 2022. This shows that the Department and the contractors did not give adequate priority to creation of distributary network as was given to the headworks/main canals.

Chart 5.3 – Link wise progress of execution of distributary network



Source: Records of the I&CAD Department

Notes:

1. *In Link-I, CA works were not awarded so far (March 2022) for 30,000 acres. Hence, length of the distributary network is not known*
2. *There is no CA in Link-II*
3. *In Link-VI, Package 18, survey work for distributaries was not done. Hence length of distributaries is not known so far*
4. *In Link-VII, Package 22, survey work for distributaries was not done. Hence length of distributaries is not known so far*

Case Study

The scope of works under Packages-10, 11 and 12 under Link-IV of the project involves creation of water conveyor system including construction of pump houses, supply and erection of lift systems and excavation of tunnels/canals to lift water from Mid-Manair Reservoir to SKMS Reservoir. In addition, the scope of work under these three packages also included creation of distributary network for 0.3 lakh acres, 1.10 lakh acres and 1.25 lakh acres, respectively. These works were stipulated for completion by June 2019. The works of erection and commissioning of lifts and excavation of tunnels and main canals were completed in all the three packages and the Department had also issued provisional completion certificates to this effect in June 2020. Pumping of water[134] was also done during March – June 2020.

Audit, however, observed that the works relating to creation of CA through distributary network was not synchronous with the progress of lifts and water conveyor system. Even after nearly two years since commissioning of the main water conveyor system, as against the CA of 2.65 lakh acres targeted to be created in these three packages, distributary network for only 35,288 acres of CA (6,040 acres, 19,500 acres and 9,748 acres in Packages-10, 11 and 12 respectively) was created as of March 2022.

Non-synchronization between the schedules of main canals and distributary network resulted in delay in providing irrigation to the targeted CA even after completion of headworks/main canals.

Out of the 18.26 lakh acres of CA targeted under the project, only 40,288 acres[135] of CA was created as of March 2022 despite incurring a huge expenditure of ₹86,788.06 crore on the project.

The Government replied (November 2023) that the CA served under Packages-10, 11 & 12 was 13,500 acres, 36,500 acres and 33,410 acres, respectively. The Government further replied that in head works, the linear length will be less and number of farmers involved is less whereas in the distributary network, the linear length of Distributaries, Minors and Sub-Minors will be much more and land acquisition involves higher number of farmers/villages with less extent of land and therefore, the land acquisition process involves a lot of work and will take 4 to 6 months. Further, the investigation process is a sequential process *i.e.*, after completion of investigation of main canal, investigation of distributaries will be taken up and thereafter, the investigation of Minors/Sub-Minors will be taken up. As the number of distributaries and Minors is more, it will take a lot of time to complete investigation and land acquisition process. The Government stated that the works of distributary network are in brisk progress in many packages and all efforts are being taken to complete the works at the earliest.

[134] Package 10: 8.65 TMC, Package 11: 6.74 TMC and Package 12: 5.14 TMC
[135] Package-10: 6,040 acres, Package-11: 19,500 acres, Package-12: 9,748 acres and Package-14: 5,000 acres

The reply is not acceptable as the Department should have taken into account these complexities while fixing the agreement period of the package works. The fact remains that though the original agreement period stipulated by the Department is over in majority of works, creation of distributary network is still in progress and there is no synchronization between the works of distributaries network *vis-à-vis* head works/main canals. Had the works been completed as per the stipulated period, a total extent of 14.83 lakh acres of CA would have been created whereas only 40,288 acres of new CA has been created as of March 2022. Without distributaries, the end point delivery of water to the targeted CA will be delayed and intended objectives to be derived from the projects will not be met.

5.6 Arrangements for supply of drinking water from the project

In addition to providing irrigation facilities, the Kaleshwaram Project envisages supply of 40 TMC of drinking water to the twin cities of Hyderabad and Secunderabad (30 TMC) and the enroute villages under the project (10 TMC).

The Government of Telangana (Panchayat Raj and Rural Development Department) has already been implementing a flagship program called 'Mission Bhagiratha' to provide protected and assured drinking water to all households of the State by tapping water from various reservoirs, projects and river flows in the State.

Though 40 TMC of water was allocated under Kaleshwaram Project for drinking water purposes, it appears that neither the Irrigation Department nor the Engineer-in-Chief (EnC), Mission Bhagiratha have any comprehensive plan for achieving this objective. To an audit enquiry, the EnC (Irrigation), Gajwel replied (July 2022) that the Government had approved[136] (October 2017) allocation of 22.77 TMC of water from Kaleshwaram Project to Mission Bhagiratha and another 9.06 TMC of water was proposed to be allocated from Sri Komaravelli Mallanna Sagar (SKMS) Reservoir. However, Audit observed from the Government orders that the 22.77 TMC of water was allocated from the reservoirs of the already existing projects[137] (which are proposed to be used as transit reservoirs in Kaleshwaram Project) and no fresh allocations were made from the new reservoirs formed/being formed under the Kaleshwaram Project. Further, even though it was proposed[138] to draw 9.06 TMC of water from SKMS reservoir of Kaleshwaram Project, the Irrigation Department was yet to obtain approval of Government for the same.

Moreover, as per the information furnished (June 2022) by the EnC, Mission Bhagiratha, a total of 10 works were taken up by the Mission Bhagiratha Department for drinking water supply from Yellampally, Medaram, Mid-Manair, Lower-Manair and SKMS reservoirs. Out of these, nine works were taken up prior to Kaleshwaram Project and were completed later. One work for drinking water supply from SKMS

[136] GO Rt.No.885 of I&CAD (WRG-GRC) Department dated 30 October 2017
[137] SRSP: 6.5 TMC; Yellampally: 2.82 TMC; Medaram: 0.18 TMC; Mid-Manair: 1.41 TMC; Lower Manair: 6.16 TMC and Singur: 5.70 TMC
[138] During a joint inspection of the project by the EnC, Kaleshwaram project and the EnC, Mission Bhagiratha on 24 June 2020

reservoir to the Hyderabad Metropolitan Water Supply and Sewerage Board (HMWSSB) was taken up only in August 2021 and is in progress.

It is clear from the above that the project has not been able to provide the contemplated drinking water as of June 2022. In the absence of any comprehensive plan, the objective of utilising 40 TMC of water from Kaleshwaram Project for drinking water supply is unlikely to be achieved for a long time.

The Government replied (November 2023) that a comprehensive plan has been prepared and is being implemented through Mission Bhagiratha from the last two years at various drawal points as per requirements for utilizing the drinking water supplied through Kaleshwaram Project. The main trunk of the project is completed and is ready for integration with Mission Bhagiratha. It was further replied that drinking water is being provided from SKMS reservoir by the Mission Bhagiratha Department and that 10 TMC of drinking water is being supplied to Hyderabad and Secunderabad from Sripada Yellampally Project as per Government Orders (August 2008).

The reply is not convincing as the Government did not furnish any records in support of its reply that a comprehensive plan to supply water has been prepared. The work for drinking water supply from SKMS reservoir to HMWSSB is still in progress. Further, Yellampally Project is an already existing project and the Government Orders for supply of 10 TMC of water from this project were issued long back in August 2008 and these orders were not with reference to the PCSS or Kaleshwaram projects.

5.7 Arrangements for water supply to industries

The Kaleshwaram Project envisages supply of 16 TMC of water for industrial usages. When Audit enquired about separate plan, if any, for utilization of Kaleshwaram water for industrial uses, the EnC (Irrigation), Gajwel replied (July 2022) that water to industries would be allocated based on the applications received from the individual industries. It was further replied that so far (July 2022) permissions had been accorded (May 2021 to June 2022) to three industrial units for drawal of a total of 16.3 million litres per day (MLD), but agreements were yet to be concluded and the industries were yet to establish water drawing system. It was also replied that two more applications were under process. Thus, no water has been released from Kaleshwaram Project for industrial purposes as intended (upto March 2022).

The Government replied (November 2023) that the main trunk of Kaleshwaram Project is completed and is ready for supply of water to industries. It was further stated that water is being supplied from Sripada Yellampally Project (which is one of the balancing reservoirs of Kaleshwaram Project System), to industries such as National Thermal Power Corporation (NTPC), Ramagundam and to the Urea plant of M/s Ramagundam Fertilizers and Chemicals Ltd (RFCL), Ramagundam, Peddapalli District. Applications are being received from various industrial units and permissions were given to three units. The Government further replied that the process of water

supply to industries involves several stages like preliminary enquiries by the industrial units, submission of applications, approval of the same by competent authorities and making water drawal arrangements by the units and takes time. It was also stated that even though 10 TMC of water is allocated for industries, the setting up of industries is time taking process and that many industries have shown interest in setting up units.

The reply is not tenable as supply of water through Yellampally Project is an already existing arrangement and in respect of Kaleshwaram Project, permissions have been given to only three units (for drawal of 0.21 TMC).

5.8 Overall status of the project and its outcomes

The Link wise status of the project works executed as of March 2022 is as given below:

Link-I: The Link I of the project consists of construction of three barrages and three lifts at Medigadda, Annaram and Sundilla and water conveyor system to lift 195 TMC of water from River Godavari and convey the same up to Sripada Yellampally Reservoir. In addition, a CA of 30,000 acres was to be created under this link. All the six package works relating to the three barrages, three lifts and water conveyor system were completed. The link is ready to lift water (at the rate of 3 TMC per day) from Medigadda and carry it to Yellampally Reservoir. However, no CA was created under this link as the work of creation of 30,000 acres of CA was yet to be taken up, as of March 2022.

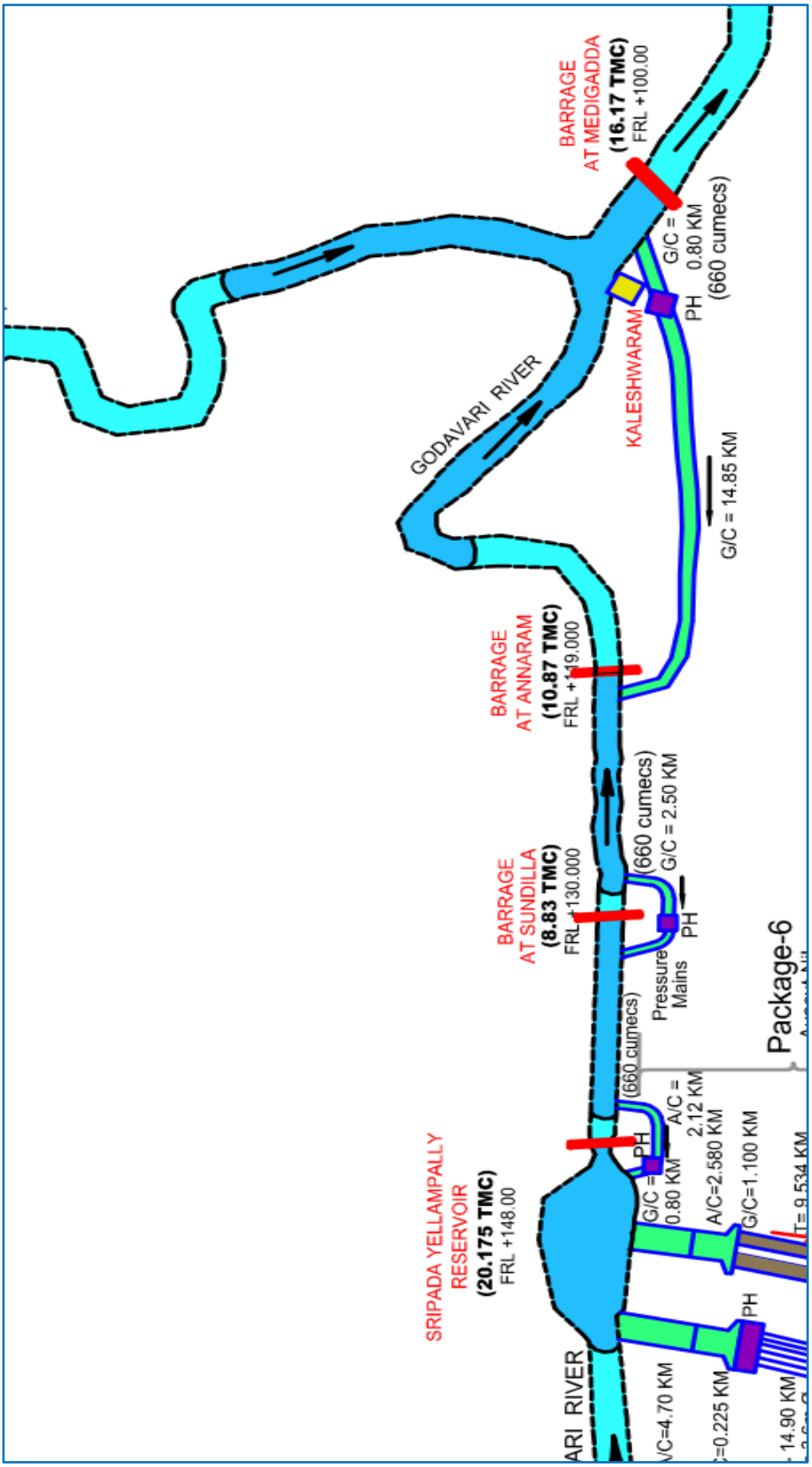
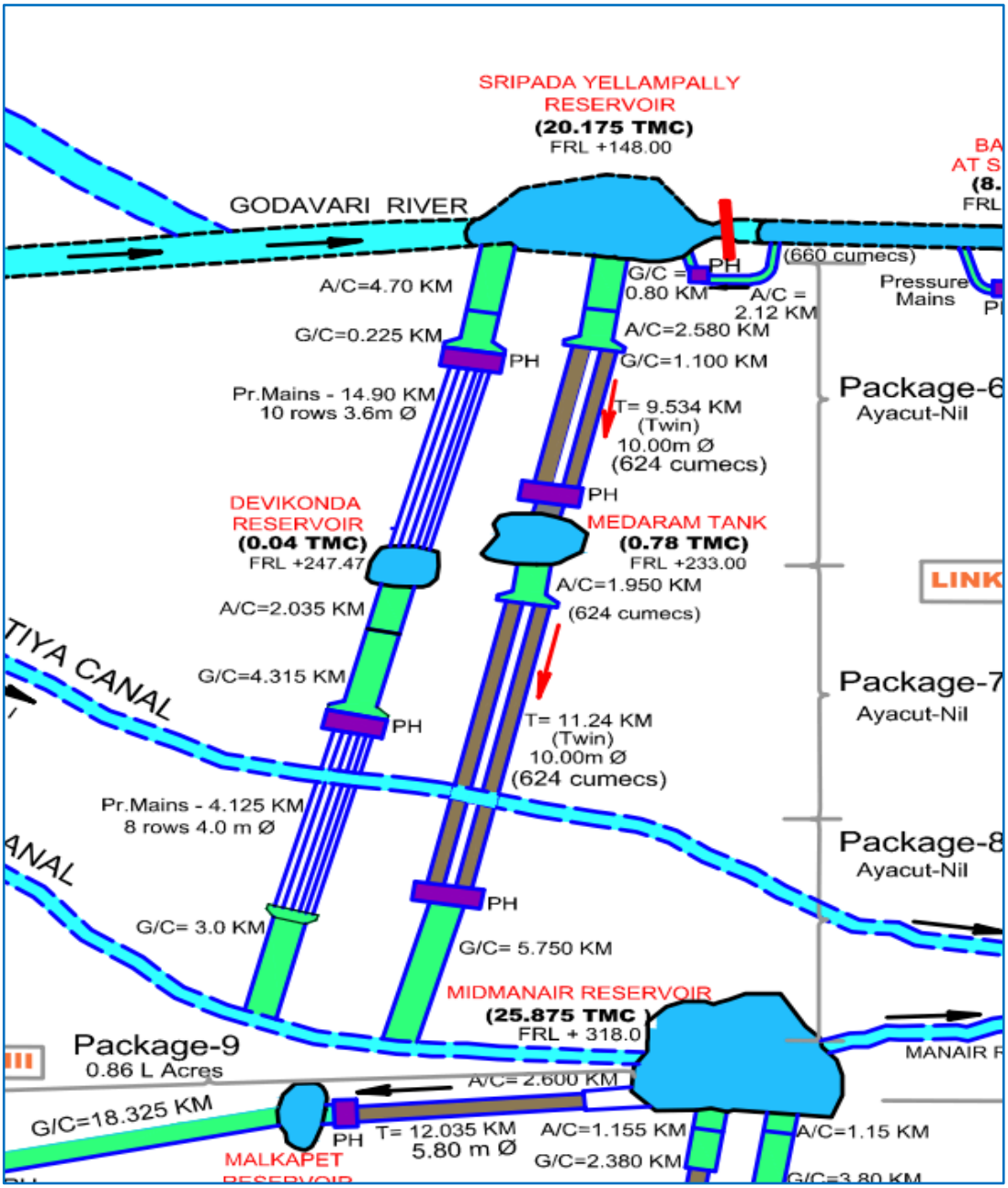


Figure 5.7 - Line diagram of Link-I (From Medigadda Barrage to Sripada Yellampally Reservoir)

Source: Records of the I&CAD Department

Link-II: The Link-II consists of two lifts and water conveyor system to lift and carry water from Yellampally Reservoir to Mid-Manair Reservoir via Medaram tank. The two lifts and conveyor system initially awarded under three packages to carry 1.9 TMC of water per day were completed. The Department later took up four more works (two lift works and two canal works) to convey additional 1.1 TMC of water per day. Out of these, two lift works were ongoing (physical progress: 40 *per cent* to 42 *per cent*) while the two canal works were yet to start, as of March 2022. The link is ready to lift 1.9 TMC water per day from Yellampally Reservoir and carry it to Mid-Manair Reservoir and to supplement water to the already existing Sri Ram Sagar Project and the Flood Flow Canal**.** There is no direct CA under this link.

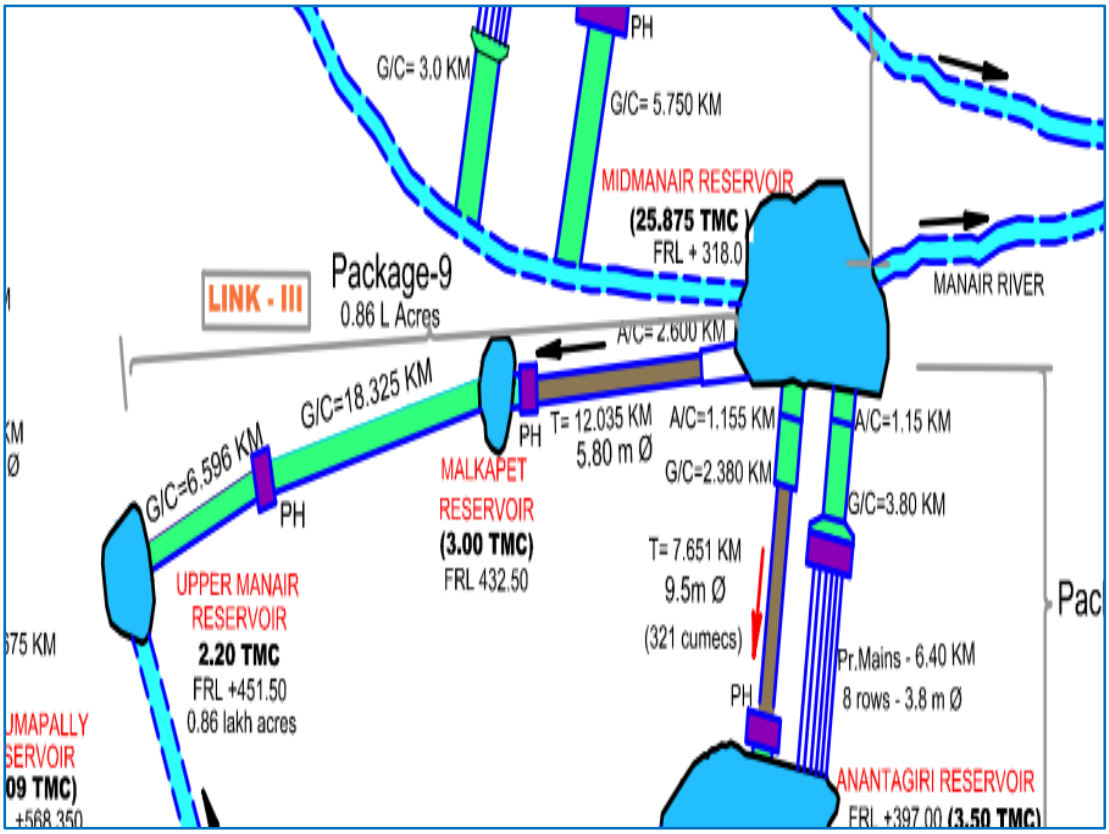
Figure 5.8 - Line diagram of Link-II
(From Sripada Yellampally Reservoir to Mid Manair Reservoir)



Source: Records of the I&CAD Department

Link-III: The works under Link-III include water conveyor system from Mid-Manair Reservoir to Upper-Manair Reservoir including enhancing the storage capacity of Malkapet Reservoir along the way. The link has an CA of 96,150 acres. There are three package works under this link and all are ongoing with progress ranging from 3 *per cent* to 80 *per cent*. While the progress in earth work component was 95 *per cent*, the progress in construction of structures and distributaries was only 3 *per cent* and 7 *per cent*, respectively. No CA was created under this link, as of March 2022.

Figure 5.9 - Line diagram of Link-III (From Mid Manair to Upper Manair Reservoir)

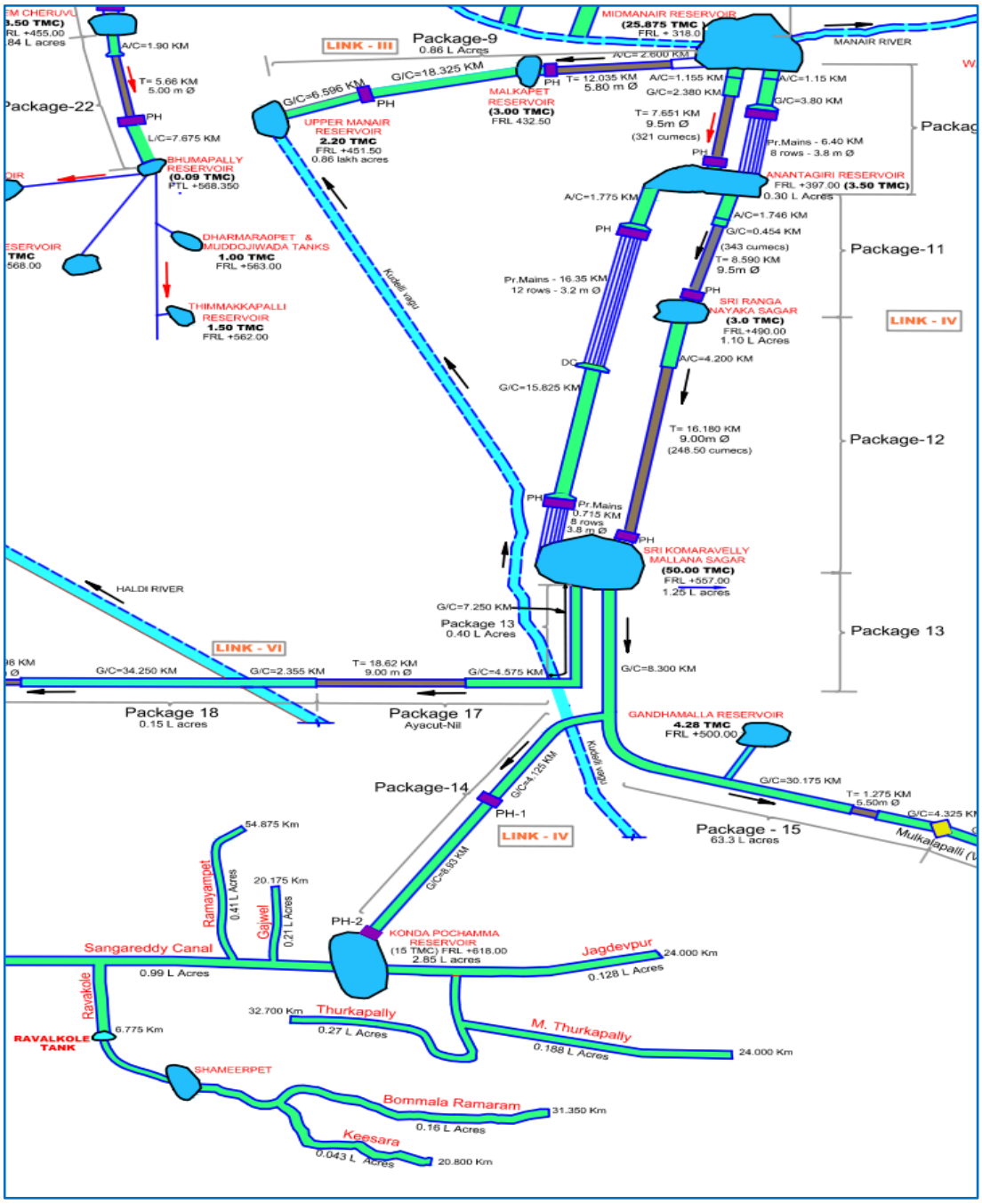


Source: Records of the I&CAD Department

Link-IV: The Link-IV was to convey water from Mid-Manair Reservoir to Kondapochamma Sagar and feeding the en-route reservoirs of Ananthagiri, Sri Ranganayaka Sagar and Sri Komaravelli Mallanna Sagar (SKMS), to be newly formed. A total CA of 5.42 lakh acres was to be created under this link. The link consists of 27 package works (including four works relating to additional carriage capacity of one TMC). Of these, only three works have been completed and one work has not yet commenced. The remaining 23 works are ongoing with progress ranging from 17 *per cent* to 99 *per cent*. All the four reservoirs (*viz*., - SKMS, Kondapochamma Sagar, Ananthagiri and Sri Ranganayaka Sagar reservoirs) have been largely completed and filling of water has been commenced. The link is ready to convey 0.76 TMC of water per day from Mid-Manair Reservoir to SKMS Reservoir and 0.64 TMC of per day from SKMS to Kondapochamma Sagar Reservoir. As per

the information furnished by the Department, only 40,288 acres[139] of CA was created under this link, as of March 2022. The shortfall was due to non-completion of the other related works and distributary network. Out of the eight lift systems, only three were completed and remaining five lift works were in progress. The branch canals were yet to be completed. The progress of construction of structures and distributaries was only 26 *per cent* and 8 *per cent*, respectively.

Figure 5.10 - Line diagram of Link-IV
(From Mid-Manair Reservoir to Konda Pochamma Sagar Reservoir)

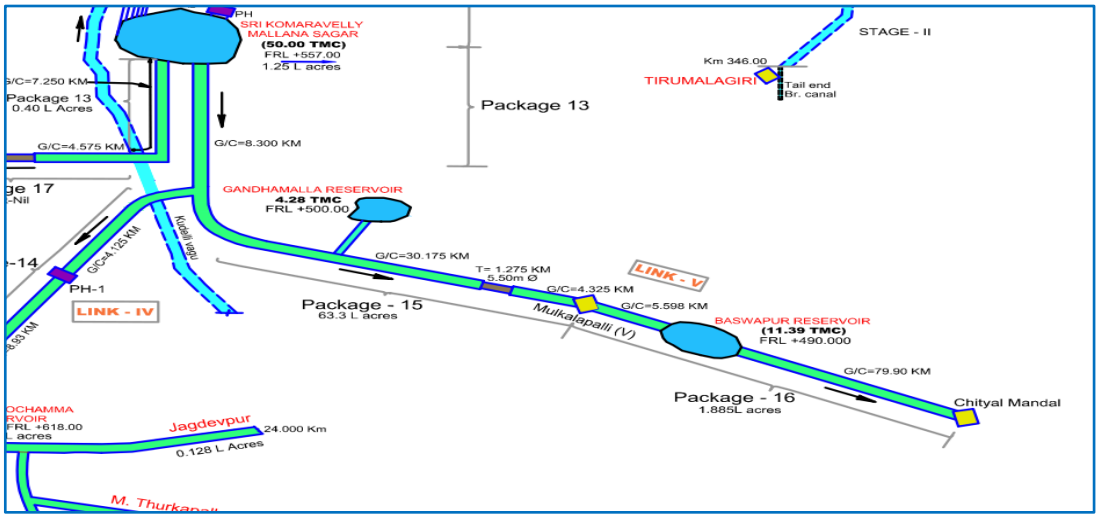


Source: Records of the I&CAD Department

[139] Package-10: 6,040 acres, Package-11: 19,500 acres, Package-12: 9,748 acres and Package-14: 5,000 acres

Link-V: This Link proposes to carry water from SKMS reservoir to feed the Gandhamalla and the Baswapur reservoirs to be newly formed and to create a CA of 2.52 lakh acres. Out of the four package works under this link, one work has not commenced and the remaining three are ongoing (progress: 34 *per cent* to 74 *per cent*). The construction work of Gandhamalla reservoir has not commenced. No CA had been created under this link, as of March 2022 as the progress of distributary network is only two *per cent*.

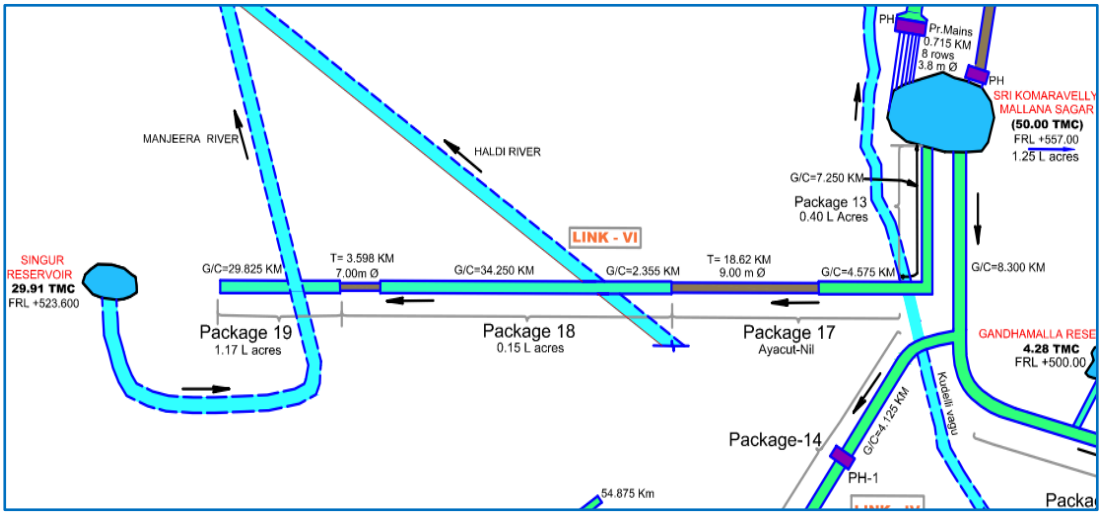
Figure 5.11 - Line diagram of Link-V (From Anicut to Chityal Mandal)



Source: Records of the I&CAD Department

Link-VI: This Link envisages carrying water from SKMS Reservoir to Singur Reservoir and creation of a CA of 93,000 acres besides supplementation of water to Singur and Nizamsagar projects. There are three package works under this link and all were ongoing (progress ranging from 15 *per cent* to 33 *per cent*). While the main canal works were in progress the work relating to distributary system has not commenced yet and no CA had been created. Further, the work relating to supplementation of water to Singur project had not been taken up, as of March 2022.

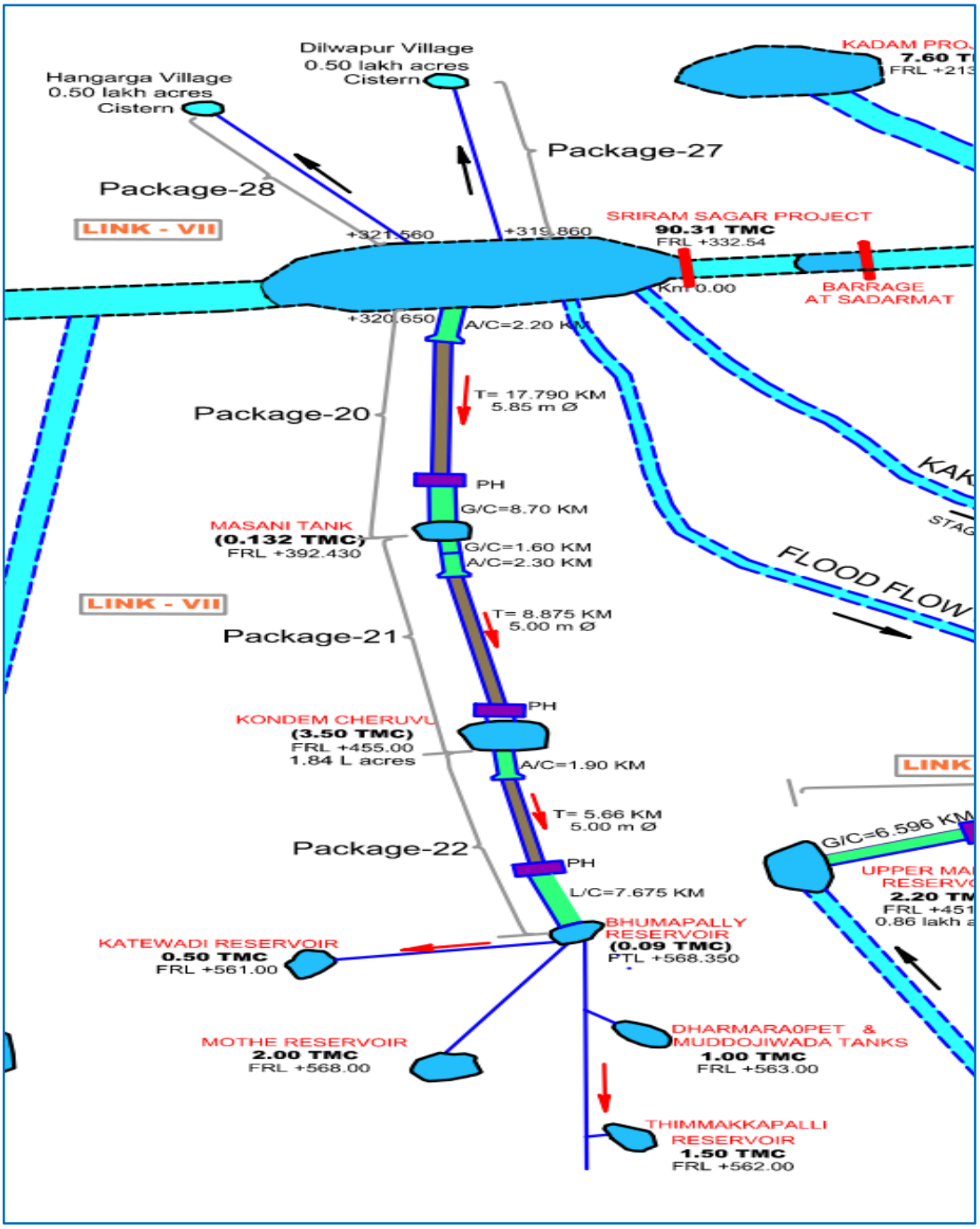
Figure 5.12 - Line diagram of Link-VI (SKMS Reservoir to Singur)



Source: Records of the I&CAD Department

Link-VII: This Link proposes to draw water from the foreshore of Sri Ram Sagar Project (SRSP) reservoir and create a total CA of five lakh acres on either side of SRSP. The link consists of six package works and all the works were ongoing with progress ranging from 11 *per* cent to 88 *per cent*. None of the 10 lifts were completed and there was dismal progress in all the work components *viz*., earth work (5 *per cent*), concrete work (31 *per cent*), main canal (47 *per cent*), structures (2 *per cent*) and distributaries (7 *per cent*). No CA had been created under this link, as of March 2022.

Figure 5.13 - Line diagram of Link-VII (SRSP Reservoir to Bhoompally Reservoir and Nirmal and Mudhole Assembly Constituencies)



Source: Records of the I&CAD Department

The overall progress of the Project works as of March 2022 is given in Table 5.7 below:

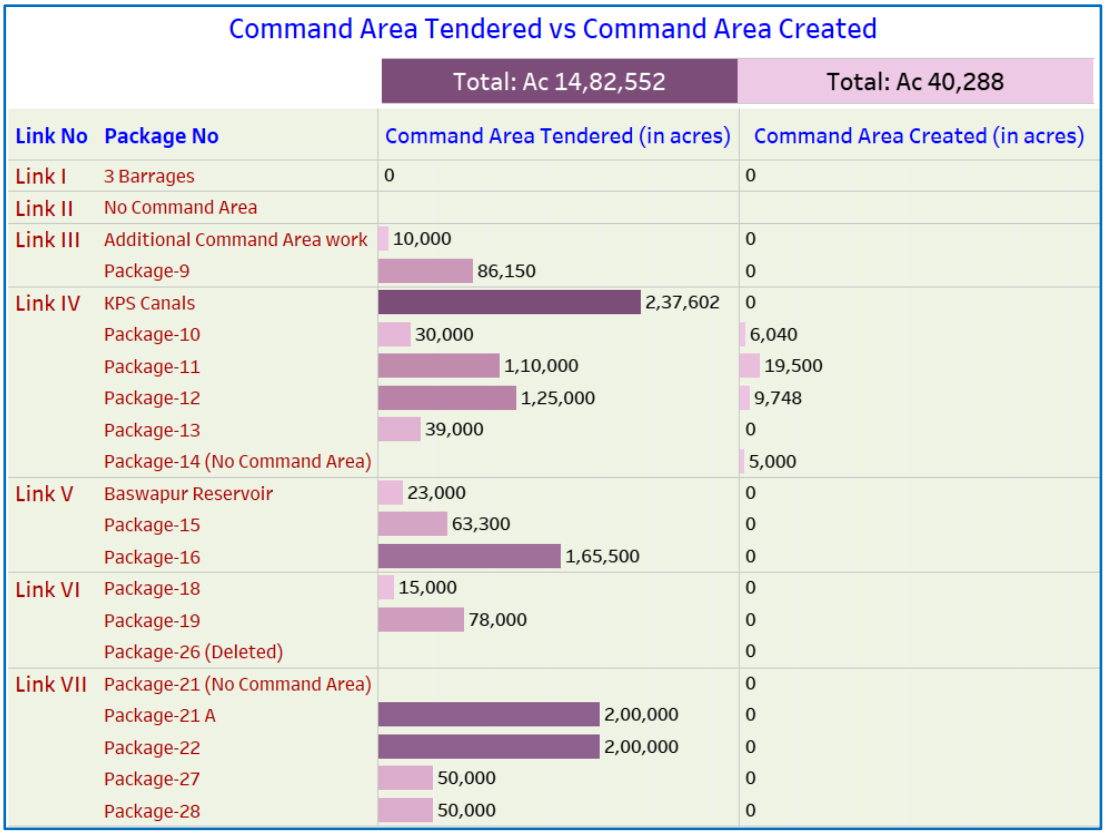
Table 5.7 - Component wise progress of execution as of March 2022

S. No.	Component of work	Quantity of work to be done	Work completed so far	Progress percentage
1	Earth Work (in lakh Cu.M.)	8,123.47	4,629.22	57
2	Concrete (in lakh Cu.M.)	226.76	150.64	66
3	Structures (No.)	11432	2093	18
4	Main Canal (in Kms)	1,566.04	897.00	57
5	Distributaries (in Kms)	9,564.35	690.18	7
6	Lifts (No.)	31	10	32
7	Barrages/Reservoirs (No.)	17	8	47

Source: Records of the I&CAD Department

Thus, the main water conveyor system is ready to lift River Godavari water from Medigadda Barrage and convey 1.9 TMC of water per day up to Mid-Manair reservoir, 0.76 TMC of water per day up to SKMS reservoir and 0.64 TMC of water per day up to Kondapochamma Sagar reservoir. However, due to non-completion of the work relating to other lifts, branch canals and distributaries, only 40,288 acres of CA had been created as of March 2022.

Chart 5.4 – Package wise progress of creation of new command area



Source: Records of the I&CAD Department

As already mentioned earlier (in Paragraphs 5.6 and 5.7), the project has also not been able to provide drinking and industrial water as contemplated in the DPR.

Thus, even after six years since re-engineering and spending a huge amount of ₹86,788.06 crore, the Project has been able to create only 40,288 acres of new CA as against the targeted CA of 18.26 lakh acres. The Project has not been able to provide water for drinking/industrial purposes as intended. Though the Department now expects the Project to be completed by June 2024, with the present status of works and the volume of work yet to be done, completion of all the works and achievement of full benefits contemplated under the Project is likely to take many more years to come. Moreover, even after completion, the Project will not be able to provide irrigation to the full extent of targeted CA of 18.26 lakh acres since the water allocation for irrigation is likely to fall short of actual requirement (as discussed in Paragraph 4.2).

The Government replied (May/November 2023) that the works of main trunk from Medigadda barrage up to Kondapochamma Sagar reservoir have been completed and water is impounded in the three barrages in Link-I and reservoirs like Annapurna, Sri Ranganayaka Sagar, SKMS, Kondapochamma Sagar reservoir, *etc*. It further replied that even though some of the packages may not be completed in full shape, the completed portion of main trunk is serving and water was provided for stabilization of CA under the existing SRSP Stage-1 below LMD, SRSP Stage-2, Nizamsagar, FFC and Singur projects in the form of crucial wettings for the standing crops in the last three years and that there was a remarkable increase in the groundwater table due to impounding of water in reservoirs. The Government stated that the total CA irrigated during 2022-23 was 2,48,375 acres which included new CA of 1,30,500 acres and remaining CA through filling up of minor irrigation (MI) tanks and check dams and that a CA of 16,99,356 acres was also stabilized. The Government also furnished the latest status of various works, which showed progress ranging from 12 to 99 *per cent*. It was also stated that all works of the project are in brisk progress and all efforts are being made to complete the works at the earliest.

The reply is not acceptable as the main objective of the project was creation and providing irrigation to new CA of 18.26 lakh acres and not providing irrigation through MI tanks/check dams and recharging of ground water. As of March 2022, only 40,288 acres of new CA had been created so far. Further, the original agreement period stipulated by the Department is over in 48 out of the 56 works. Had these works been completed within the stipulated agreement period, a total new CA of 14.83 lakh acres could have been created under these works. Besides, the works relating to creation of 3.43 lakh acres of CA had not even been entrusted. Considering the volume of work yet to be done, the project works cannot be completed within the contemplated completion period of June 2024.

5.9 Implementation of Environmental Management Plan (EMP)

The Ministry of Environment, Forest & Climate Change (MoEF) had accorded (December 2017) Environmental Clearance (EC) for the Kaleshwaram Project after considering the Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP)[140] submitted by the State Government. The approved EMP contained various measures proposed to be taken up at a total cost of ₹16,230.43 crore to overcome the environmental effects arising due to implementation of Kaleshwaram Project. The EC conditions stipulated that the EMP shall be strictly adhered to, and the budgetary provision for the implementation of EMP shall be fully utilized without diverting it for any other purpose. As per the information furnished by the Department (September 2022), the details of approved cost of the activities proposed in the EMP and the expenditure incurred thereon (upto August 2021) are given in Table 5.8 below.

Table 5.8 - Component-wise cost and expenditure incurred under EMP

S. No.	Component	Total cost (₹ in crore)	Expenditure incurred (₹ in crore)	Implementing Department
1	Catchment Treatment Plan	125.29	156.01	Irrigation
2	Command Area Development Plan	1,326.86	174.31	Irrigation
3	Compensatory Afforestation	722.30	722.30	Forest
4	Biodiversity & Wildlife Management Plan	3.36	4.97	Forest
5	Greenbelt Development Plan	19.21	--	Irrigation
6	Fisheries Conservation and Management Plan	485.00	209.57	Fisheries[141]
7	Reservoir Rim Treatment Plan and River Bank Stabilisation	236.75	1,042.15	Irrigation
8	Water, Air and Noise Management Plan	25.93	54.49	Irrigation
9	Sanitation & Solid Waste Management Plan	16.40	33.27	Municipal
10	Local Area Development Plan	28.24	13.06	Revenue
11	Resettlement & Rehabilitation Plan (including Land Acquisition)	13,241.09	6,775.27	Irrigation & Revenue
	Total	**16,230.43**	**9,185.40**	

Source: Records of the I&CAD Department

As per the EC conditions, the responsibility for implementation and monitoring of EMP rests fully with the I&CAD Department. Though the Department stated that a total expenditure of ₹9,185.40 crore has been incurred on EMP, it did not furnish further details of activities/sub-components on which the above expenditure was incurred and by whom.

The Government replied (May 2023) that an amount of ₹9,980.05 crore was expended under various components of the EMP. It was further replied that an amount of ₹6.74 crores was spent towards plantation and ₹106.44 crore towards construction of 35

[140] Prepared by the Environment Protection Training and Research Institute (EPTRI)

[141] The Fisheries Department stated in August 2022 (pointed out in Paragraph 5.9.2) that the funds had not been released to them by the I&CAD Department but have been allocated from their normal budgetary allocation (as commented in Paragraph 5.9.2).

check dams from January 2021. An amount of ₹7,613.76 crore was spent till date towards Land Acquisition and R&R for the Project. The greenbelt development plan is under progress. Turfing and revetment rip rap works were taken up as a part of reservoir rim treatment. Further, year-wise plantation programme all along the approach road to barrages and reservoir periphery and along the canal length was planned to be taken up by the Project authorities with a target to complete phase-wise on priority basis. About 253 Piezometers/observation wells were constructed for monitoring the depth of water levels in the Project area with a total cost of ₹3.35 crore and ₹1.56 crore were spent to install 159 Nos. of Digital Water Level Recorders (DWLR). Ambient Noise level monitoring is being conducted as per Noise Pollution (Regulation and Control) Rules, 2000 and 2010. Under CA Development Plan, an amount of ₹684.16 crore was spent on construction of main canal including distributary network for the packages pertaining to Package Nos. 10, 11,12 and canals under Kondapochamma Sagar. The Government further replied (November 2023) that an amount of ₹4.98 crore was deposited towards Bio-Diversity & Wildlife Conservation which is part of ₹722.30 crore deposited in CAMPA account and out of this, an expenditure of ₹0.58 crore was incurred.

Audit could not cross check the above expenditure as the activity/ sub-component wise details and the supporting documents were not furnished during audit. Further, as seen from the Government reply, the expenditure incurred on canal works are also being claimed as part of EMP which is not acceptable.

5.9.1 Implementation of Compensatory Afforestation

A total of 3,168.13 Ha of forest lands were diverted for execution of the Kaleshwaram Project. The MoEF had accorded Stage-I clearance for diversion of the above extent of forest lands in October 2017 with a condition that compensatory afforestation (CA) over non-forest land equal to the forest land being diverted shall be raised on identified land within three years. As against the 3,168.13 Ha of forest lands diverted for the project, non-forest lands to the extent of 3,367.14 Ha were transferred to the Forest Department. Audit observed that:

- The Forest Clearance (FC) conditions stipulated that the non-forest land transferred to the State Forest Department should be notified as Reserve Forest under the provisions of the Forest Act within six months from the date of FC. Though alternative land of 3,367.14 Ha was transferred to the Forest Department in November 2017, no evidence was found in the records of Forest Department to show that these lands were notified as Reserve Forest even after more than four years (as of July 2022).

The Government replied (November 2023) that out of the 3,367.62 Ha of non-forest land handed over, 496.58 Ha has been notified, 12.26 Ha has been partially notified and proposals for notification of an extent of 218.11 Ha are sent to Government.

The fact remains that even after a lapse of six years since grant of Stage-I Forest Clearance, complete notification has not yet been done. The reply is silent on the status

of the remaining 2,640.67 Ha of non-forest land and reasons for delay in notification of the non-forest land.

- In the FC accorded for the project, the MoEF had directed that CA should be carried out by planting at least 1,600 plants per Ha in the in the alternate non-forest lands of 3,168.13 Ha (total plantations to be done: 50.69 lakh). Accordingly, the Forest Department collected an amount of ₹722.30 crore from the I&CAD Department towards CA cost. Audit, however, observed that while a total extent of 3,168.13 Ha of forest lands was diverted for the project, the Forest Department took up CA in only 2,653.12 Ha of non-forest lands. The Forest Department did not furnish the reasons for not taking the CA in the remaining land. Non-taking up of CA in the remaining land resulted in net reduction of the overall forest cover by 515.01 Ha (3,168.13 Ha *minus* 2,653.12 Ha).

The Government replied (November 2023) that the Forest Department had stated that the reduction in CA area is due to the non-suitability of non-forest land for planting and that to compensate this reduction, plantations were taken up elsewhere in the degraded forest land.

The reply is silent as to why the Forest Department had accepted the land which is not suitable for raising CA and what action was taken to rectify this.

- Further, though FC conditions stipulated for planting of 1,600 plants per Ha in the identified non-forest lands, the Forest Department was planting only 446 plants per Ha, which is 72 *per cent* less than the 1,600 plants stipulated by MoEF. The Forest Department proposed to take up the remaining plantations in the degraded forest lands already under its control. Audit observed that in the degraded forest areas, where only supplementation of plantations was required because of the already existing forest, plantations were being taken up at the rate of 1,275 plants per Ha, which is nearly three times as compared to the density of plantations taken up in the non-forest lands, as shown in Table 5.9 below:

Table 5.9 - CA plantations as stipulated in the FC and as being done by Forest Department

S. No.	Type of forest land	CA stipulated in the FC			CA planned by Forest Department		
		Area (in Ha)	Plants per Ha	Total plants	Area (in Ha)	Plants per Ha	Total plants
1	Non-Forest Land	3,168.13	1,600	50,69,010	2,653.121	446	11,84,359
2	Degraded Forest Land	--	--	--	2,680.696	1,275	34,17,954

Source: Records of the Forest Department

Due to the low density of plantations in the non-forest lands, the very objective of the CA was not being achieved.

The Government replied (November 2023) that as per the guidelines (dated 08 November 2017) on CA, the number of plants to be planted over CA land shall be

1,000/Ha and when the requisite number of plants cannot be planted on the Non-Forest Land (NFL), the balance plants will be planted in degraded forest land. Accordingly, CA is proposed with 200 to 400 plants/Ha in 2,653.121 Ha of non-forest area and with 1,111 plants/Ha in 2,680.696 Ha of degraded forest land and bund plantation was proposed for 309.76 Km and accordingly, the compliance report is forwarded to the MoEF & CC duly mentioning the extent of area under plantation in non-forest land and degraded forest land for each Division. It was further replied that as of June 2023, CA was achieved in 2,292.181 Ha of non-forest land and 2,816.62 Ha of degraded forest land (more than the proposed area of 2,680.696 Ha).

The reply is not convincing as the Stage-I FC conditions clearly stipulated planting of 1,600 plants per Ha in the identified non-forest lands whereas the CA plantations planned was only 446 plants per Ha. The reply also did not explain the reasons for proposing lesser number of plants in the non-forest land for raising CA in the plans.

- As per the FC conditions, a Monitoring Committee should be constituted with a nominee of the Central Government to monitor the implementation of the stipulated conditions including CA plantations. However, no such Committee had been constituted as of March 2022.
- As per the CA plan prepared by the Forest Department, a total of 51.44 lakh plants were proposed for plantation. Though the details of the extent of non-forest lands in which the CA plantations were taken up, number of plantations done and expenditure incurred were called for (April 2022), the Principal Chief Conservator of Forests did not furnish the same to Audit (August 2022).
- The FC conditions also stipulated that the State Government should ensure that the user agency (the I&CAD Department) submits annual compliance report in respect of the FC conditions to the State Government and to the Regional Office of MoEF regularly. However, Audit observed that the I&CAD Department was not submitting the compliance reports.

The Government replied (May 2023) that the compensatory afforestation programme is under progress and is being taken up by the State Forest Department with a total grant of ₹722.30 crore and as per the procedure the total grant amount has already been deposited with State Forest Department. Implementation of FC plan is a continuous process and all necessary steps were being taken to plant saplings as per the EMP. Accordingly, the Forest Department is implementing the Compensatory Plan stage-wise with the available saplings against the accepted plan and it will be completed at the earliest as per FC conditions. It was further replied that as reported by the Forest Department, an expenditure of ₹111.84 crore was incurred till date and the implementation of the plan would be completed at the earliest.

The Government did not furnish specific reply regarding non-constitution of Monitoring Committee. The details of actual progress of plantations were also not furnished. As regards the non-submission of compliance reports, though the Government replied that the compliance report is forwarded to MoEF, no evidence in support of the same was furnished to Audit.

5.9.2 Implementation of Fisheries Conservation and Management Plan

In the EMP, an amount of ₹485 crore was proposed for implementation of the Fisheries Conservation and Management Plan (FCMP) to be implemented in 15 districts covered under Kaleshwaram Project. The activities proposed under FCMP included enhancing seed production, enhancing fish production, harvesting support, marketing support, infrastructure development, encouraging innovative projects and capacity building. The FCMP was to be implemented by the Fisheries Department of Government of Telangana.

Audit observed that the Government of Telangana did not allocate/release any funds to the Fisheries Department for implementation of FCMP. The Commissioner of Fisheries replied (August 2022) that though sanction of funds for the fisheries component under EMP is pending, the Department had taken up some of the components of FCMP under the other ongoing schemes[142] implemented with the normal budgetary allocations.

The reply is not acceptable as the above-mentioned schemes were not framed with reference to the components of FCMP. Audit observed that activities like establishment of freshwater fish seed hatcheries, captive fish seed rearing ponds, pen culture, re-circulatory aquaculture system, *etc*., which were proposed under FCMP, were not covered under the existing schemes.

The Government replied (May 2023) that out of an allocated amount of ₹485 crore, about ₹245.46 crore has been spent towards Fisheries Development by the Telangana State in the Project area till date. It was further stated that the Kaleshwaram Project was inaugurated at Medigadda in June 2019 and subsequently, the reservoirs *i.e.*, Annapurna, Sri Ranganayaka Sagar, Kondapochamma Sagar and Sri Komaravelli Mallanna Sagar were inaugurated and impounded with water by 2022. Further, about 1,900 linked MI tanks were also filled with Kaleshwaram water which resulted in huge increase in fish production. In view of the recent development in fish production, the Government of Telangana is taking all necessary steps to regularize the development of fisheries industry. The FCMP implementation is a continuous process and will be implemented completely as per the EMP plan stage-wise in consultation with all the concerned Departments and authorities in due course.

The reply is not specific to the audit observation. Further component/subcomponent wise expenditure as per approved FCMP was not furnished along with the reply.

5.10 Wasteful/unfruitful/extra expenditure

5.10.1 Unfruitful expenditure on consultancy services

The Department entrusted (March 2019) the work of 'preparation of DPR/master plan for beautification and development of certain facilities in Link-I and Link-II of Kaleshwaram Project' to a consultancy firm for ₹6.35 crore plus taxes.

[142] *viz*., Integrated Fisheries Development Scheme (IFDS), Blue Revolution Scheme (BRS) and Pradhan Mantri Matsya Sampada Yojana Scheme (PMMSY)

The contractor completed the work and an amount of ₹7.25 crore was paid. Audit observed that though the contractor submitted (March 2020) the DPR, plans, designs and drawings, the Department did not take up the beautification/development works as of December 2021. As a result, the expenditure of ₹7.25 crore incurred on consultancy services remained unfruitful.

The Government replied (November 2023) that the contractor has submitted the Detailed Project Report consisting of plans, detailed designs and drawings and the beautification works would be taken up after receiving approval from the Government.

However, the fact remained that even after four years of Agreement, no beautification work was taken up utilizing the DPR.

5.10.2 Execution of work outside the scope of Kaleshwaram Project

The work of Package-14 of Kaleshwaram Project was entrusted to a contractor in November 2017. The scope of work under this package included excavation of gravity canal and construction of two stage lifts to feed water to Konda Pochamma Sagar Reservoir. No CA was proposed to be created in this reach.

During execution of work, the Department entrusted (September 2019) an additional work of 'Eravally pilot micro irrigation scheme' to the same contractor at an additional cost of ₹10.99 crore. This additional work contemplated filling of five irrigation tanks by lifting water from Kurelivagu by constructing pump houses, installation of pumps and laying of pipes for a length of 5.2 Km. Audit observed that the Eravally piped micro irrigation project has no direct link with the Kaleshwaram Project. The water source for this project was a stream called Kurelivagu.

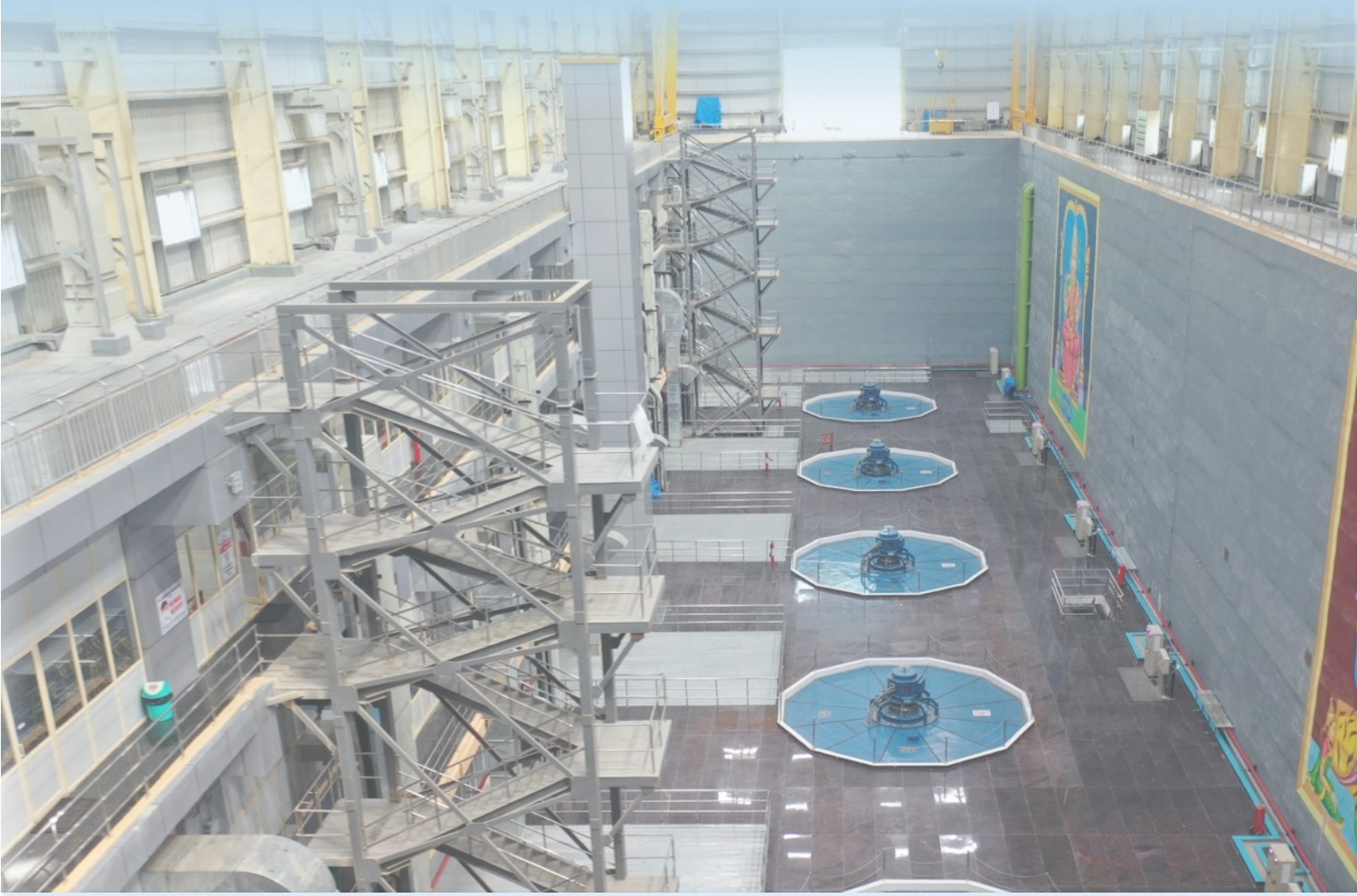
Despite being independent of Kaleshwaram Project, the work was included in the Package-14 which was outside the scope of the Project. The expenditure of ₹10.99 crore incurred on this work was met from the loans raised by M/s KIPCL for the Kaleshwaram Project.

The Government replied that the source of water for Eravally Pilot Micro Irrigation Scheme is Kurelivagu. The Kurelivagu originates at Pedda Cheruvu (of Chembarthy village, Markook Mandal), which is fed through Kaleshwaram project. It was further replied that the micro irrigation project was proposed to stabilize the CA covered in five tanks under Kurelivagu by filling them depending upon water availability in Kondapochamma Sagar and that the pilot project was entrusted to the existing agency of Package-14 after obtaining revised administrative approval from Government.

The reply is not acceptable since the DPR did not envisage any micro irrigation scheme for stabilization of existing CA under minor irrigation tanks and execution of the Eravally micro irrigation project at a cost of ₹10.99 crore was in deviation to the DPR.

CHAPTER VI

Contract Management



CHAPTER VI

Contract Management

SUMMARY

Works under the Kaleshwaram Project were awarded at different points of time between 2008-2020 to a varied set of agencies. While 17 contracts were awarded on EPC basis, 39 contracts were on unit price (lumpsum or LS) basis. It was seen that in 21 of the 56 works contracts entrusted under the project, the scope of work involved supply and installation of lifts. The Department provided a total amount of ₹17,653.71 crore towards the cost of pumps, motors and auxiliary equipment in the estimates of these works, without assessing the market rates. Audit verified the actual cost at which the contractors procured the equipment (from M/s Bharat Heavy Electricals Ltd.) in four works and found that amounts (₹7,212.34 crore) provided for this equipment in the estimates was higher by ₹5,525.75 crore than their actual cost (₹1,686.59 crore). Even when 30 *per cent* of the estimated cost is allowed for the items/operations outside the scope of BHEL supply and another 20 *per cent* is allowed towards overheads and contractors' profit, the possibility of undue benefit of at least ₹2,684.73 crore to the contractors of these works cannot be ruled out.

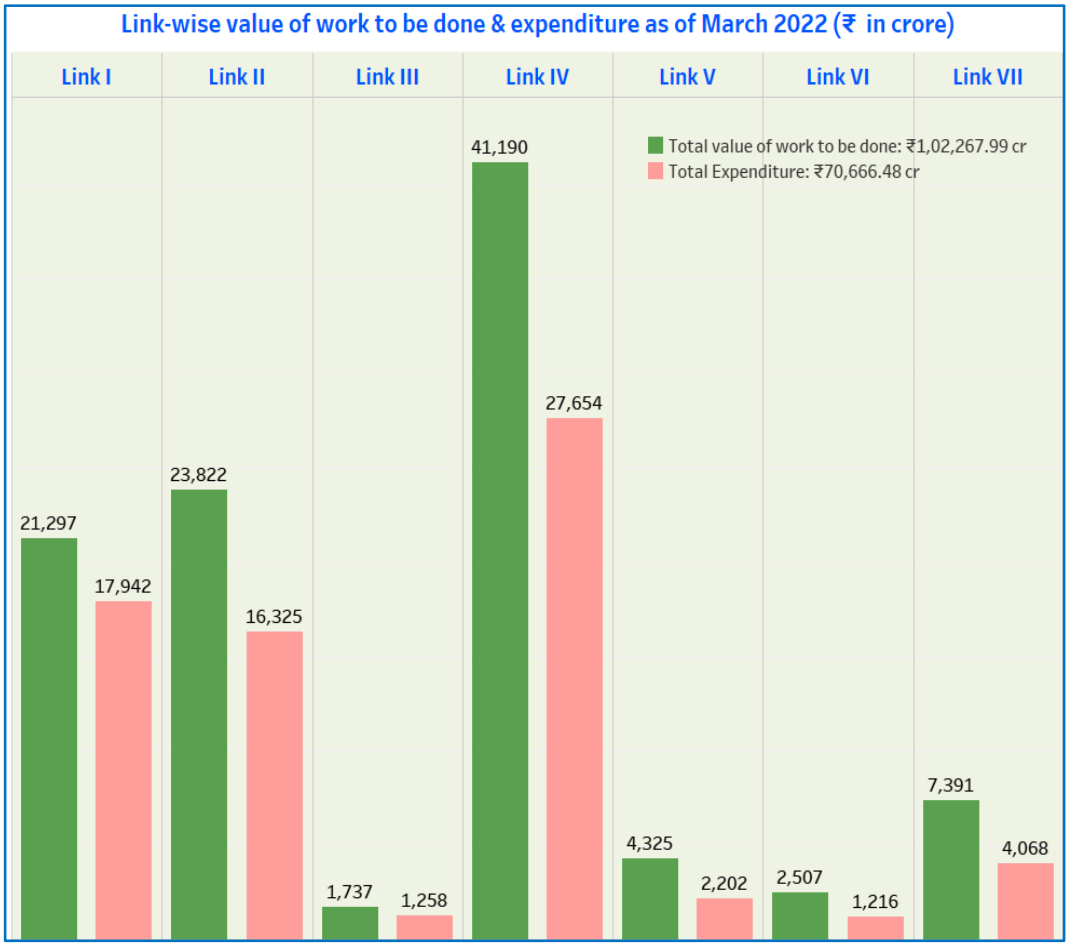
In respect of the other common equipment, an aggregate amount of ₹1,282.94 crore provided for could not be verified during audit as the Department did not produce the invoices. Post tender inclusion of price adjustment clauses were also done by the Department on the request of the successful bidders, resulting in avoidable payment of ₹1,342.48 crore. Similarly, adoption of incorrect rates/costs resulted in inflation of the estimates. Audit also found instances where the Department had allowed additional payment to contractors, but not adjusted payment from contractors when there were reductions in work quantities.

6.1 Details of link-wise expenditure

The Kaleshwaram Project was divided into seven Links and the works under each link were further sub divided into various packages. In all, a total of 56 package works with an aggregate agreement value of ₹82,252.75 crore[143] were awarded to various contractors. Out of the 56 works awarded under the project, 17 works (₹30,489.13 crore) were entrusted through Engineering, Procurement and Construction (EPC) Turnkey contracting system and 39 works (₹51,763.62 crore) were awarded under the conventional unit price contract system (locally called as lumpsum or LS contracts).

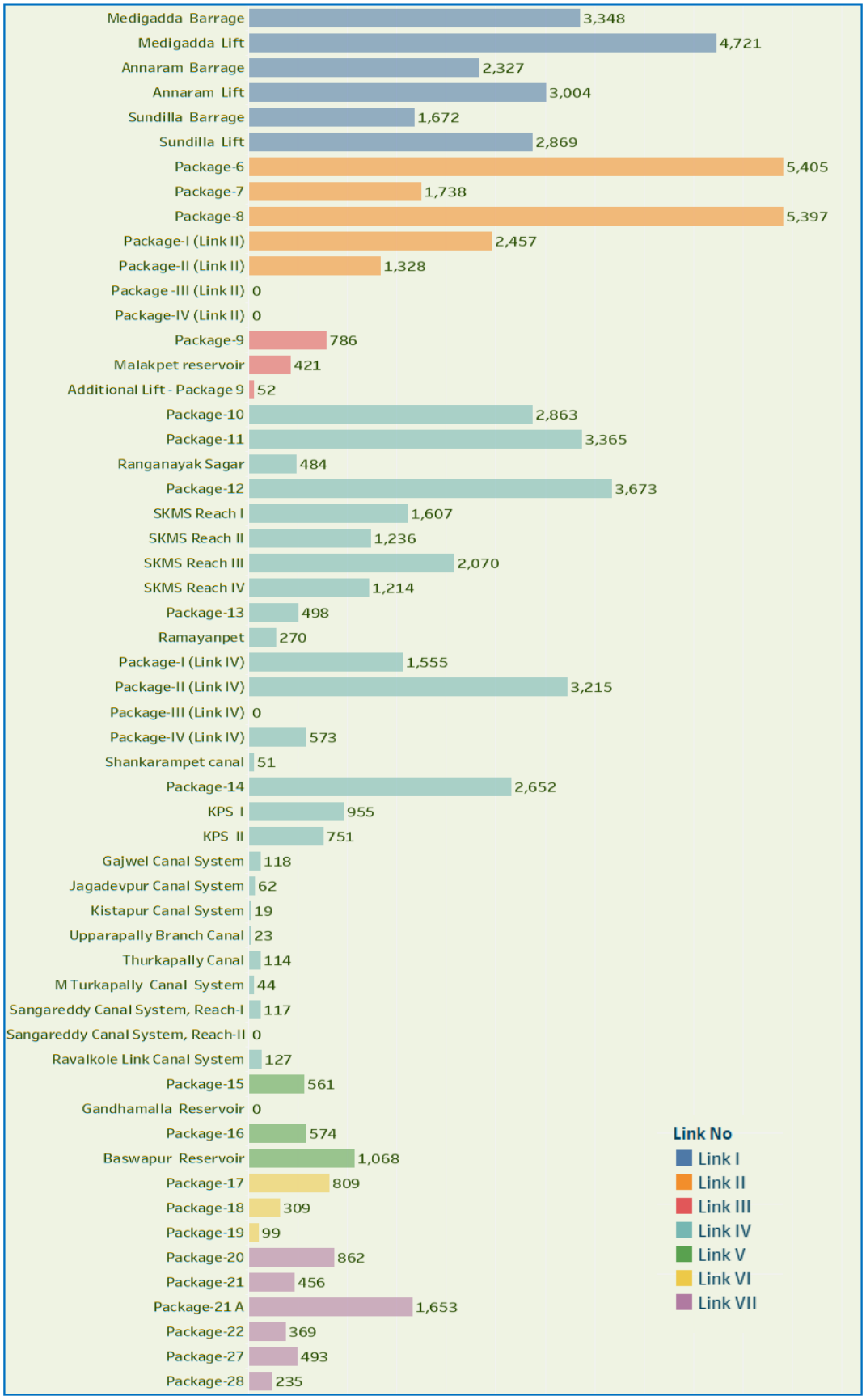
[143] These include 19 works pertaining to the erstwhile PCSS project brought under Kaleshwaram project after re-engineering with revised scope of work, 28 new works were taken up consequent to re-engineering and 9 more additional works awarded subsequently

Chart 6.1 – Link wise final value of agreements and expenditure as of March 2022



Source: Records of the I&CAD Department

Chart 6.2 – Package wise expenditure as of March 2022 (₹ in crore)



Source: Records of the I&CAD Department

The estimates for the works in both the modes of contract are prepared based on Andhra Pradesh/Telangana State Standard Specifications and rates provided in the 'Schedule of Rates' (SoR). In case of non-availability of rates in the SoR for a component/item of work, quotations from reputed firms shall be collected for preparation of estimate. Adoption of observed data of similar works in the State or neighbouring State is the other practice in vogue.

Under the EPC contracts followed in the State, the contractors were required to conduct detailed survey and investigations, submit proposed alignments, designs and drawings to the Department for approval. After receiving these approvals, the contracting agencies were required to identify the lands required for execution of works and submit the land plan schedules to the Department.

On the other hand, in LS contracts, the responsibility for designs and identification and acquisition of lands rests solely with the Department. As per the existing instructions[144] of Government, administrative approval/technical sanction for irrigation works would be issued only after designs are finalized, detailed investigation is completed, and necessary lands are acquired for taking up works without interruption for the first two years.

In addition to the above differences in both the contracts, some basic differences are also detailed below:

Table 6.1 – Differences between EPC and LS contracts

S. No	EPC system of contract	LS system of contract
1	The contractor is to design a project or work, procure all the necessary materials and construct it, either through own labour or by subcontracting part of the work and deliver it to the employer. The contractor carries the entire risk of the project for schedule, as well as budget, in return for a fixed price.	The contractor has to execute the work as per approved designs and drawings and payment would be made on actual quantities executed.
2	The work specified in the contract is divided into several components to facilitate payments and the cost of each component has to be specified as a percentage of the total bid price.	Payments are made to contractors with reference to the quantities of work actually executed by them duly considering the tender percentage quoted by them
3	Agreements do not contain 'bill of quantities' indicating the quantities and rates of each item of work.	Agreements do contain 'bill of quantities' indicating the quantities and rates of each item of work

Source: Records of the I&CAD Department

In case of the 17 tenders invited through the EPC system during the period 2008-09, the tenders were invited by the Superintending Engineers of the concerned Circles and the 1st level scrutiny of the bids (technical and financial) was undertaken at the Circle level. Thereafter, the tender evaluation reports were submitted to the concerned Chief

[144] GO Ms. No.94 of I&CAD (PW-COD) Department, dated 01.07.2003

Engineer(s)/Engineer(s)-in-Chief. Subsequently, it was submitted to the State Level Standing Committee[145] and then to the High-Powered Committee[146], which was responsible for finalization and acceptance of tenders. The finalized/accepted tenders were recommended to the Government by the High Powered Committee and final award of work was issued by the Superintending Engineer.

In case of the 39 tenders invited under the LS system during the period from 2016-20, the Superintending Engineer (SE) of a Circle Office invited tenders for respective works and evaluated both the technical and the financial bids. Thereafter, the tender evaluation reports were submitted to the Chief Engineers/Engineer(s)-in-Chief for 2nd level check. The tender evaluations were finally submitted to the Commissioner of Tenders [147] (CoT[148]) for scrutiny and finalization. The decision of the CoT on tender is final and after finalization of the tenders, the SE of the concerned circle gives the final award of work.

Before calling for tenders for any work, the Department prepares cost estimates to arrive at the estimated contract value (ECV) which is put to tender. While bidding, the bidders have to quote the overall tender percentage (*i.e.*, tender discount or tender premium) on the ECV. The estimates are prepared by computing the quantities of each item of work to be executed and the rate of each item. The rates of individual items of work are calculated by considering the costs involved (*i.e.*, the cost of materials, operations, labour, *etc*.) in execution of that item of work. For working out the rates of each item of work, the rates of materials, operations, labour, *etc*., available in the relevant SoRs prepared every year are adopted. In respect of the items for which rates are not available in the SoR, the rates are ascertained from open market and adopted in the estimates.

The erstwhile combined State of Andhra Pradesh had been stipulating a maximum ceiling up to which the bidders can quote their tender premium. The ceiling on tender premium was 10 *per cent* during July 2003 to November 2004 and five *per cent* thereafter. After re-organisation of the combined State of Andhra Pradesh, the newly formed Telangana State has continued the five *per cent* ceiling on tender premium. It is obvious that the objective behind stipulation of ceiling on tender premium was to ensure that the works taken up by Government Departments are not entrusted at unreasonably high prices and that value for money was achieved in procurement of works. In order to achieve this objective and to assess the reasonableness of the bids received in the tender process for works, it was essential that the works estimates are prepared realistically.

Audit observed that, after re-engineering of the project, none of the works were awarded under the EPC system.

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[145] SLSC consists of Engineer-in-Chief as chairman, Commissioner of Tenders, CE, CDO, CE concerned and Deputy financial advisor as Members

[146] HPC consists of Chief Secretary as Chairman, Irrigation Secretary and Finance Secretary as members.

[147] vide GO Ms. No. 94 of I&CAD (PW-COD) Department dated 01 July 2003

[148] Commissioner of Tenders is Chief Engineer (Administration wing)

6.2 Preparation of estimates

Audit observed the following deficiencies in preparation of estimates in Kaleshwaram Project:

6.2.1 Costing of Electro/Hydro mechanical equipment

The Kaleshwaram Project, has 27 lifts[149] (included in 21 agreements) with each lift having multiple pumps/motors. These lift works involve execution of civil works like construction of pumphouse, *etc*., and supply, installation and commissioning of Electro-Mechanical and Hydro-Mechanical (EM&HM) equipment. The EM&HM equipment includes - (i) pumps, motors and auxiliary equipment like control panels, unit auxiliary boards, DC distribution boards, *etc*., and (ii) common equipment like cranes, generator sets, batteries, *etc*.

In the estimates of these 21 works involving lifts (10 LS contracts and 11 EPC contracts), the Department had provided a total amount of ₹18,936.65 crore[150] towards the cost of EM&HM equipment (with an aggregate capacity of 8,338.04 MW).

6.2.1.1 Estimation of cost of pumps, motors and auxiliary equipment

Audit observed that the SoRs prepared in the State did not contain the rates for pumps, motors and auxiliary equipment. The Department obtained estimates for pumps and motors from M/s Bharat Heavy Electricals Limited (BHEL) in September 2005. The estimates obtained from BHEL, however, did not provide any break-up of the costs. The Department, using the estimates provided by BHEL, provided lumpsum amounts[151] towards the cost of pumps and motors in the estimates of the 11 EPC works (out of 21 works) awarded in 2008-09.

However, in case of the 10 LS works taken up after 2016-17, the Department stated that the estimates were prepared based on the rates adopted in Kalwakurthy Lift Irrigation Scheme which was commissioned in the year 2008 and updating the rate up to 2016. The mechanism adopted by the Department in preparation of estimates in respect of pumps, motors and auxiliary equipment lacked consistency and transparency.

In the agreements concluded with contractors for these 21 works, an aggregate amount of ₹14,562.32 crore was provided towards supply and commissioning of pumps, motors and auxiliary equipment. The amount provided in these agreements works out to ₹135.56 lakh/MW to ₹350.60 lakh/MW. As of March 2022, supply of equipment

[149] In addition, there are four small lifts (in Package-9) involving submersible pumps (total capacity: 4.66 MW). These have not been taken into account for Audit analysis. Further, in seven out of the 21 lifts, the Department later decided to increase the capacity of pumps/motors (total increase: 116.4 MW) but is yet to work out the revised cost of pumps/motors.

[150] ₹17,653.71 crore for pumps, motors and auxiliary equipment and ₹1,282.94 crore for other common equipment

[151] Breakup of the lumpsum amount is not available.

was completed in nine works[152], partially completed in eight works[153] and supplies were yet to be made in the remaining four works[154]. A total amount of ₹8,896.29 crore was paid to contractors for this equipment supplied so far (March 2022) in these works.

In an effort to ascertain the actual market value of this equipment, Audit sought the copies of purchase invoices collected, if any, by the Department before making payments to contractors. However, the Department did not furnish the invoices stating that there was no stipulation in the agreements requiring the contractors to submit invoices in support of the equipment procured.

Audit observed that in four EPC works (Package Nos. 6, 8, 10 and 11), the Department had included a total amount of ₹7,212.34 crore in the estimates for supply and installation of pumps and motors of an aggregate capacity of 2,805.76 MW. It was observed that contractors of these four works engaged M/s BHEL (which was also a partner in the Joint Ventures), for supply, installation, testing and commissioning of pumps, motors and auxiliary equipment. M/s BHEL had supplied and commissioned the equipment in these works during 2017 to 2020. Audit ascertained from M/s BHEL the amount charged by it from the JV partners for this component. Audit observed that there were variations between the amounts provided for this equipment in the estimates and the actual cost at which M/s BHEL had executed the work on behalf of the JV, as shown below:

Table 6.2 – Variation between the amounts provided in the estimates for pumps, motors and auxiliary equipment and actual cost of supply by M/s BHEL[155]

S. No.	Pkg. No.	Total capacity of pumps and motors supplied @ (in MW)	Amount * provided in the estimates (₹ in crore)	Average cost provided per MW (₹ in lakh)	Cost at which M/s BHEL supplied the equipment to contractors (₹ in crore)	Actual cost per MW (₹ in lakh)	Excess amount provided in the estimate (₹ in crore)	Excess percen--tage
1	6	871	2,238.17	256.97	530.92	60.96	1,707.25	321.56 %
2	8	973	2,508.96	257.86	529.15	54.38	1,979.81	374.15 %
3	10	424	1,086.45	256.24	305.72	72.10	780.73	255.37 %
4	11	537.76	1,378.76	256.39	320.80	59.65	1,057.96	329.79 %
	Total	**2,805.76**	**7,212.34**	**257.05**	**1,686.59**	**60.11**	**5,525.75**	**327.63 %**

Source: Records of the I&CAD Department and information provided by M/s BHEL

@ Package-6: 124.4 MW X 7 Nos.; Package-8: 139 MW X 7 Nos.; Package-10: 106 MW X 4 Nos.; and Package-11: 134.44 MW X 4 Nos.

* including the cost of pump discharge valves

As seen from the above table, the actual cost at which M/s BHEL had supplied the pumps and motors ranged from ₹54.38 lakh/MW to ₹72.10 lakh/MW and the average

[152] Medigadda lift, Annaram lift, Sundilla lift and Package Nos. 6,8,10,11,12 and 14
[153] Package-9, Package Nos.1 & 2 of additional 1.1 TMC works in Link-II, Package Nos. 1 & 2 of additional 1 TMC works in Link-IV, Package Nos. 20, 21-A & 28
[154] Package Nos. 21, 22, 27 and Package-4 of additional 1 TMC work in Link-IV
[155] BHEL was a part of the successful consortium(s) which were awarded the four packages.

cost works out to ₹60.11 lakh/MW. The amounts provided in the estimates (₹7,212.34 crore) of these works was more than four times the actual cost (₹1,686.59 crore).

As per the procedure followed for preparation of estimates in the irrigation works in the State, the Department provides Overheads & Contractor's profit at the rate of 13.615 *per cent* over the cost of works. Even when 20 *per cent* of the supply cost is allowed towards Overheads and Profit, there was a possibility of undue benefit of ₹5,188.43 crore to the contractors of these four works.

Audit could not compare the actual cost of pumps and motors in the remaining 17 packages, as supply of the EM&HM equipment was not yet done in four works and even in the remaining 13 works where the supplies were made, the Department did not furnish the relevant invoices stating that there was no stipulation in the agreements requiring the contractors to submit invoices in support of the equipment procured.

The Government, in the Exit Conference, stated that works were awarded through a transparent process by inviting global tenders in 2008-09. It was also replied (May 2023) that these pumping stations were tailor made and the components of these pumping stations were not standardized items and there was no SoR for these items. It was further stated that the cost of pumps and motors and their associated and auxiliary equipment was obtained from M/s BHEL (as ₹2.40 crore per MW), which was the pump and motor manufacturing unit of Government of India. The Government further replied that there would be about 31 major items/equipment of specific type and rating out of which, the scope of supply of M/s BHEL was limited to only three items (pumps, motors and associated equipment). It was further replied that the EPC contractor had to pay for the EM&HM items, transport the materials in segments to worksite from various units of BHEL like Bhopal, Rudrapur, Bangalore, *etc*., with transit insurance, fabrication of some components, assemble the segments at site, erection, testing at all stages and commissioning the same including dry run and wet run. Hence, the price of BHEL said to be furnished by them to Audit was only for part of equipment cost. As the civil, EM&HM works needed to be carried out simultaneously, erection of EM&HM equipment was done at multiple stages spanning over years, keeping expert engineers, manpower, equipment co-ordination and that arranging training on this equipment was also necessary. Considering all the complex steps and operations involved in the erection and testing of EM&HM equipment, the BHEL would have quoted the rate of ₹2.40 crore per MW based on which the estimates were prepared. Government also replied that the Department had collected the rate per MW followed in 11 other projects across Madhya Pradesh, Gujarat, Rajasthan, and Karnataka States and the rate per MW in those projects was ranging from ₹2.33 to ₹3.84 crore per MW. Hence, the rate per MW adopted in Kaleshwaram Project was justifiable.

The fact however remains that the cost paid to the contractors for the EM&HM equipment was higher than the prevailing market rates. This is evident from the fact that when Audit verified the item wise costs provided for the EM&HM equipment in other lift works taken up subsequently (during 2016-17 to 2019-20) under

Kaleshwaram Project, it was observed that the cost provided for pumps, motors and associated equipment in these estimates consisted of 72 *per cent*[156] of the total cost of EM&HM equipment and only 28 *per cent* of the cost represented the remaining auxiliary equipment, spares and other operations like transportation, insurance, jointing/assembling at site and installation, testing and commissioning which were stated to be outside the scope of supply of M/s BHEL. It was also observed that the cost provided for other common equipment (like mobile cranes, generator sets, *etc.*) in these works ranged from ₹51.13 crore to ₹85 crore[157] per pump house.

Thus, even when 30 *per cent* cost is allowed for the items/operations outside the scope of BHEL supply (such as other auxiliary equipment, spares, and other operations/costs) and a further amount of ₹85 crore per lift is allowed for common equipment, the possibility of contractors of these four EPC packages getting unduly benefited by at least ₹2,684.73 crore cannot be ruled out.

Table 6.3 -Calculation worked out by Audit

(₹ in crore)

Description	Amount	Amount
Total amount provided in the estimates for EM&HM equipment ***(A)***		7212.34
Deduct 30% towards items/operations stated to be outside the scope of work of BHEL ***(B)*** = (A) * 30%		2163.70
Deduct cost of common equipment (@ ₹ 85 crore per lift * 4) ***(C)***		340.00
Net cost provided in the estimates for the items within the scope of supply of BHEL ***(D)*** = (A) - (B) - (C)		4708.64
Actual cost of the items supplied by BHEL ***(E)***	1686.59	
Add contractors' profit and other overheads @ 20% on the above ***(F)*** = (E) * 20%	337.32	
Cost to contractors for the items supplied by BHEL ***(G)*** = (E) + (F)	2023.91	2023.91
Total (D) - (G)		**2684.73**

Source: Information collected from the records of the I&CAD Department and information provided by M/s BHEL

The Government further replied (November 2023) that Audit had arrived at the undue benefit to contractors towards EM&HM equipment as ₹2,684.73 crore with certain assumptions of cost share percentage on the components such as items supplied outside the scope of BHEL, cost of the items supplied by BHEL, common equipment and contractors' benefits on BHEL items which is not justifiable. Government contended that Audit considered contractors' profit only on BHEL items, but it has to be considered on all the items such as the items supplied outside the scope of BHEL including erection, testing and commissioning of EM&HM works. It was also replied that Audit did not consider the labour components and other material components such

[156] 71.87 *per cent* in Package-II of additional TMC work in Link-II; 72.13 *per cent* in Package-1 of additional TMC work in Link-IV; and 76.52 *per cent* in Medigadda Lift

[157] ₹51.13 crore in Medigadda Lift; ₹57.57 crore in Package-1 of additional TMC work in Link-IV; and ₹85.36 crore in Package-II of additional TMC work in Link-II.

as welding rods, oils, lubricants *etc*., while working out the above undue benefit to contractors.

The reply is not correct as Audit considered contractors' profit only on BHEL items as these were supplied items (based on invoices) and were exclusive of the contractors' profit. The rates of other items like testing, erection, and commissioning, *etc*. are at estimated rates and inclusive of contractors' profit. Hence, Audit did not consider contractors profit on these items. Further, in respect of labour and material components such as welding rods, oils, lubricants, *etc.*, while working out the undue benefit to contractors, Audit has considered 30 *per cent* cost towards these miscellaneous operations/costs including the cost of jointing/assembling at site and installation, testing and commissioning, *etc*.

Recommendation - 8

The Department should evolve a sound and transparent mechanism, including conducting market survey periodically for estimation of costs of various EM&HM equipment. The possibility of including the rates in the SoRs should also be explored.

Recommendation - 9

The Department should ensure that a detailed cost breakup of EM&HM components is given in the estimates of lift works to ensure transparency in release of payments.

Recommendation - 10

The Department should include a clause in the works contract conditions stipulating production of invoices as a pre-condition for releasing payments in respect of EM&HM components.

6.2.1.2 Frontloading in Payment Schedules

As per the terms and conditions of the EPC contracts concluded for the PCSS project works (2008-09), the EPC agencies have to execute the total work as per the basic project parameters broadly defined in the respective agreements within the firm fixed contract price. These agreements do not contain 'bill of quantities' indicating the quantities and rates of each item of work. However, for the purpose of regulating the interim payments to contractors, the total contract price is divided into several components duly indicating their percentage costs in the total contract value and indicated in the 'payment schedule' in the agreement. After concluding the agreements, contractors submit detailed estimates for the work in which the cost provided in the payment schedule for each component will be further divided into sub-component wise costs. The detailed sub-component wise payment schedules are vetted and approved by the Department. Payments to contractors are regulated as per the costs so assigned to each sub-component in the detailed payment schedules.

As already stated earlier (in Paragraph 6.2.1.1), the cost of pumps, motors and auxiliary equipment was already inflated in the departmental estimates in four works. Audit could not compare the actual cost of pumps and motors in the remaining 17 packages, as supply of the EM&HM equipment was not yet done in four works and even in the remaining 13 works where the supplies were made, the Department did not furnish the relevant invoices stating that there was no stipulation in the agreements requiring the contractors to submit invoices in support of the equipment procured. Audit observed that the inflated costs provided in the estimates for pumps and motors were likely passed on to the contractors by frontloading the cost of different items of common equipment in the detailed payment schedules, as shown below:

Table 6.4 – Examples of frontloading of payments made for common equipment in EPC contracts (This frontloaded amount is included in the estimated cost of pumps and motors of EM&HM)

(₹ in crore)

S. No.	Pkg. No.	As per abstract estimates			Actual supply/payment		
		Capacity and Quantity	Unit Rate (₹ in crore)	Estimated cost (₹ in crore)	Capacity and Quantity	Payment (₹ in crore)	Excess payment (already included in estimates of other equipment (₹ in crore))
	Payments made for Diesel generator set						
1	6	250 KVA X 3	0.25	0.75	500 KVA X 1 320 KVA X 1	39.82	39.07
2	8	250 KVA X 3	0.25	0.75	500 KVA X 1 320 KVA X 1	44.39	43.64
3	9	250 KVA X 1	0.25	0.25	250 KVA X 1	1.80	1.55
4	10	250 KVA X 3	0.25	0.75	500 KVA X 1 320 KVA X 1	27.82	27.07
5	11	250 KVA X 2	0.25	0.50	330 KVA X 1	31.10	30.60
6	12	250 KVA X 2	0.25	0.50	320 KVA X 1	14.65	14.15
	Payments made for Electric overhead travelling (EOT) crane						
7	6	NA X 1	10.00	10.00	NA X 2	96.49	86.49
8	8	150 MT X 2	12.00	24.00	NA X 2	110.51	86.51
9	9	250 MT X 1	2.00	2.00	NA X 1	15.67	13.67
10	10	150 MT X 2	8.00	16.00	125 MT X 3	41.29	25.29
11	11	150 MT X 2	8.00	16.00	150 MT X 1	72.51	56.51
	Payments made for mobile crane						
12	6	30 MT X 1	0.75	0.75	30 MT X 1	9.89	9.14
13	8	30 MT X 1	0.75	0.75	30 MT X 1	10.21	9.46
14	10	30 MT X 1	1.00	1.00	30 MT X 1	8.63	7.63
15	12	30 MT X 2	1.00	2.00	30 MT X 2	5.69	3.69

NA: Information not available/not furnished

Source: Records of the I&CAD Department

The departmental estimates of the EPC Package Nos. 6, 8, 10, 11 and 12 (awarded in 2008-09) did not contain separate provisions in respect of certain items of common

equipment. The cost of these items was included in the composite cost provided for pumps, motors and auxiliary equipment. In such cases, Audit compared the payments made for these items with the amounts provided for similar items in the estimates of Medigadda, Annaram and Sundilla lifts (prepared with 2015-16 rates). It was found that high amounts were paid for the following items.

Table 6.5 – More examples of higher payments for common equipment in EPC contracts

(₹ in crore)

S. No.	Items	Cost as per estimate of Sundilla lift	Package-6		Package-8		Package-10		Package-11		Package-12	
			Amt. paid	Excess	Amt. paid	Excess	Amt. paid	Excess	Amt. paid	Excess	Amt. paid	Excess
1	Station Auxiliary Boards	1.12	35.89	34.77	35.68	34.56	32.77	31.65	37.5	36.38	29.32	28.2
2	Pump House Earthing	1.86	28.37	26.51	25.53	23.67	26.86	25	34.83	32.97	22.79	20.93
3	Unit Auxiliary transformers	8.38	40.57	32.19	52.07	43.69	33.57	25.19	43.54	35.16	28.49	20.11
4	Emergency Board	0.93	53.4	52.47	51.79	50.86	26.86	25.93	34.83	33.9	15.47	14.54
5	Switch gear panel	4.65	222.9	218.25	341.93	337.28	116.54	111.89	151.15	146.5	85.63	80.98
6	Battery sets	2.33	32.45	30.12	108.53	106.2	61.58	59.25	79.87	77.54	30.12	27.79
Total		**19.27**	**413.58**	**394.31**	**615.53**	**596.26**	**298.18**	**278.91**	**381.72**	**362.45**	**211.82**	**192.55**

Source: Records of the I&CAD Department

As can be seen from the above tables, there is a significant risk that inflated costs provided in the estimates for pumps and motors were passed on to the contractors by frontloading the amounts paid for different items of EM&HM equipment.

In contrast to the EPC contract system, in the traditional unit price (locally called Lumpsum or LS) contract system, the items of work to be executed, their quantities and the estimated unit rates payable for each item are mentioned in the Bill of Quantities (BOQ) in the agreements. Payments to contractors are regulated as per the quantities actually executed/supplied and the rates mentioned in the BOQ after applying the quoted tender percentage.

Audit, however, observed that in the three LS contracts relating to Medigadda, Annaram and Sundilla lifts, though the Department prepared the estimates with itemised rates for EM&HM equipment, it provided lumpsum amounts in the BOQ in the agreements without the item-wise rates. For regulation of payments, it later prepared a separate payment schedule for the EM&HM equipment duly giving the detailed break up of amounts payable for each item of equipment.

In these contracts, the payments for the pump and motors were made below the estimate rates prepared by the Department but higher payments were frontloaded for various items of common/auxiliary equipment, as compared to the amounts provided

for these items in the departmental estimates[158]. Some such cases of higher payments are shown in the table below.

Table 6.6 – Examples of higher payments frontloaded for common/auxiliary equipment in LS contracts of Medigadda, Annaram and Sundilla lifts

(₹ in crore)

S. No.	Item description	Medigadda Lift			Annaram Lift			Sundilla Lift		
		Est. cost*	Amount paid	Excess	Est. cost*	Amount paid	Excess	Est. cost*	Amount paid	Excess
1	Station Auxiliary boards	0.74	2.24	1.50	1.12	3.36	2.24	1.12	3.40	2.28
2	SFC starting equipment (3 No.)	13.03	54.05	41.02	13.03	47.74	34.71	13.03	48.24	35.21
3	Air Conditioning & Ventilation	2.79	8.07	5.28	2.79	8.10	5.31	2.79	8.14	5.35
4	EOT Crane 100/25 (3 No.)	9.31	16.79	7.48	9.31	16.77	7.46	9.31	32.75	23.44
5	Pump House Earthing	1.86	25.68	23.82	1.86	25.65	23.79	1.86	25.92	24.06
6	415V 500 KVA DG Sets (3 No.)	1.24	5.49	4.25	1.24	5.49	4.25	1.86	8.31	6.45
7	Fire Protection System	1.40	8.96	7.56	2.33	14.91	12.58	2.33	15.07	12.74
8	2000 KVA Unit Auxiliary Transformers-Dry Type (3 No.)	7.45	19.73	12.28	9.93	16.43	6.50	7.45	13.63	6.18
9	500 KVA Unit Auxiliary Transformer-oil filled	0.62	2.93	2.31	1.24	6.26	5.02	0.93	4.74	3.81
10	50 Ton Mobile Crane	5.59	8.56	2.97	5.59	8.61	3.02	5.59	8.69	3.11
11	Bus ducts & related equipment	21.10	44.37	23.27	14.89	32.53	17.64	17.38	41.31	23.93
12	AC Distribution Board	11.17	27.25	16.08	8.07	19.66	11.59	9.31	22.92	13.61
13	11 KV - XLPE Cables	12.41	40.61	28.20	12.41	29.46	17.05	12.41	31.35	18.94
14	LT Power Cable	7.45	24.54	17.09	5.59	17.02	11.43	5.59	17.36	11.77
15	Control cable and cable tray	5.59	19.01	13.42	5.59	15.20	9.61	5.59	14.10	8.51
16	Instrumentation cables	3.72	10.74	7.02	3.72	10.64	6.92	3.72	12.41	8.69
17	SFC Starting Isolators	17.87	29.13	11.26	13.90	18.25	4.35	15.89	21.08	5.19

* Estimates calculated by converting the estimated item rates for 2 TMC to 3 TMC by Audit

Source: Records of the I&CAD Department

[158] The scope of work under the initial contracts of Medigadda, Annaram and Sundilla lifts stipulated installation of EM&HM equipment for lifting of 2 TMC of water per day. The scope of work was later increased to 3 TMC per day. For comparison of payments, Audit worked out the estimated cost of equipment by increasing the costs provided in the original estimates on pro-rata basis.

The higher payments made for the above items in the contracts of Medigadda, Annaram and Sundilla lifts present a significant risk that the cost of pumps and motors were inflated in the estimates of these works also and the inflated amounts were likely passed on to the contractors through frontloading payments of common equipment.

The Government replied (May 2023) about the discrepancy between estimate cost and payments made to the contractor towards auxiliary equipment that estimates were made to arrive at the total cost of EM&HM equipment based on the tentatively worked out ratings of equipment. However, in detailed engineering, some equipment like SFC system and station auxiliary boards, 11 KV panels got changed in view of starting method adopted by pump and motor supplier. Accordingly, revised ratings of the modified equipment were arrived at and payment schedules were prepared by considering the updated ratings. The 100 *per cent* value of payment schedule approved by the committee had not exceeded the total amount provided for Electro-Mechanical equipment. Frontloading of each individual item did not have any relevance in EPC system.

Though the payment was restricted within the agreed EM&HM items value, the fact remains that the payment made towards common equipment was higher when compared to any existing standard.

6.2.1.3 Estimation of cost of common equipment

In addition to pumps, motors and auxiliary equipment, the EM&HM equipment used in the pumphouses/lifts also includes common equipment like EOT crane, mobile crane, generator set, batteries, switch gear board, transformers, earthing material, *etc*.

In the estimates relating to 21 works involving installation of lifts, the Department included an aggregate amount of ₹1,282.94 crore towards common equipment. The rate analysis or the basis on which these costs were arrived at were not forthcoming from the estimates/departmental records. Since the Department did not produce the invoices, Audit could not check the accuracy of the costs provided in the estimates for these items.

The Government replied (October 2023) that the rates of common items were obtained from the already completed pumping stations/generating stations and the prices were updated/upgraded as per the required rating with the experience of engineers.

The reply of the Government is not justifiable since the prices for common equipment like DG set, mobile crane, EOT crane, gantry crane, *etc*., could have been assessed by obtaining quotations from the manufacturers by mentioning their specifications.

6.2.1.4 Post tender incorporation of price adjustment clause

Under the earlier PCSS project, the Department invited (March/July 2008) tenders for Packages-6, 8, 10, 11 and 12 and after tender evaluation, entrusted (November/ December 2008) the works to the lowest bidders. The tender/agreement conditions of these works provided for price adjustment (PA) for cement, steel and fuel if the variation (increase or decrease) is more than five *per cent*. The tender/agreement conditions stated that no escalation on labour and other materials would be paid and that the Bidder has to quote the bid taking into account any variation in rates and wages

during the period of execution *i.e.*, from the date of quoting the rates to the end of completion of work in all respects. The tender/agreement conditions did not stipulate PA for EM&HM equipment and payment of compensation of foreign exchange value.

Audit observed that after opening of price bids of the above works, based on the request of the successful bidders and recommendation (October 2008) of the Advisors Committee[159], the Government issued (7th November 2008) instructions to include, among other things, a clause allowing PA on EM&HM equipment and compensation for variation in foreign exchange rates in all the agreements to be signed henceforth by the Department.

Audit observed that while recommending inclusion of PA clause, the Advisors Committee[160] also pointed out that during the pre-bid meetings, some of the bidders had raised the issue of PA on EM&HM equipment and fluctuation in foreign exchange and that the Department had clarified that no payment towards these items would be made. The Committee also stated that inclusion of such clauses in the agreement at this stage involves financial commitment and if such clause has to be incorporated in the agreements, it requires specific approval of Government.

Since the tender conditions had not provided for PA on EM&HM equipment and the specific request of bidders had been rejected in the pre-bid meetings, the bidders would have factored in the financial implication on account of possible price escalation in the bid prices already quoted by them. Therefore, allowing PA in these cases would not only be a vitiation of the tender process but also unduly benefited the successful bidders. The Government ignored this fact and ordered inclusion of these clauses in all the future agreements (instead of future tenders). Accordingly, the Department included these clauses in the above contracts by concluding (June – December 2014) supplemental agreements with contractors.

Table 6.7 – Post tender inclusion of price variation clause in agreements

S. No.	Pkg. No.	Tender notice date	Pre-bid meeting date	Price bid opening date	Date of agreement	Date of supplemental agreement	Price escalation paid on EM&HM equipment (₹ in crore)
1	6	22.03.2008	23.04.2008	06.06.2008	12.11.2008	19.06.2014	294.92
2	8	22.03.2008	05.05.2008	25.06.2008	17.11.2008	19.06.2014	399.74
3	10	14.07.2008	NA	14.08.2008	02.12.2008	01.12.2014	147.56
4	11	22.03.2008	23.04.2008	06.06.2008	24.11.2008	01.12.2014	319.38
5	12	14.07.2008	NA	14.08.2008	24.11.2008	20.10.2014	180.88
						Total	**1,342.48**

Source: Records of the I&CAD Department

[159] Constituted by Government vide G.O.Ms.No.144 of I&CAD (PW: Reforms) Department dated 13 June 2007 to examine EPC agreements

[160] Comprising three Advisors (Advisor on Andhra Pradesh, Advisor on Telangana Project, Advisor on Rayalaseema Project, Engineer-in-Chief (AW), Chief Engineer, PCLIS and Director, Hydel APGENCO (special invitee)

Post tender inclusion of price adjustment clause in the above agreements resulted in avoidable payment of ₹1,342.48 crore towards payment of price escalation on inflated EM&HM equipment and undue benefit to contractors.

The Government replied (November 2023) that the bidders had represented for inclusion of foreign exchange variation clause and price variation clause as the equipment has to be imported and the payments are to be made in the Euros/Dollars which are varying with foreign exchange rate day to day and that the prices of raw materials like steel, copper and aluminium are fluctuating a lot and the agreement period is 48 months. It further replied that based on the representations of agencies and the Advisors Committee's recommendations, the Government had given instructions in November 2008 with the concurrence of Finance Department, for incorporation of price adjustment clause in the agreements which are going to be signed henceforth by the Department and as such, provision of this clause is justifiable and there was no undue benefit to contractors.

The reply is not acceptable since the bidders would have factored in the financial implications of these issues while quoting their bids and therefore, inclusion of price variation clause after finalization of tenders has resulted in avoidable payment of ₹1,342.48 crore towards price escalation and undue benefit to the contractors.

6.2.2 Inflation of estimates for other works

6.2.2.1 Inflation of estimate due to adoption of incorrect rate

The work of Package 21A included providing Pressured Pipe Irrigation System (PPIS) which involves laying of pipelines using pipes of different sizes.

- Mild Steel (MS) Pipes (1000mm to 3000mm dia) for the main pipeline
- Ductile Iron (DI) Pipes (350mm to 900mm dia) for the distributary network
- High Density Polyethylene (HDPE) Pipes (40 mm to 355 mm dia) to the fields

Accordingly, in the estimates prepared for the work, the Department provided the cost of excavation of trenches for laying pipelines and refilling of trenches after laying of pipes.

Audit observed that for excavation of trenches for all the three types of pipes, the Department adopted a unit rate of ₹98.30 per cubic metre (Cu.M.) which included the cost of depositing the excavated earth with a lead of one Km.

Figure 6.1 - Laying of HDPE pipeline in Metpally segment at Jakranpally village

Source: I&CAD Department

Since the trenches excavated (in the agricultural lands of the farmers) for laying the 40 mm to 355 mm diameter HDPE pipes are very small in size (trench width: 0.44 M to 0.75 M and depth: 1.04 M to 1.355 M), there was no need to deposit the soil at a distant place. Hence, allowing a lead of one Km for excavated soil was unwarranted and resulted in inflating the estimate by ₹21 crore.

The Government replied (November 2023) that the rate for excavation of earth for laying of HDPE pipes would be revised without 1.00 Km lead and the excess amount paid would be deducted from the future bills.

6.2.2.2 Inflated estimate due to inclusion of cost of sand

In January 2015, the State Government notified[161] the 'Telangana State Sand Mining Rules' which permitted use of river sand free of cost for local use in Government works on payment of seigniorage charges.

Audit observed that in the estimate of Package-21A, the Department proposed utilization of river sand to be brought from the foreshore of Sri Ram Sagar Project reservoir. However, despite availability of river sand free of cost, the Department included initial sand cost of ₹647.60 per Cu.M. (basic cost of sand: ₹570 plus contractor's profit: ₹77.60) in the estimate (prepared in December 2017). This resulted in inflating the estimate by ₹23.15 crore.

The Government accepted that usage of river sand was permitted free of cost on payment of seigniorage charges and that the initial cost of sand would be recovered from the forthcoming bills of the contractor.

6.3 Tendering process

6.3.1 Entrustment of consultancy services to an ineligible firm

The Department invited (February 2019) Expression of Interest (EOI) for consultancy services for preparation of DPR/master plan for beautification and development of certain facilities in Link-I and Link-II of Kaleshwaram Project. Only one bid was received which was accepted by the Department and the work was awarded (March 2019) to the sole bidder for ₹6.35 crore.

Audit observed that the tender conditions, *inter alia*, stipulated that the prospective bidder should have accomplished experience in consultancy services for development of similar work and documentary proof issued by Government/Quasi-Government/ PSUs/MNCs should be submitted. The conditions also stipulated that the prospective bidder should provide experience certificates of at least three consultancy services in landscape and tourism development works each costing ₹25 lakh or one such project costing ₹75 lakh in any one financial year.

Audit observed that the successful bidder did not submit any proof of having completed a project costing ₹75 lakh in one year. The contractor had submitted only

[161] Vide GOMs No.3, dated 08.01.2015 issued by the Industries & Commerce (Mines-I) Department

a work order (for ₹1.05 crore) issued (September 2018) by a private company for tourism and resort development work in Odisha State. However, the Department accepted the bid and entrusted the work to the agency though it did not meet the stipulated qualification criteria.

The Government replied (May/October 2023) that M/s SAR International Limited had completed consultancy work for development of tourism and resorts projects in Odisha State and in addition, the Director of M/s SAR International Limited had completed consultancy projects like (i) landscape consultancy work in HMDA, Buddha Purnima Project, Hyderabad, (ii) Architectural consultancy services for Buddhist monument at Japaipet under AP Tourism Development Corporation, *etc*., and the Director's experience was also taken into account in arriving at eligibility criteria.

The reply is not tenable since as per the NIT, the Firm/agency participating in bidding should possess the necessary experience. Consideration of experience of its Director is not supported by any Government orders. Moreover, the work experience as shown in support of bid was not of M/s SAR International Limited but that of M/s Landscape Plus, whose Director later joined the M/s SAR International Limited. Further, while finalizing the bid, the Committee constituted to finalize the tender itself mentioned that the firm is comparatively a new entity.

6.4 Regulation of payments to contractors

6.4.1 Regulation of payments in EPC contracts

Under the Engineering, Procurement and Construction (EPC) turnkey contracts concluded for the project works, the EPC contractor was to conduct detailed survey and investigation, prepare and submit designs and drawings to the Department in line with the basic project parameters broadly defined in the agreement and execute the entire work including all ancillary and incidental items of work and deliver the project in complete shape. The agreement conditions stipulated that the contractor was bound to execute all supplemental works that are found essential, incidental and inevitable during execution of main work at no extra cost to the employer and the cost due to such supplemental items of work shall be borne by the contractor.

Thus, in the EPC contract system followed in the State, the contract price would not be adjusted for any increase or decrease in the cost of work on account of changes work quantities/designs, necessity of any additional items of work, *etc*., as long as there is no change in the outcomes to be achieved as defined in the basic project parameters in the agreements.

Audit, however, observed instances where the Department on one hand allowed additional payments to the EPC contractors for works within the scope of agreements but on the other hand did not adjust the payments where there were reductions in the work quantities, as discussed in the following paragraphs:

6.4.1.1 Undue benefit to contractor due to non-deduction of cost of work not executed

Under the erstwhile PCSS project, the work of Package-18 was entrusted (February 2009) to a contractor for ₹700.75 crore, under EPC turnkey contract system. The scope of work in this package consisted of construction of water conveyor system (lined gravity canal and tunnel) and creation of distributary network for a CA of 15,000 acres. During re-engineering of the project, the Department made (June 2017) some changes in the scope of work. Accordingly, the Department prepared a revised estimate and concluded (November 2017) a supplemental agreement with the contractor for an additional amount of ₹57.32 crore.

Audit observed that though there are both increases and reductions in the scope of work under some components, the Department provided additional amounts for the increases in work in the supplemental agreement but did not deduct the amounts for reductions in the quantities/scope of certain items of work as shown below.

Table 6.8 - Non-deduction of amounts for reduction in scope of work in Package-18

S. No.	Original scope of work	Changes made in the scope of work	Amount adjusted in the supplemental agreement
1	Excavation of gravity canal for a length of 39.60 Km with carrying capacity of 87.21 cumces	Carrying capacity of canal increased to 164 cumecs for a length of 2.505 Km	Additional amount of ₹19.05 crore was provided.
2		Carrying capacity of canal reduced from 87.21 cumecs to 81.10 cumecs in 34.10 Km and to 78.10 cumecs in 0.05 Km	No deduction was made for the reduction in the discharge capacity in these reaches and reduction in canal length (₹19.23 crore).
3		The total length of canal reduced from 39.60 Km to 36.655 Km (*i.e.*, by 2.945 Km)	
4	Excavation of lined tunnel (7.00 m dia) for a length of 6.28 Km	Length of tunnel reduced from 6.28 Km to 3.598 Km	No deduction was made for the reduction in tunnel length (₹63.85 crore).
5	One Adit[162] tunnel was proposed	Adit tunnel deleted	No deduction was made for Adit tunnel not excavated (₹11.24 crore).
6	No diversion structures were proposed	5 structures were proposed for Haldivagu crossing	Additional amount of ₹20.96 crore was provided.

Source: Records of the I&CAD Department

Due to non-deduction of the cost of reduction in works has resulted in inflating the value of agreement by ₹94.32 crore and undue benefit to contractor to that extent.

[162] *Adit* is a horizontal or near horizontal passageway to a larger underground tunnel for the purpose of ventilation, water removal and/or for use as auxiliary entrance to the main tunnel

The Government replied (November 2023) that during re-engineering, the discharge capacity was increased from 87.21 cumecs to 164 cumecs from the starting point to Haldi vagu crossing and additional amount towards execution of gravity canal up to Haldi vagu and for the diversion structures at Haldi vagu was provided in the revised IBM. The balance scope of work *i.e.,* from the reach beyond the Haldi Vagu crossing to end point was not changed. IBM Committee in its meeting held in July 2017 approved the IBM value of the gravity canal for a length of Km 34.10 from Km 26.625 to Km 60.725 by adopting the section as approved by the CE, CDO for 87.21 cumecs to carry the modified discharge against 81.10 cumecs. Hence, the same amount as provided in the original IBM was incorporated in the revised IBM and the same was approved (July 2017) by Government. It was also submitted that length of the gravity canal and tunnel was finalised after investigation and therefore, no deduction in the cost of gravity canal and tunnel was incorporated in the revised IBM. As regards the adit tunnel, Department stated that it is used to facilitate access to the main tunnel works. It is neither the component of the work nor the basic parameter. Due to non-taking up the adit tunnel, the cost of land acquisition towards adit tunnel was saved to the Government and also benefited the farmers.

The reply is not tenable as the Department chose to add additional amount when there are increases in the scope of the work but it ignored to reduce the cost in case of reductions. In the revised estimate, it was clearly mentioned about the revised hydraulic particulars (HPs) of this Package as approved by the CE, CDO in June 2017. The IBM Committee should have insisted for reduction in cost of gravity canal and tunnel on account of reduction in the overall length and revised cross section of the canal/tunnel according to the revised HPs approved by CE, CDO.

Further, the Government's contention that the agreement value would be adjusted only when there is a change in the basic project parameters is also not acceptable since the basic parameters in the agreement of Package-18 mentions the discharge capacity of the canal as 87.21 cumecs. As per the revised HPs, the discharge of canal was reduced from 87.21 cumecs to 81.10 cumecs in 34.10 Km and to 78.10 cumecs in 0.05 Km. While the Department allowed the additional cost where there was increase in the discharge capacity, it did not deduct the cost in case of the reduction. As regards the adit tunnel, Department admitted that adit tunnel was not taken up in this Package. However, it did not answer as to why the provision of adit was included in the revised estimate when it was not needed for execution.

6.4.1.2 Issues related to payment of dewatering charges

(A) Payment of dewatering charges contrary to agreement conditions

The terms and conditions of the EPC agreements stipulated that the contractor was expected to quote the bid price in lumpsum after careful analysis of the performance of work to be completed considering all specifications and conditions of contract. Further, the contractor shall also be deemed to have inspected and examined the site and to have satisfied himself, before submitting his bid, as to the form and nature

thereof including the sub-surface conditions and other local conditions, the hydrological, geological and climatic conditions, the extent and nature of work and materials necessary for the completion of the works, *etc*. The agreement conditions clearly stipulated that no payment shall be made towards dewatering[163]. In case dewatering was found to be essential but the contractor suspends dewatering operations, the Engineer-in-Charge shall have the liberty to take over dewatering operations and recover the amount spent thereon from the contractor.

In deviation to above agreement clauses, the Government approved (March 2019) additional payment of ₹50.17 crore to the contractor of Package-7 towards dewatering charges on the ground that the alignment of the tunnel is passing under SRSP canal, distributaries and its CA due to which weak and shear zones were encountered resulting in formation of open and internal cavities. However, additional payment for dewatering charges contrary to agreement conditions resulted in undue benefit of ₹50.17 crore to the contractor.

The Government replied (May/November 2023) that the alignment of Package-7 twin tunnels is passing under the SRSP canal and its distributaries at several places. In addition, there is a stream which is crossing the tunnels at Km 4.950. During execution, internal and open cavities were formed due to weak and shear zones encountered. Due to these factors, heavy seepages occurred in the entire stretch of tunnels necessitating huge dewatering in addition to the nominal provision made in the estimate. This feature is seen only in Package-7 unlike Package-6 & 8 which met with normal and routine working conditions. It was further replied that during a review meeting, the agency had represented to the Chief Minister that the provision for dewatering in the estimate was nominal and requested to compensate for the additional cost of dewatering being incurred by them during execution and that the Government had agreed to consider the same. Considering the peculiar site conditions, the State Level Standing Committee agreed and recommended to the Government for consideration and approval for the additional cost of dewatering for an amount of ₹50.17 crore treating this as a special case. Accordingly, the Government accorded approval for the additional cost towards dewatering for an amount of ₹50.17 crore, duly relaxing the agreement conditions.

The fact remains that this is an EPC contract under which the contractor is bound to execute all supplemental works that are found essential, incidental and inevitable during execution of main work at no extra cost to the employer. Further, the agreement conditions clearly stipulated that no payment shall be made towards dewatering. The additional payment for dewatering charges was contrary to the agreement conditions and resulted in undue benefit to the contractor.

[163] dewatering means removing groundwater seeping into the work site which would hinder the execution of work.

(B) Undue benefit to contractor due to payment of dewatering charges

In respect of the work 'Construction of Medigadda Barrage' (entrusted in Lumpsum contract mode), in response to a query by a prospective bidder during pre-bid meeting (May 2016), the Department clarified that dewatering charges would be paid subject to a ceiling of five *per cent* on the relevant work components for which dewatering is required. Accordingly, a clause to this effect was included in the agreement. Audit, however, observed that without providing any justification, the Department sanctioned 7.16 *per cent* of value of work as dewatering charges instead of restricting it to five *per cent*, as clarified during pre-bid meeting. The excess over five *per cent* worked out to ₹29.01 crore, which is contrary to the agreement conditions and an undue benefit to the contractor.

The Government replied (May 2023) that continuous dewatering at Medigadda Barrage, was essential as the river flow increased after confluence with perennial river Pranahitha at Kaleshwaram. The provision for dewatering was made in the Revised Estimate-I for 2,84,54,010 KwHr subject to a ceiling of 5 *per cent* of the relevant components. Further, due to heavy monsoons the total dewatering quantities increased to 4,79,40,324 KwHr which was 8.42 *per cent* of relevant components. Accordingly, restricting clauses were relaxed/ exempted.

The reply of the Government is not tenable as the demand of the bidders to allow dewatering charges based on actual quantities was rejected in the pre-bid meeting. Accordingly, the prospective bidders would have quoted their bid prices, foreseeing the expected dewatering quantities. Therefore, post bid relaxation to the agreement conditions is tantamount to passing of undue benefit to the contractor.

6.4.1.3 Undue benefit to contractor due to allowing additional payments contrary to agreement conditions

The work under Package-9 was entrusted (November 2008) to a contractor under EPC turnkey contract system for ₹714.71 crore. The scope of work, *inter alia*, included excavation of a tunnel for a length of 7.885 Km with 5 metres diameter. After re-engineering, the Department later increased (March 2017) the tunnel diameter to 5.8 metres and accordingly revised the agreement value.

As the progress of work was slow, the Department later deleted (July 2017 to July 2020) parts of work from the scope of this contract and entrusted them to five different agencies, as per the same terms and conditions as that of the original contract. Part of the tunnel work was entrusted (July 2017) to one of the contractors at an agreed value of ₹239.82 crore.

Audit observed that the terms and conditions of this EPC turnkey contract stipulated that the contractor was bound to execute the entire work on a firm lump sum price on a single source responsibility basis. The agreement conditions further stipulated that the contractor was bound to execute any items of work contingent to main work at no extra cost and the cost of such items shall be deemed to have been included in the contract price. The agreement clauses also stipulated that no separate payment would

be made for dewatering and the quoted bid price is inclusive of such charges. However, the Department included (May 2020) an amount of ₹3.45 crore towards additional adit tunnel, ₹5.24 crore for spacing the vehicle pockets[164] and ₹2.79 crore towards dewatering charges in the revised estimate, even though these items fall under the original scope of work as per the EPC agreement conditions. Inclusion of these amounts was contrary to these agreement conditions and resulted in inflating the revised estimate/agreement and undue benefit of ₹11.48 crore to the contractor[165].

The Government replied (May 2023) that additional adit at Km 4.350 was proposed to speed up the work. Further, the size of vehicle pocket was increased for smooth parking of heavy machinery. The tunnel was passing through the weak and shear zone due to which open and internal cavities were formed leading to huge dewatering quantities. Hence, the provision for adit, vehicle pockets and dewatering was made in the revised estimate.

The reply is not acceptable as the additional expenditure on excavation of adit, vehicle pockets and dewatering were to be borne by the contractor as per the EPC Contract conditions. Hence, allowing additional cost contrary to the agreement conditions was not justifiable.

6.4.1.4 Non-reduction of cost of works not required to be executed

Package-16 (under link-V) of earlier PCSS project was entrusted (February 2009) to a contractor for ₹1,082.97 crore on EPC Turnkey basis. The scope of work mentioned in this agreement, *inter alia*, included excavation of Reach-II (for a length of 89 Km) of canal from Tipparam tank up to Panthangi (V) of Chityala (M) of Nalgonda District with a carrying capacity of 33.20 cumecs, construction of Baswapur reservoir with a capacity of 0.8 TMC and creation of distributaries for a CA of 1.66 lakh acres.

During re-engineering of PCSS project, the capacity of Baswapur reservoir was increased. The work of formation of the Baswapur reservoir was deleted from the scope of this work and entrusted to another contractor.

Further, the scope of the work under Package-16 agreement was changed during re-engineering. Due to increase in capacity of Baswapur reservoir, the discharge capacity of the canal which was to feed water to the reservoir (from chainage Km 36.202 to Km 41.800) was increased from 33.20 cumecs to 70 cumecs. Accordingly, the Department concluded (November 2018) a revised agreement with the contractor for ₹1,059.75 crore for the work retained under Package-16.

(i) Audit observed that the scope of work under the original agreement included excavation of main canal for a length of 89 Km. However, as per the approved designs, the length of canal was reduced during execution to only 57.80 Km and the work was being executed accordingly. Despite knowing this fact, while working out the revised value of work, the Department did not deduct the cost of the 31.2 Km canal portion

[164] vehicle pocket in a tunnel is intended for parking of vehicles to allow passing of vehicles coming from the opposite direction

[165] In the supplemental agreement concluded in June 2020

which was not required to be executed. This resulted in likely undue benefit up to the extent of ₹93.40 crore[166] to the contractor.

The Government replied (May 2023) that the length of the main canal incorporated in technically sanctioned estimate was as per the preliminary survey and was considered for estimation purpose to arrive at the IBM value. It was also stated that the work was entrusted on EPC mode and that the contractor was to undertake detailed surveys of the alignments incorporated in the estimate so as to meet the criteria of providing irrigation facility to the 1,65,500 acres of CA.

The reply of the Government is not tenable because at the time of re-engineering, additional amount was provided for additional work incorporated in the agreement. On the contrary, when some portions of work were deleted from the scope of work, no corresponding deduction was made from the agreement value.

The Government further replied (November 2023) that as per the IBM estimate, the main canal was proposed from Km 36.202 to Km 94.000 for a length of 57.8 Km. Further, at Km 94.000, LMC and RMC with approved length of 13.7 Km and 16.15 Km, respectively, were proposed. Hence, the total length of main canal including LMC and RMC was 87.649 Km and saving in the length of the main canal is only 1.352 Km and not 31.20 Km as pointed out by Audit.

This reply is also not acceptable since in the revised estimate, additional amounts were provided for additional works resulting from re-engineering, while no reduction was made for the reduction in the length of canal. Further, as per the original estimate, the designed discharge of the main canal beyond Km 94.500 was not less than 10.876 cumecs and its cost was worked out accordingly. This cost is carried forward in the revised estimate also. On the other hand, the design discharge of the LMC and RMC, which are stated to be under execution in lieu of the deleted main canal, are only 2.496 cumecs and 0.37 cumecs, respectively, and hence not comparable with the deleted portion of main canal[167].

(ii) Further, the increase in the size of Baswapur reservoir also led to reduction in the length of the main canal on the downstream side of the reservoir by 167 metres. However, the Department did not deduct the cost of this portion resulting in a further undue benefit of ₹1.72 crore to the contractor.

The Government replied (November 2023) that in view of the approved MDDL of Baswapur, the discharge from Km 44.117 to Km 44.650 was enhanced from 22.746 cumecs to 25.403 cumecs and two additional structures were necessary to negotiate the canal bed level and the cost of the same was adjusted against the reduced length of the canal.

[166] The cost for constructing the additional LMC and RMC and other structures as given in the reply of the Department could not be calculated by Audit due to lack of sufficient information.
[167] The cost for constructing the additional LMC and RMC and other structures as given in the reply of the Department could not be calculated by Audit due to lack of sufficient information.

The reply is not acceptable in view of Clause 39.3.2 of the agreement, which entails that any contingent work on the main work should be done by the contractor at no extra cost. The two additional structures stated to be executed are the items contingent on the main work and hence the contractor was bound to execute with no extra cost to the Department. On the other hand, the portion of canal not required to be executed due to change in scope of work while re-engineering should have been deducted from the revised estimate and supplemental agreement.

(iii) Audit also observed that due to increase in the size of Baswapur Reservoir, a stretch of 2.317 Km of main canal already excavated under Package-16 on the upstream side came under submergence. By that time, the contractor had not executed cement concrete (CC) lining in this canal reach. However, while computing the revised agreement value for the balance work under Package-16, the Department did not deduct the cost of lining work in the submerged canal reach from the agreement. This resulted in undue benefit of ₹2.77 crore to contractor for the CC lining work which was not required to be executed.

The Government accepted the audit observation and replied (November 2023) that the cost of lining from Km 41.800 to Km 43.950 worked out to ₹2.46 crore only and that the amount would be recovered from the next bill.

However, the Government did not furnish any calculation in support of the amount of ₹2.46 crores and details of recovery are awaited (November 2023).

6.4.1.5 Execution of shorter length of gravity canal resulted in undue benefit to the contractor

As per the tender notice/agreement, the scope of work under Package-9 included excavation of a 29.50 Km long gravity canal with CC lining. After part of the canal excavation was done by the original contractor, due to slow progress of work, the Department later deleted the remaining portion of the canal from the scope of contract and entrusted it to another contractor at the same rates and terms of the original contract.

In the original estimate, an amount of ₹35.92 crore was provided for the excavation and CC lining of gravity canal. Audit observed that as per approved alignment/designs and actual execution, the length of canal was reduced from 29.50 Km to 24.921 Km (*i.e.*, by 4.579 Km). However, the Department allowed full payment to contractors without restricting the payment to the actual execution. This resulted in undue benefit of ₹5.69 crore[168] to the contractors.

The Government replied (November 2023) that as per the project basic parameters, the canal work has been carried out to create contemplated CA of 60,000 acres of new CA and 20,000 acres of stabilisation CA. Though, the length of the canal was reduced, the discharge in the canal increased from 10 cumecs to 12.987 cumecs *i.e.*, about 30 *per cent* in capacity. The canals for increased discharge were executed within the amount provided in the sanctioned estimate.

[168] The total amount provided in the estimate for 30.225 Km was ₹35.92 crore. The pro-rata cost of 4.579 Km = (₹35.92 crore X 4.579 Km/30.225 Km) + ₹0.25 crore (Tender Percentage @ + 4.643%)

Reply of the Department is not acceptable as the Department did not provide any evidence in support of its argument that reduction in canal length was compensated by increased water discharge, thereby ensuring that the proposed ayacut (60,000 acres and stabilisation CA of 20,000 acres) was served even with reduced specifications. In the absence of any documents to prove that there was change in other specifications such as width and depth to compensate for the length reduction, Audit is unable to derive assurance that allowing of full payment to the contractor was justifiable.

6.4.1.6 Unwarranted provision towards Service Tax in the agreement

Under the PCSS project, the work of Package-20 was awarded (November 2008) to a contractor for ₹892.67 crore for completion by November 2012. Due to slow progress of execution of work by the contractor, the Department deleted part of the work from the contract and entrusted (June 2020) it to three different contractors by concluding separate agreements with them.

Audit observed that in one of the contracts concluded for the balance works, the Department included an amount of ₹9.54 crore towards Service Tax, even though irrigation works executed for the Government were fully exempt from levy of Service Tax. Though no amount had so far (January 2022) been paid to contractor towards Service Tax, inclusion of ₹9.54 crore for the same in the agreement was unwarranted and would result in undue benefit to contractor.

The Government replied (May/November 2023) that the Service Tax of ₹9.54 crore which is available in the estimate was exhibited in the payment schedule but the same has not been paid to the contractor. It was further stated that the revised estimate is under preparation and the Service Tax provision would be deleted from the revised estimate.

6.4.2 Undue benefit/excess payment to contractors due to inflation of values of revised estimates/supplemental agreements

After initial entrustment of works to contractors, there will be occasions where changes in scope of work are necessitated or additional works are to be taken up. As per Note-6 under Para 154 of the AP Public Works Department (APPWD) Code, such ‘supplemental’ or ‘additional’ items of work can be entrusted to the original contractor. Before entrustment of additional items of work, the Department prepares revised estimates and after approval of the same, concludes supplemental agreements with the original contractors. Since entrustment of additional works to the original contractors is similar to entrustment on nomination basis, it is important that the revised estimates and the cost of additional items are prepared accurately. Audit observed cases where the Department had provided higher rates/costs for additional items in the revised estimates leading to inflation of the value of supplemental agreements and consequent excess payments/undue benefits to contractors, as discussed below.

6.4.2.1 Undue benefits to contractor due to incorrect preparation of revised estimate

Package-21 was awarded to a contractor under the earlier PCSS project for ₹1,143.79 crore. The scope of work in this package, *inter alia*, included excavation of a gravity canal to convey 8 TMC of water from Masani tank up to Padakanti tank. The canal was proposed to run parallel to the existing Nizamsagar Project (NP) canal. Later, in order to avoid extra land acquisition for the parallel canal, the Department decided (June 2012) to utilize the existing NP canal as combined canal for NP and Package-21 by increasing its carrying capacity in the entire stretch of 14.40 Km.

After re-engineering of PCSS project, some of the other components of work (like creation of distributary network, *etc*.) under Package-21were deleted (October 2017) and taken up separately. Accordingly, the Department prepared (February 2020) a revised estimate for ₹807.92 crore covering the work of increasing the discharge capacity of NP canal. Audit observed that the revised estimate prepared by the Department was inflated resulting in undue benefit to contractor as discussed below:

(i) In the revised estimate, the Department provided ₹45.66 crore for cement concrete (CC) lining of NP canal. Audit observed that as per the canal drawings already approved (March 2016) by the Department, cement concrete (CC) lining to canal was to be provided with 100 mm thickness from Km 0.00 to Km 1.32 and with 75 mm thickness for balance stretch from Km 1.32 to Km 14.40 and the contractor was executing the work accordingly. However, in the revised estimate, the Department provided the cost of CC lining with 100 mm thickness even for the 13.08 Km long reach where 75 mm thick lining was being executed and was making payments to contractor accordingly. Thus, the incorrect excess provision of lining thickness resulted in inflating the cost of work by ₹13.25 crore and undue benefit to contractor to that extent.

The Government accepted the audit observation and assured to recover the excess payment from the next bill.

(ii) Audit further observed that in the revised estimate, the Department provided ₹6.37 crore for CNS treatment[169] in the canal reach from Km 3.00 to Km 14.40. However, it was observed that as per the soil test reports (2013) in this canal, CNS treatment was not required for canal in certain reaches[170] (for canal bed and slopes for a total length of 5.475 Km and for canal sloped for a length of 2.175 Km). The Department also confirmed that CNS treatment was not required in these reaches. Despite this, the Department provided the cost of CNS treatment for the entire reach from Km 3.00 to Km 14.40 and accordingly, was making payments to contractor. This resulted in undue benefit of ₹3.19 crore to the contractor.

[169] A layer with Cohesive Non-Swelling (CNS) soils is laid beneath CC lining to ensure that the lining is not disturbed due to swelling of soils in the canal bed and slopes

[170] Side slopes and canal bed in reaches Km 3.5 to Km 4.2, Km 8.25 to Km 8.45, Km 9.25 to Km 9.475, Km 9.75 to Km 11.95 and Km 12.25 to Km 14.40; and side slopes in reaches from Km 2.275 to Km 3.475, Km 4.225 to Km 4.700 and Km 5.000 to Km 5.950

The Government, in its reply (November 2023) concurred that CNS soil treatment was not required in 2.725 Km in the executed portion from Km 0.000 to Km 9.75 and that CNS treatment would be required from Km 9.75 to Km 14.400. It was further replied that a revised estimate as per actuals was under submission.

However, the Government did not furnish the details of canal reaches where the CNS treatment was claimed to be not required in the executed canal portion. As per the the soil test reports available with the Department, CNS treatment was not required for a total length of 3.300 Km (in canal bed and slopes for a total length of 1.125 Km and in canal slopes for a length of 1.175 Km) out of the 9.75 Km length stated to be executed so far. The Government did not furnish the reasons for this variation. Further, in the balance canal reach yet to be executed also, CNS treatment was not required in 4.35 Km (in canal bed and slopes).

The fact, however, is that the soil test reports available with the Department showed that the soils in canal reaches for a total length of 7.65 Km conformed to the properties[171] of CNS soils as prescribed in IS Code: 9451 (1994) and therefore, no CNS treatment was required in these reaches. Thus, the excess payment made should be recovered.

(iii) As per the Goods and Services Tax (GST) Act – 2017, the GST leviable on works contracts was stipulated as 12 *per cent*. The orders issued (July 2018)[172] by Government of Telangana also stipulated that GST at the rate of 12 *per cent* should be added to the value of works executed after 22 August 2017. Audit, however, observed that while preparing the revised estimate for Package-21, the Department added GST at 18 *per cent* on the cost of surge protection system instead of 12 *per cent*. This resulted in inflating the revised cost of work by ₹0.65 crore and undue benefit to contractor.

The Government (Finance Department) replied (October 2023) that the excess provision of GST would be corrected in the revised estimate.

6.4.2.2 Excess payment due to adoption of incorrect rate of Overheads and Contractor's profit

The Department prepared the estimates for the works of Medigadda, Annaram and Sundilla barrages with SoR 2015-16 and awarded the works after tender process. The original scope of these agreements *inter alia* contemplated 'sheet pile' foundations. After award of works, based on the site conditions, the specification of foundations was changed as 'Secant pile[173]' foundations. Accordingly, supplemental agreements were concluded with the contractors by including this as a supplemental item.

[171] *i.e.,* liquid limit ranging from 30 to 50 *per cent* and plasticity index ranging from 15 to 30
[172] G.O.Ms.No.67 of Irrigation and CAD (Reforms) Department, dated 14 July 2018
[173] Secant Pile wall consists of overlapping piles (primary and secondary piles) to for structural or cut-off walls to achieve water tightness

As per the preamble of SoR for the year 2015-16, 'Over Head Charges and Contractor's Profit' was to be allowed at the rate of 13.615 *per cent* while computing the rates for work items. Audit, however, observed that while computing the rate for the supplemental item (Secant pile), the Department added overhead charges and contractor's profit at the rate of 20 *per cent* and 10 *per cent*, respectively. Providing overhead charges and contractor's profit at the rate of 30 *per cent* instead of 13.615 *per cent* as stipulated in the SoR has resulted in excess payment of ₹35.07 crore[174] to the contractors of these three works.

The Government replied (November 2023) that the Data for Secant Piles is not available in the SoR 2015-16 of Government of Telangana. Hence, the Data and Rate of Secant piles was adopted from the "MoRTH[175]" specification of Government of India, which is being adopted in Roads & Buildings Department of Government of Telangana. The overhead charges and contractor's profit at the rate of 20 *per cent* and 10 *per cent*, respectively are provided for Secant piles as per the "MoRTH" Data and is not comparable with the provision of the SoR 2015-16 as the item of this work is very specialized and deduced from the "MoRTH" Data.

The contention of the Government is not correct as the rates arrived at by the Department are deduced from the combination of both the MoRTH specifications and also the State Standard Data applicable for irrigation works. From the approved estimate prepared for Secant Pile, it is clearly seen that the rates of items such as cement concrete, reinforcement, *etc*. used in the work were adopted from work estimate, which was prepared as per Standard Specifications/SoRs of the State for irrigation works. Hence, adoption of overhead and contractor's profit as per the MoRTH was not justified.

6.4.2.3 Undue benefit to contractor due to inflating the amount payable for survey and investigations

The work under Package-9 was entrusted (November 2008) to a contractor under EPC contract system. The scope of work under this EPC contract includes conducting of detailed survey and investigations and preparation/submission of designs and drawings by the EPC contractor. In the estimates prepared for the work, the Department had included an amount of ₹3.04 crore towards the cost of survey and investigations, worked out at the rate of 0.50 *per cent* of the estimated cost of works (₹608.26 crore).

Due to re-engineering of the project, the scope of work under this package increased and the Department prepared (November 2021) a revised estimate (RE) for the revised scope of work. As per the RE, the cost of work was computed as ₹868.41 crore. Audit, however, observed that in the RE, the Department provided the cost of survey and investigations at the rate of 2.82 *per cent* instead of adopting 0.5 *per cent* as per the

[174] Medigadda: ₹13.40 crore; Annaram: ₹11.14 crore and Sundilla: ₹10.53 crore
[175] Ministry of Road Transport and Highways

original estimate. This resulted in inflation of value of revised estimate/ supplemental agreement by ₹20.17 crore and undue benefit to contractor to that extent.

Similarly, in the revised estimate of Package-20 also, the Department provided the cost of survey and investigations at the rate of 3.95 *per cent* contrary to the 0.5 *per cent* provided in the original estimate. This led to inflation of value of revised estimate by ₹27.29 crore.

Table 6.9 – Inflated provision for survey and investigations

S. No.	Package No.	Percentage of S&I in the original estimates	Cost of revised scope of work as per RE (₹ in crore)	Amount to be provided for S&I (₹ in crore)	Percentage adopted in the REs	Actual amount provided in the RE (₹ in crore)	Excess amount provided (₹ in crore)
1	9	0.50	868.41	4.34	2.82	24.51	20.17
2	20	0.50	790.15	3.95	3.95	31.24	27.29

Source: Records of the I&CAD Department

The Government replied (May/November 2023) that the provision towards Survey & Investigations was proposed at the rate of 0.5 *per cent* only in the original and revised estimates of these works. However, in view of the intricate nature of work, the amount payable for Survey & Investigations was later increased to 3.5 *per cent* in the payment schedule duly reducing the amounts allotted for other components of work, but within the total agreement values.

However, the copies of the latest detailed estimates/working sheets have not been furnished in support of the reply. As such, Audit could not verify the correctness of the facts stated in the reply.

6.4.2.4 Unwarranted additional payment for approach road

The Department entrusted (August 2016) the work of construction of Medigadda barrage to a contractor for ₹1,849.31 crore with a stipulation to complete the work within 24 months. Due to subsequent changes in scope of work, the value of work under the agreement was increased to ₹4,321.44 crore.

The contract conditions stipulated that – "*In addition to existing public roads constructed by Government, if any, in the work area, all the additional approach roads inside work area required by the contractor shall be constructed and maintained by him at his own cost".* The agreement clauses further stipulated that *"The contractor's heavy construction traffic shall not traverse any public roads unless the contractor has made arrangement with the authority concerned. In case contractor's heavy construction traffic or equipment is not allowed to traverse any public roads and the contractor is required to make some alternative arrangements, no claim on this account shall be entertained".*

Audit, however, observed that during execution of work, the Department entrusted another work of construction of a new 60 feet wide bituminous road for a length of

13.90 Km from Kudurupally village to the Medigadda barrage to the same contractor as an additional item at an estimated cost of ₹46.28 crore. The cost of this road work was further increased to ₹66.29 crore, due to laying of bituminous layer on the above road and taking up another road work from Medigadda barrage to Ambatpally village. An amount of ₹44.42 crore had been paid to the contractor so far (January 2022) for the road work.

The Department justified taking up this road work on the ground that the existing single lane R&B road from Mahadevpur village to the barrage site was passing through five villages and movement of contractor's heavy vehicles would pose problems to the residents. Further, the road had many electrical line crossings all along its length and shifting of all those electrical lines was a difficult task.

It is evident from this that the road work was taken up to facilitate smooth movement of men, machinery and materials of the contractor. Therefore, the cost of this road work should have been borne by the contractor, as per the agreement conditions. Instead, the Department shouldered this cost by entrusting the work as additional item resulting in undue benefit to the contractor to the tune of ₹66.29 crore, contrary to agreement conditions.

The Government replied (May 2023) that the constructed approach road is an alternate road from Kudurupally village to Medigadda Barrage outside the work area of Medigadda Barrage. The existing R&B road leading to the barrage site was a single lane narrow road and passing through forest and villages. It was difficult to shift the electrical lines all along the road and the heavy vehicle movement to the barrage site would have posed problems for the public. As such, it necessitated an approach road from Kudurupally (V) to Medigadda (V). Further, by providing the additional resources/facilities, the barrage work was completed in stipulated time.

The reply of the Government confirms that due to taking up of barrage work there was heavy vehicle movement which posed problems to the public. In this scenario, as per the agreement conditions, the cost of the newly laid road should have been borne by the contractor as it facilitated the smooth movement of men, machinery and materials.

6.4.2.5 Undue benefit to contractor due to increase in the agreement value

The scope of work under the EPC agreement of Package-9, *inter alia*, included excavation of a tunnel and construction of a pumphouse. While preparing the estimate, the Department contemplated construction of an open pumphouse and an amount of ₹101.20 crore was provided for pumphouse, surge pool and draft tube. The original contractor executed part of this work and was paid ₹26.34 crore. The Department later decided to execute the pumphouse underground instead of open pumphouse. Further, due to slow progress of work by the original contractor, the Department deleted the part of work from the scope of original contract and entrusted (July 2017) to another contractor for ₹214.02 crore with the same rates and conditions of the original agreement. In this agreement, an amount of ₹76.50 crore was provided for construction

of a pumphouse, surge pool and draft tube. After concluding the agreement, based on the request (November 2017) of the second contractor, the Department increased (May 2020) the cost of these works by adding the amount of ₹26.34 crore already paid to the first contractor. Such an increase in the amount payable for a particular work after concluding the agreement was highly irregular. Moreover, this increase was based on the request of the contractor only and was not supported by any evidence that there was any increase in the quantities. Thus, increase in the agreed value resulted in undue benefit of at least ₹26.34 crore to the contractor.

In response to the above, the Government stated that as per the recommendations of the High-Power Committee and suggestions of the Advisor for lift irrigation schemes, the surge pool and pumphouse are proposed in the underground. The Committee also directed to prepare the extra financial implications due to change in the basic project parameters. Accordingly, the expenditure was incurred.

Even though the High-Power Committee directed to prepare the extra financial implications, the same was not prepared by the Department. However, the Department allowed ₹26.34 crore based on the request of the second contractor without any assessment. Hence, allowing the same had resulted undue benefit to the contractor.

6.4.2.6 Irregular payment towards additional lead (conveyance) charges

The General Conditions of tender notice/contract for the work of construction of Medigadda barrage stipulated that the contractor should inspect the site and proposed quarries of choice for materials including quarrying, conveyance and all other incidental charges and quote his bid price. The Technical Specifications also specified that the contractor should examine availability of coarse aggregate from the existing stone crushers and opening of new quarries, *etc*., if required, and quote accordingly. The agreement conditions clearly stipulated that no claims on extra leads for aggregates would be entertained.

Audit observed that in the revised estimate, the Department provided extra lead charges for additional 28 Km for conveyance of metal in respect of some items of work. Payment for additional lead was contrary to the agreement conditions and resulted in excess payment of ₹26.46 crore to the contractor.

The Government replied (May 2023) that the only road through which the entire machinery and material has to be transported to the work site was very busy. There were hundreds of sand trucks from the sand quarry that were plying on the same road. About 450 trucks per day were deployed for transportation of material from source to batching plant on both Right bank side (TS) and Left bank side (Maharashtra) of the barrage. The above circumstances enforced the transport of construction materials for project works from Kaleshwaram-Sironcha side to Pochampally (v) Maharashtra side in order to complete the work in time.

The reply of the Government is not tenable as the contractor was required to execute the work within the quoted price. Thus, the payment towards additional lead was against the agreement conditions.

6.4.2.7 Avoidable extra expenditure due to non-utilization of excavated rock

The work of Construction of Malkapet Reservoir (under Link-III) was entrusted (September 2017) to a contractor under LS system. The scope of work under this contract included several items including earthwork excavation in hard rock (requiring blasting) for formation of reservoir and laying of rock toe[176] to the reservoir bund.

The bill of quantities in the agreement contained two rates for the work of laying of rock toe. The rate of laying rock toe by re-using the excavated hard rock was ₹425.10 per Cu.M. and the rate for laying with stone brought from quarry was ₹736 per Cu.M. The contractor has so far (February 2022) laid rock toe of a total quantity of 1,34,888 Cu.M. Out of this, the Department made payments for 63,706 Cu.M. at the rate of ₹425.10 per Cu.M. (re-used rock) and for 71,182 Cu.M. at the rate of ₹736 per Cu.M.

Audit observed that in this work, the contractor has so far excavated a total quantity of 2.72 lakh Cu.M. of hard rock. Thus, sufficient hard rock was available for re-use in laying of rock toe. However, only 63,706 Cu.M. of rock was shown as re-used in the work. Payment of higher rate (applicable for rock brought from quarry) for rock toe despite availability of excavated hard rock resulted in avoidable extra expenditure of up to ₹2.18 crore[177] and undue benefit to contractor. Further, there is also the possibility of an additional commitment of ₹1.22 crore on the rock toe quantity of 40,050 Cu.M. still to be executed by the contractor.

The Government replied (November 2023) rock samples from total available quantity of 1,58,604 Cu.M. of surface boulders were tested (August 2020) as per IS Codes and the useful quantity of 39,651 Cu.M. was utilised for revetment. It was further replied that 1,18,848 Cu.M. of rock spoil was obtained during excavation of cut-off trench through open blasting. As the quality of rock spoil can be visually assessed, sample testing was not required. The Government stated that rock spoil stacked and measured was 63,706 Cu.M. which was used in the rock toe. The total useful quantity of 1,03,357 Cu.M. was utilised for revetment and rock toe and there is no balance work left over.

In the instant case, Audit is unable to corroborate the correctness of the quantity of useful rock stated to be available in this work since the Department got test reports for a rock spoil of only 1.53 lakh Cu.M. as against the total excavated hard rock of 2.72 lakh Cu.M. In case the total excavated quantity was tested, there was a possibility of getting additional useful rock.

[176] Rock toe is a structure of rocks placed along the water's edge on the lower part of earth dam (on the downstream side) to provide drainage and/or to protect the earth dam from tail water erosion

[177] (₹736 - ₹425.10) X 71,182 Cu.M. = ₹2.21 crore. After applying tender discount of 1.30 *per cent*, the amount works out to ₹2.18 crore

6.4.3 Recoveries from contractors

6.4.3.1 Extra expenditure due to non-recovery of cost of filling of over-breakages in tunnel from contractors

The work under Package-9 was entrusted (November 2008) to a contractor for ₹714.71 crore under EPC contract system. The work under this package included excavation of a 12.035 Km long concrete lined tunnel with 5.8 metres diameter. As the progress of work was slow, the Department later deleted part of the tunnel work from the scope of this contract and entrusted (October 2017) to another contractor. Accordingly, the tunnel excavation work was executed by these two contractors. The Department later entrusted (July 2020) the work of providing cement concrete lining inside the tunnel to a third contractor for an agreed value of ₹78.85 crore.

The agreement concluded with the third contractor included an amount of ₹8.87 crore towards filling of over-breakages[178] in the tunnel. Audit observed that the specifications for tunnels incorporated in the agreements concluded with the first and second contractors stipulated that any over-breakages/enlargements in excavation shall be back filled with concrete (similar to lining) at the cost of the contractor. In the instant case, the over-breakages occurred when the tunnel excavation was done by the first and the second contractors. Since these contractors left the work without backfilling with concrete, the Department should have recovered the cost of refilling the over breakages with concrete from them as per the contractual provision. However, the Department did not take any action to recover the same from the earlier contractors, resulting in additional financial burden of ₹8.29 crore on public exchequer.

The Government replied (November 2023) that at the time of preparation of IBM, the Department proposed with an over breakage of 150 mm on either side including tunnel lining 300 mm thickness on either side. As per Geologist's report, over breaks were noticed at many reaches due to intersection of sub-horizontal joints with vertical joints and due to shearing affect along the jointed rock mass. During the excavation, over breaks were encountered beyond the provision made in the estimate. To fill up this with CC lining, extra amount was allowed. It was further replied that the type of strata cannot be anticipated at the time of preparation of IBM estimate as investigation has to be carried out by the agency.

The reply is not acceptable since this is an EPC contract under which the contractor was responsible for any variation in the work quantities. Further, allowing extra amount for filling of over breakages over and above the permissible limit is contrary to agreement conditions and hence not justifiable.

[178] Over-breakages denotes the excess area excavated beyond the profile upto which excavation is actually required to be done

6.4.3.2 Excess payment to contractors due to non-deduction of embedded taxes

The Department prepared the estimate for Package-18 with Schedule of Rates (SoR) for the year 2008-09 and awarded (February 2009) the work to a contractors after tender process. In the estimate, the rates of materials to be used in the work were inclusive of the applicable Central/State taxes.

After introduction (July 2017) of Goods and Services Tax (GST), the works contracts were being subjected to GST at the rate of 12 *per cent*/18 *per cent*. Thus, to avoid GST on the taxes already included in the cost of works, the Government of Telangana issued (July 2018) orders[179] that in respect of the works done after 01 July 2017, the taxes already embedded in the rates/materials under the existing contracts should be deducted and to the net value of work so arrived at, GST at the rates applicable from time to time should be added while making payments to contractors.

In Package-18, while computing the amount of embedded taxes to be deducted from the cost of work, the Department worked out the amount of embedded taxes in the work item 'earthwork excavation in hard rock' as ₹3.79 per Cu.M. However, while making payments to contractor, the Department did not deduct this tax, resulting in excess payment of ₹1.65 crore to the contractor.

The Government replied (November 2023) that the excess paid amount of ₹1.65 crore had been recovered from the Running Account bill-27. However, no records have been furnished to Audit in support of proof of recovery.

6.4.4 Price adjustment payments

6.4.4.1 Excess payment of price escalation due to adoption of incorrect value of work

The terms and conditions of the contracts of Medigadda, Annaram and Sundilla barrage works provided for price adjustment in case of variation in the prices of steel, cement, POL (Petrol, Oils and Lubricants), labour and other materials. Accordingly, the Department paid a total amount of ₹529.39 crore to contractors towards price adjustment in these contracts.

The clauses relating to price adjustment in these contracts stipulated that for the purpose of calculating the price adjustment amount, the seigniorage charges, VAT and other overhead charges shall be deducted from the total value of work done. From the net value of work, the cost of the relevant component (*viz*., steel, cement, *etc*.) would be worked out and the price variation would be worked out on this cost. Audit observed that while computing the amount of price adjustment payable to contractors, the Department deducted seigniorage charges and overhead charges from the total value of work but did not deduct the amount of taxes embedded therein. This led to inflating the cost of each component (for which price variation is being paid) in the

[179] GO Ms.No.67 of I&CAD (Reforms) Department, dated 04 July 2018

work done. As a result, an amount of ₹16.91 crore was excess paid to contractors in these three works towards the price adjustment.

The Government replied (November 2023) that the excess payment in respect of Annaram barrage was adjusted and that excess amount in respect of Medigadda and Sundilla barrages would be adjusted from the next bill.

The details/evidence of recovery were not furnished to Audit (November 2023).

6.4.5 Excess payments recovered at the instance of Audit

In respect of three works Audit had pointed out cases of excess payments amounting to ₹65.45 crore, as shown in the Table below:

Table 6.10 – Issues pertaining to excess payments pointed out by Audit

Sl. No.	Name of the work	Issue pointed out by Audit	Amount pointed out (₹ in crore)
1	Package-12	Incorrect inclusion of steel	62.82
2	Kondapochamma Sagar Reservoir (Reach-1)	Recovery of cost of stone and lead charges	1.76
3	Package-15	Excess payment of price adjustment on POL	0.87
	Total		**65.45**

Source: Replies furnished by the Government to the audit observations

The detailed description of the above cases is given in ***Appendix 6.1***.

The Government, while accepting the facts (November 2023), replied that the entire amount had been recovered from the contractors at the instance of Audit.

Though the Government furnished the recovery particulars in respect of the above cases, it did not state the action taken/proposed to fix responsibility on the officials responsible for preparation of incorrect estimates/excess payments.

Recommendation - 11

The Department should review the cases of inflated estimates and undue benefits to contractors pointed out by Audit, fix responsibility on the officials involved and take immediate steps to recover/prevent the excess payments to contractors.

6.4.6 Advance payment on electro/hydro-mechanical equipment and pipes

The scope of work under Package-21A (in Link-VII) included construction of two lifts and installation of Pressured Pipe Irrigation Systems (PPIS) to irrigate two lakh acres of CA. The terms and conditions of the agreement specified that the payments in respect of electro/hydro-mechanical equipment and pipes would be released stage-wise *viz*., 70 *per cent* on receipt of goods at site, 20 *per cent* on erection of equipment, 5 *per cent* on successful testing and commissioning of equipment and the remaining 5 *per cent* at the time of final bill.

Audit observed that the Department released (October 2021) the third stage payment of 5 *per cent* (for testing and commissioning) in respect of electro/hydro-mechanical equipment and pipes used in the PPIS amounting to ₹28.94 crore to the contractor on the ground that hydro testing was completed. On a further scrutiny of records, Audit noticed that the works relating to the pumphouses/lifts through which water was to be received for PPIS were not yet completed (pumphouse for Metpally segment was in progress and that of Gadkol Segment was in its initial stage). Thus, the PPIS equipment could not have been commissioned without completion of pump houses. Therefore, release of third stage payment (5 *per cent*) for the equipment/pipes of PPIS without successful commissioning was injudicious and contrary to agreement conditions and resulted in advance payment to that extent.

The Government accepted that the 5 *per cent* payment should be made only after testing and commissioning as pointed out by Audit and that the excess payment would be recovered/adjusted in the next bill.

Details of recovery/adjustment had not been intimated (November 2023).

6.4.7 Advance payment for operation and maintenance (O&M) charges

The scope of works under Packages – 6, 8, 10, 11 and 12 included execution of civil works and supply, installation and commissioning of electro and hydro mechanical (EM&HM) equipment. In the agreements, the scope of work under 'Maintenance during Defect Liability Period (DLP)' stipulated that the contractor shall maintain the civil works for five years (three years after DLP) and EM&HM works for 15 years (13 years after DLP) within the agreed cost and that a separate agreement would be concluded for O&M. The cost estimates prepared by the Department and the schedule of payments included in the agreements also provided the cost of O&M for 3 years for civil works and for 13 years for EM&HM works. Thus, the O&M charges during the initial two years of DLP is included in the cost of initial works and are not payable separately.

Audit, however, observed that in Packages - 10, 11 & 12, the Department concluded separate O&M agreements with the contractors for a period of 5 years/15 years from the completion of works instead of 3 years/13 years after completion of DLP. Due to

this, the O&M cost payable in 13 years after DLP is now spread over 15 years (including the DLP). The Department provided O&M charges of ₹70.75 crore for the first two years in the payment schedules of these three packages. Out of this, an amount of ₹47.26 crore has been paid as of January 2022. The DLP was not yet completed. Release of O&M charges during DLP would ultimately result in advance payment of ₹70.75 crore to contractors.

The Government replied (November 2023) that as per agreement clauses, the contractor has to take over the pumphouses and the pipeline from the commercial operation date and the O&M shall be for 5 years for civil works and 15 years for the civil, Electro Mechanical and Hydro-Mechanical works connected with the lift system. The bidder shall quote for this item separately in the financial bid and a separate agreement would be concluded for O&M. As the O&M of headworks is deemed to have started, based on the recommendation of the SLSC, the O&M agreements were concluded for the three package works on 01 July 2020 as per the prices quoted by the contractors for O&M component. It was further replied that no extra payments over the quoted price will be made during the O&M period. The Government further stated that during the DLP, the contractors are responsible for the quality of works executed *i.e.*, to rectify the defects arising out of the scheme without extra cost and that during DLP, the contractor has to deploy men and machinery for the operation of pumps for which the payment has to be made by the Department from the O&M amount and accordingly, payments were made. Hence, the payment made during the DLP is not a front-end payment. Further, the payment has been made duly distributing the cost quoted by the contractors towards O&M for 15 years as against 13 years which is a saving to the Department. The Government further replied that the payments towards O&M were not paid from October 2021 for Package-10 and from January 2022 for Package-11 and Package-12 by the Department.

The reply is not tenable as the O&M charges during the two years of DLP are included in the cost of initial works and are not payable separately, as per the agreements. Though the Department stated that it is not paying the amount for O&M now, an amount of ₹47.26 crore had been already paid as of January 2022.

6.4.8 Non-recovery of Mobilization Advances and interest thereon

In the Report of the Comptroller and Auditor General of India on Jalayagnam (Report No. 2 of 2012), Audit had pointed out that large amounts of Mobilization Advances (MA) given to contractors were pending recovery in various projects including the PCSS Project. Audit now observed that:

- After re-engineering of PCSS project, the Department deleted (October 2017) Packages-23, 24, 25 and 26 from the scope of Pranahitha and Kaleshwaram Projects. Audit observed that even after more than four years, the Department was yet to close the contracts and settle the accounts of the contracting agencies (March 2022). Audit observed that in Packages-23, 24 and 25, as against the total MA of ₹64.05 crore given to the contracting agencies, the Department

could recover advances of only ₹44.57 crore leaving a balance of ₹19.48 crore unrecovered (February 2022). Out of the total interest amount of ₹26.91 crore, accrued up to May 2018, the Department could recover only ₹13.19 crore, up to last bills paid. It was further observed that though the Department held Bank Guarantees (BGs) worth ₹43.40 crore collected from the contractors towards MA (₹19.97 crore)/ Deposits (₹23.43 crore), it did not encash these BGs to adjust the dues receivable from contractors. The reasons for non-encashment of BGs were not on record.

- After re-engineering, the Government decided (July 2017) to close the contract of Package-14 and entrust the work with some revisions to other contractors by calling for tenders. Audit observed that as of March 2021, a total amount of ₹61.69 crore (*i.e.*, MA: ₹29.49 crore and interest: ₹32.20 crore) was pending recovery from the original contractor. Audit further observed that as against the outstanding amount of ₹61.69 crore due from the contractor, the Department held BGs amounting to only ₹31.04 crore, which were not encashed so far (January 2022) for the reasons not on record.

The Government replied (May/October 2023) that the settlement of accounts with the contractors was under process and that the pending MA and interest thereon would be recovered/ adjusted from the contractors' deposits/BGs available with the Department and the balance amounts payable to contractors at the time of final settlement of accounts. In respect of Package-14, the Government further replied (October 2023) that the Honourable High Court, Hyderabad had issued (2015) stay orders for recovery of interest on MA for the extended period of contract. It was also replied that final settlement of accounts to the agency were under process and soon after disposal of the Court case, the recoveries of MA and interest would be made.

However, Government reply is silent on non-settlement of accounts with contractors and non-encashment of BGs for more than four years since the decision (July/October 2017) to close these contracts.

Recommendation - 12

The Department should immediately take steps to recover the dues of mobilization advances from the contractors of closed contracts and fix responsibility on the officials involved. Strict instructions should also be issued to the departmental officers to ensure prompt encashment of bank guarantees without delay in cases of pre-closure of contracts in future.

CHAPTER VII

Pranahitha Project

CHAPTER VII
Pranahitha Project

SUMMARY

During re-engineering of the PCSS project, it was decided to reduce the FRL of Tummidihetti barrage from +152 Mtrs to +148 Mtrs to reduce submergence in Maharashtra State and to lift 20 TMC of water at Tummidihetti to irrigate 2 lakh acres of new CA in the erstwhile Adilabad district. The work of preparation of the DPR for identification of the new CA was entrusted on nomination basis to WAPCOS, an agency which had not even participated in the bidding process. Though, it was initially proposed to draw water by constructing a barrage near Tummidihetti, the Department is now proposing to shift the barrage location further upstream across Wardha River.

The Department took more than six years since the re-engineering decision in June 2016 to identify the source location of the barrage and the targeted CA and the scope of works. The DPR had been submitted to CWC only in May 2023 and clearances are yet to be obtained. Concurrence of Maharashtra State for the submergence issue is yet to be obtained. As such, there has been no progress of work in the existing four civil contracts in the last four years. In this scenario, the expenditure incurred on the works executed and lands acquired remains unproductive and it may take many more years before any irrigation benefits are achieved under the project.

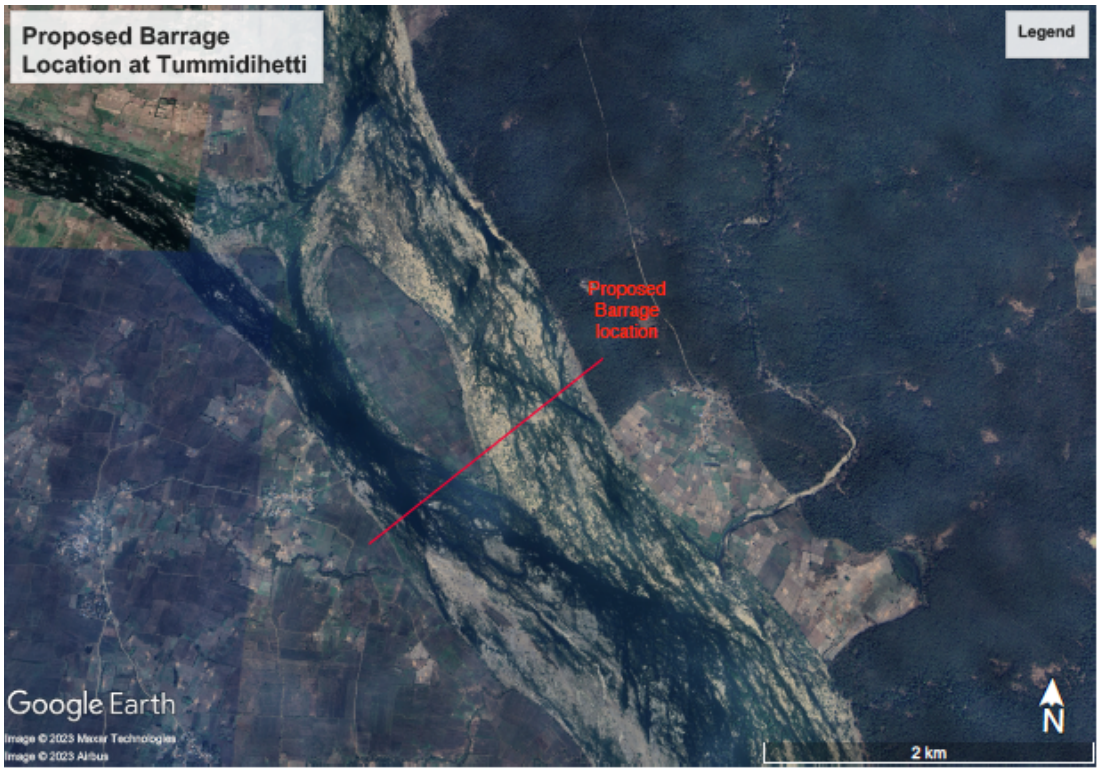
7.1 Planning for the Project

During re-engineering the earlier PCSS project, it was decided to construct the barrage near Tummidihetti with a reduced height of +148 M (instead of +152 M proposed earlier) to reduce the submergence in Maharashtra State, and to draw 20 TMC of water from Tummidihetti. The proposal was to utilise the same for providing irrigation to two lakh acres (*i.e.*, 1.44 lakh acres to be identified in addition to the 56,500 acres proposed to be created under the already existing Package Nos.4 and 5) of new CA in erstwhile Adilabad District. It was decided to continue the execution of work under the first four packages of Link-I of PCSS project and to delete the Package No.5. The work of creation of 36,000 acres of CA originally proposed under Package No.5 was now proposed to be tagged to Package No.4. This project was renamed as Dr. B.R. Ambedkar Pranahitha Project.

Figure 7.1 - Proposed barrage location near Tummidihetti

Source: I&CAD Department

Figure 7.2 - Proposed barrage location near Tummidihetti



Source: Google Earth Pro image as on 17th April 2023

7.1.1 Preparation of Detailed Project Report (DPR)

7.1.1.1 Vitiation of tender process

The Department invited (September 2015) bids for 'Preparation of DPR for CA survey for creation of additional CA under Pranahitha Project'. In response, seven firms quoted their rates. The tender evaluating authority, Superintending Engineer, MIP Circle, Bellampalli recommended (November 2015) for entrustment of the work to the lowest (L1) bidder whose quoted price was ₹1.49 crore. However, setting aside the entire tendering process, the Government issued (March 2016) orders for entrustment of the work to WAPCOS[180] (who had not participated in the bidding) on nomination basis at a cost of ₹6.66 crore, which was ₹5.17 crore more than the price quoted by the L1 bidder. Accordingly, the Department concluded (March 2016) the agreement with WAPCOS for CA survey.

Moreover, as already discussed in Paragraph 3.2.3, WAPCOS had been involved in the preparation of DPR for the earlier PCSS Project and there were major flaws in that DPR (like incorrect assessment of the quantum of water available at Tummidihetti, inadequate storage reservoirs proposed under the project, *etc*.) which led to the re-engineering of the project. Despite this bad experience, the Government chose to entrust the DPR work of Pranahitha Project to WAPCOS on nomination basis.

The Government replied (May 2023) that the work of preparation of DPR for an additional CA of 1.42 lakh acres was entrusted to the agency, WAPCOS Ltd., based on the recommendation of SLSC. The recommendation of the Committee *inter-alia* stated that in view of the time constraint the consultant of GoI was nominated as the agency has substantial experience in having carried out similar nature of work. Further, it was stated that the survey work is completed and the DPR has been submitted to CWC on 8 May 2023.

The Government further replied (October 2023) that initially, estimate was prepared for conducting survey for one lakh acres using conventional survey method. As the Government did not accord administrative approval for the same, the initial bids invited for preparation of DPR were cancelled. Later the cost of work was increased to ₹6.66 crore due to increase in the proposed CA to 1.42 lakh acres and change in the survey method to LiDAR and the work was entrusted to WAPCOS.

The fact remains that despite knowing the several defects in the earlier DPR submitted by WAPCOS which led to the re-engineering of the PCSS Project, the new DPR work was awarded to it on nomination basis.

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

7.1.1.2 Non-completion of DPR work

(i) Identification of CA: As per the agreement concluded (March 2016) with WAPCOS for identification of CA, the agency was to complete the DPR work within two months *i.e.*, by May 2016. However, the agency did not complete the work and submit the DPR (as on March 2022), despite a time overrun of nearly six years. Thus, the targeted CA of two lakh acres proposed under the project is yet to be identified.

(ii) Identification of source location: Even the source of water for the Pranahitha project had not been finalized (as on March 2022). During re-engineering of PCSS project (June 2016), the Department had initially proposed to construct a barrage near Tummidihetti with a reduced height of +148 M and to draw 20 TMC of water for the project. Later, in August 2018, the Department proposed to shift the location of the barrage 1.5 Km upstream *i.e.*, near the confluence point of Wardha and Weinganga rivers. This proposal was initiated to avoid submergence of the Chaprala Wildlife Sanctuary in the vicinity of Tummidihetti barrage location. However, this revised location was not considered for the reasons not on record. Now, the Department is considering the feasibility of constructing the barrage at a further upstream location across Wardha River near Virdandi village in Koutala Mandal, Kumuram Bheem Asifabad District. It entrusted the work to WAPCOS for preparation of DPR for barrage across Wardha River in January 2022 and the DPR was not finalised till the completion of Audit (as on March 2022).

Audit observed that it took more than six years since the decision on re-engineering was taken in June 2016 to identify the barrage location, the targeted CA and the scope of works, and to prepare and submit the DPR to CWC. Further, though two lakh acres of new CA was proposed under the project at the time of re-engineering, only 1.1955 lakh acres of new CA had been identified and an already existing CA of 21,185 acres is proposed to be stablilised.

The Government replied (November 2023) that the location of the barrage was not finalized earlier due to concerns of the Maharashtra State and that the CA of 2.00 lakh acres was not identified earlier as the location of the barrage was not finalized. It was further stated that the barrage location has now been finalized on the Wardha river instead of the Pranahitha river, a gross CA of 2.00 lakh acres has been identified in the Kumuram Bheem Asifabad and Mancherial Districts and the integrated DPR Preparation of Wardha Barrage including canal network duly utilising the existing Pranahitha main canal is finalised and has been submitted on 08 May 2023.

The fact remains that there were significant delays in the entire process right from identification of barrage site to submission of DPR to CWC.

7.1.2 Statutory clearances

As the scope of the revised Pranahitha project had not been firmed up and the DPR had not been prepared, the proposals for obtaining project clearance had not been submitted to CWC (as on March 2022). Further, the assessment of forest lands required, submergence areas effected and the impact on environment/wildlife had not been done and the statutory clearances from MoEF and MoTA were still to be obtained (March 2022).

Moreover, barrage location now proposed across Wardha river is bordering the neighbouring Maharashtra State. Thus, construction of a barrage at this location is likely to cause submergence in the Maharashtra State and therefore requires concurrence of that State. The Department had addressed (January 2022) the Chief Engineer, Water Resources Department of Maharashtra State for their comments on the proposed barrage on Wardha River. Concurrence of Maharashtra State was yet to be obtained (March 2022).

The Government replied (November 2023) that the integrated DPR including construction of pump house, Canal network to create an irrigation potential of 1.20 lakh acres was submitted to CWC in May 2023 for getting all statutory clearances from the various Directorates of CWC and Ministries and is under process. It was further stated that clearances have been received from MoTA, Central Groundwater Board, the Central Electricity Authority and the Hydrology Directorate of CWC and the remaining clearances are under process. The Government did not furnish any reply on the status of obtaining concurrence of Maharashtra State.

The fact remains that it took more than six years since the decision on re-engineering was taken in June 2016 to identify the barrage location, the targeted CA and the scope of works, and to prepare and submit the DPR to CWC. The State is yet to obtain all the statutory clearances including the CWC clearance and the concurrence of Maharashtra State for the project (November 2023).

7.2 Project Execution

As of March 2022, a total expenditure of ₹1,727.44 crore was incurred on the Pranahitha Project (including the Package No.5 which was deleted) for works, land acquisition, *etc*.

7.2.1 Status of project works

The aggregate value of agreements of the four packages that were brought under the Pranahitha Project was ₹2,759.13 crore. As against this, the value of work done to the end of March 2022 was ₹830.52 crore (*i.e.*, 30 *per cent*), as shown below:

Table 7.1 – Status of the four packages brought under the Pranahitha Project

S. No.	Pkg. No.	Reach of the water conveyor system	Agreement Date	Agreement Value (₹ in crore)	Target date of completion (Extension of time)	Value of work done up to March 2022 (₹ in crore)	Payment made to contractors upto March 2022 (₹ in crore)	Progress (%)
1	1	From Km 0.5 to Km 15	06.06.2008	229.14	05.12.2010 (31.03.2020)	101.80	98.41	44
2	2	From Km 15 to Km 28.5	26.05.2008	215.47	25.11.2010 (30.06.2019)	72.70	70.62	34
3	3	Barrage at Tummidihetti	21.11.2008	639.27	20.11.2012 (30.06.2019)	16.67	15.92	3
4	4	From Km 28.5 to Km 71.5	21.05.2009	1,675.25	11.11.2012 (30.06.2019)	639.35	620.40	38
		Total		**2,759.13**		**830.52**[181]	**805.35**	**30**

Source: Records of the I&CAD Department

Audit observed that there has been no progress in execution of the four works in the last three and half years (June 2018 to March 2022), due to non-identification of the targeted CA and non-firming up of revised scope of works.

Out of the four packages, Package No.3 deals with Construction of barrage near Tummidihetti and the remaining three packages (Package Nos. 1, 2 and 4) relate to excavation of canal.

(i) Barrage work (Package-3): As per the original agreement, a barrage was to be constructed across Pranahitha River near Tummidihetti. Now, the Department is contemplating construction of the barrage at a different location across Wardha River (refer Paragraph 7.1.1.2). However, the revised location of the barrage is yet to be finalized. Due to non-finalisation of the revised scope of work, the barrage work has not taken off even after more than five years since re-engineering.

(ii) Canal works (Packages-1, 2 and 4): After re-engineering, a total CA of two lakh acres was proposed to be created in Adilabad District under the Pranahitha project. This includes the 56,500 acres[182] of CA proposed to be created under Packages-4 and 5 in the earlier PCSS project. The remaining new CA of 1,43,500 acres was to be identified. The task of identification of entire two lakh acres of CA under the project was entrusted to WAPCOS in March 2016. However, this work had not been completed as on March 2022. Thus, no CA could be identified even after more than five years since re-engineering. As a result, the revised scope of work including the revision in the canal designs were yet to be finalised and revised estimates for none of the package works were prepared. As a result, there was no progress of work in

[181] The total amount paid to contractors in these four works was ₹805.35 crore
[182] The 36,000 acres of CA contemplated under the deleted Package-5 is now tagged to Package-4.

Packages-1, 2 and 4 since July 2017, June 2017 and June 2018, respectively and the project was in a standstill position (as on March 2022).

Audit further observed that the extended period of these four agreements was over in June 2019/March 2020. While no work was being executed in these works, the Department neither granted extension of time nor closed these four contracts.

The Government replied (November 2023) that the barrage location is now finalised at 3.50 Km upstream of the confluence of Wainganga and Wardha rivers and the integrated DPR for the barrage on Wardha River including canal network to irrigate a gross CA of 2 lakh acres has been completed and submitted to CWC in May 2023. It was further stated that Pranahitha main canal package works of 1, 2 and 4 will be carried out up to Km 56.50 by providing 2 lifts at Km 11.00 and Km 56.50 to irrigate a gross CA of 2 lakh acres and net CA of 1.20 lakh acres. The Government further replied that it had permitted closure of the contract of Package-IV and action would be taken either to close the contracts or to restart the works of Packages-I, II and III.

Thus, there has been no progress in the project works as it took more than six years since the re-engineering decision to identify the barrage location, the targeted CA and the scope of works, and to prepare and submit the DPR to CWC. The statutory clearances and the concurrence of Maharashtra State for the project are yet to be obtained and lands yet to be acquired even after more than six years since the re-engineering decision. Therefore, construction of the project and deriving any irrigation benefits from it may take many more years.

7.2.2 Utility of the work executed/expenditure incurred

As the scope of the project and the CA had not been established even after five years since re-engineering, the works executed so far on the four package works have not yielded any benefits. The utility of the expenditure incurred thereon is also doubtful as discussed below:

(i) Barrage work (Package-3): Due to change in location of the proposed barrage, the expenditure of ₹15.92 crore incurred on payment made to the EPC contractor towards survey and investigation (refer to Table 7.1) and the expenditure of ₹5.19 crore already incurred on acquisition of 383.55 acres of land for barrage at the earlier proposed location near Tummidihetti has been rendered wasteful. A total of ₹21.11 crore was already incurred on it which is rendered wasteful. Moreover, an amount of ₹6.39 crore paid towards mobilisation advance remained blocked up with the contractor.

The Government replied (November 2023) that out of the 383.55 acres acquired, an extent of 225.69 acres was in the riverbed and the remaining 157.86 acres was *Patta* land acquired for submergence and dumping area. It was further replied that the *Patta* land would be utilized for spoil dumping and for construction of office buildings and other purposes. Government further replied that the blocked mobilization advance with contractor will be recovered with specified rate of interest as mentioned in the

agreement conditions. It was further replied that write-off orders for the expenditure incurred on survey and investigations would be obtained from the Government.

(ii) Canal works (Packages-1, 2 and 4): Under the three canal packages, canal excavation work was partially executed in the reaches where lands were acquired. So far (March 2022), a total amount of ₹789.43 crore (refer to Table 7.1) was paid to contractors for the work executed. Further, an expenditure of ₹61.63 crore was incurred on acquisition of 4,677.94 acres of lands in these works. As the CA under the project had not yet been identified and distributary network was yet to be created, the utility of the expenditure of ₹851.06 crore incurred on these canal works remains doubtful. Moreover, the canal was designed and executed with a discharge capacity of 583 cumecs[183] for pumping 160 TMC of water in 90 days to irrigate a CA of 16.4 lakh acres as per the requirement of the earlier PCSS project. Now, after re-engineering, only 20 TMC of water was proposed to be drawn from River Pranahitha/Wardha to irrigate two lakh acres. Thus, even in case new CA is identified in future, providing irrigation to the CA may necessitate reduction in the discharge capacity and changes in the profile and levels of the already excavated canal. This will involve additional expenditure.

The Government replied (November 2023) that after re-engineering of the Pranahitha Project, the location of the barrage was shifted on to the Wardha river for utilising 11.5 TMC of water for the CA under this project. The existing canal profile on Pranahitha main canal would be retained and there will be no extra financial implication involved in the already excavated canal portion. It was further replied that the water column in the main canal will be useful as extra storage capacity.

The reply is not tenable since the purpose of an irrigation canal is to carry water for irrigation and not storage. The fact remains that the already excavated canal has not served any purpose so far. While it is uncertain as to when this canal would be put to use, the expenditure incurred on the canals which were excavated with a discharge of 583 cumecs is rendered largely wasteful since the requirement as per the revised project proposal is only 50 cumecs.

(iii) Package-5: The scope of work under Package-5 included conducting detailed survey and investigations, preparation of designs/drawings, excavation of canal, construction of pumphouse with lifts and laying of delivery mains (pipelines). During re-engineering, the Package-5 was shelved. By that time, work valuing ₹897.72 crore had already been executed and an amount of ₹838.14 crore had been paid to the contractor. Out of this, ₹108.96 crore paid towards survey and investigations, ₹43.47 crore paid for excavation of adit tunnel and ₹5.11 crore paid towards insurance and bankers charges was rendered wasteful. Further, the expenditure of ₹10.74 crore incurred on acquisition of 610.99 acres of land for this work was also rendered wasteful.

[183] Cubic metres per second

The Government replied (November 2023) that survey and investigations were prerequisite before commencement of work and also that the contractor had to pay the insurance and bankers charges and therefore the expenditure/payments towards survey and investigations, insurance and bankers charges cannot be treated as wasteful. It was further replied that write-off orders for the expenditure incurred on survey and investigations, insurance and bankers' charges would be obtained from Government. Regarding the land, the Government replied that the land acquired under this Package work would become part of the land bank maintained by it and the land can be used in future needs.

The reply is not acceptable. The expenditure incurred on survey and investigations, insurance and bankers charges would be productive only when the work is completed and put to use. However, in the instant case the package work has been completely deleted and the expenditure incurred on the above components including land acquisition did not serve any purpose.

Further, the Department also agreed that write-off orders would be obtained for the expenditure incurred on survey and investigations, insurance. The reply is silent on the wasteful expenditure on the adit tunnel.

(ANINDYA DASGUPTA)
Accountant General (Audit)
Telangana

Hyderabad
The 19 January 2024

Countersigned

(GIRISH CHANDRA MURMU)
Comptroller and Auditor General of India

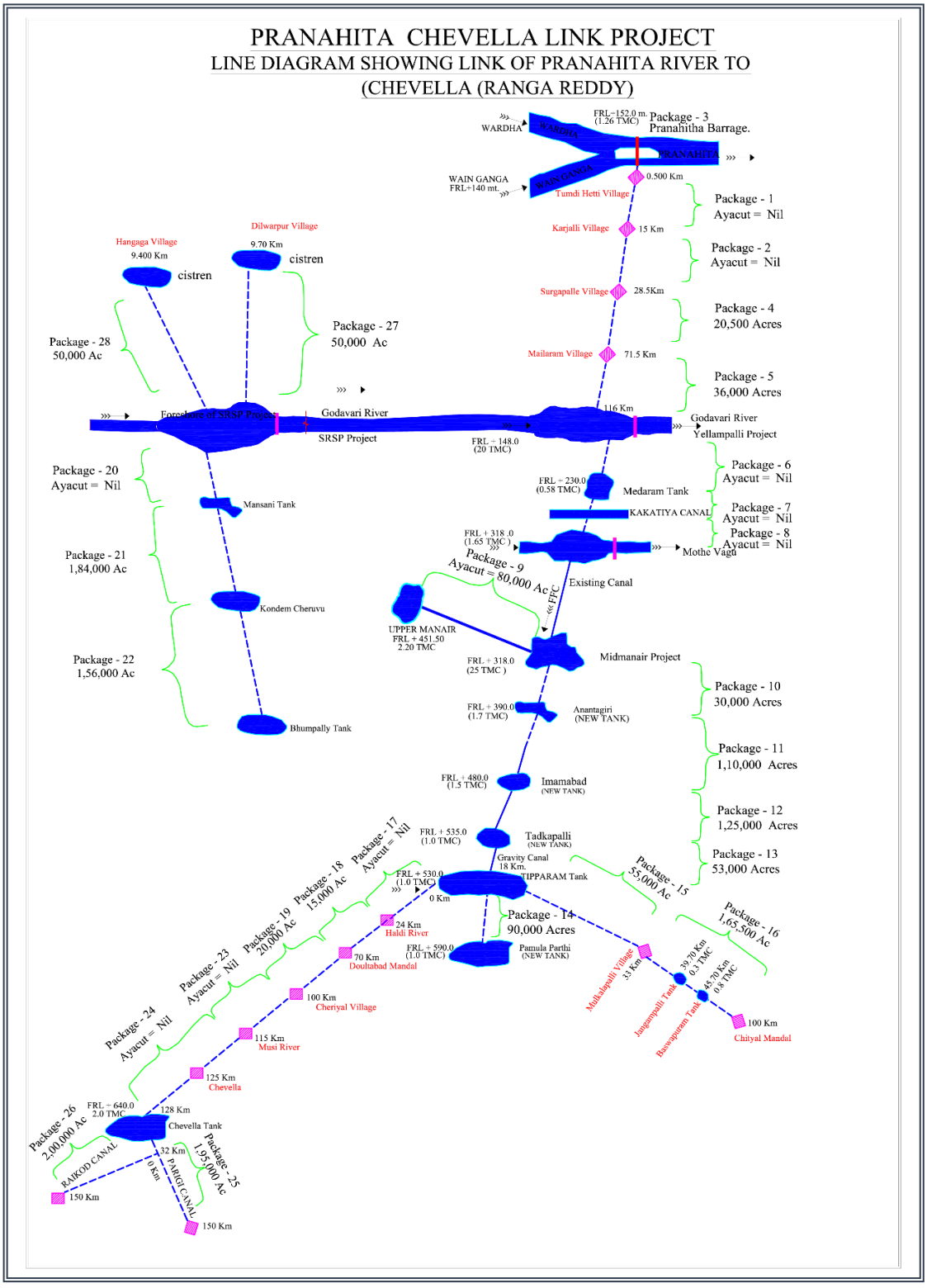
New Delhi
The 24 January 2024

Appendices

Appendix 1.1

(Reference to Paragraph 1.1)

Line diagram of PCSS project

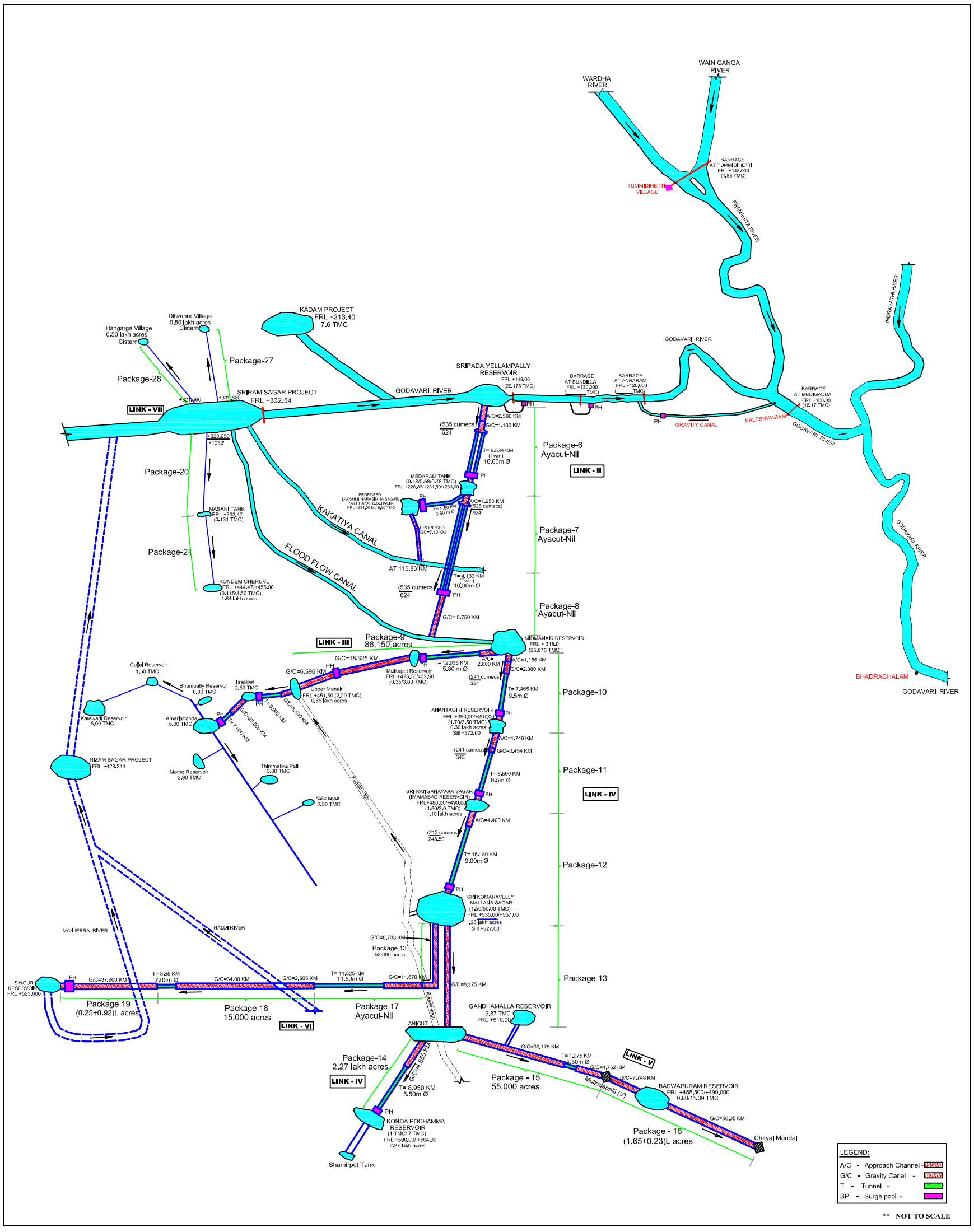


*(**Source:** Records of the I&CAD Department)*

Appendix 1.2

(Reference to Paragraph 1.1)

Line diagram of Kaleshwaram Project as per the DPR

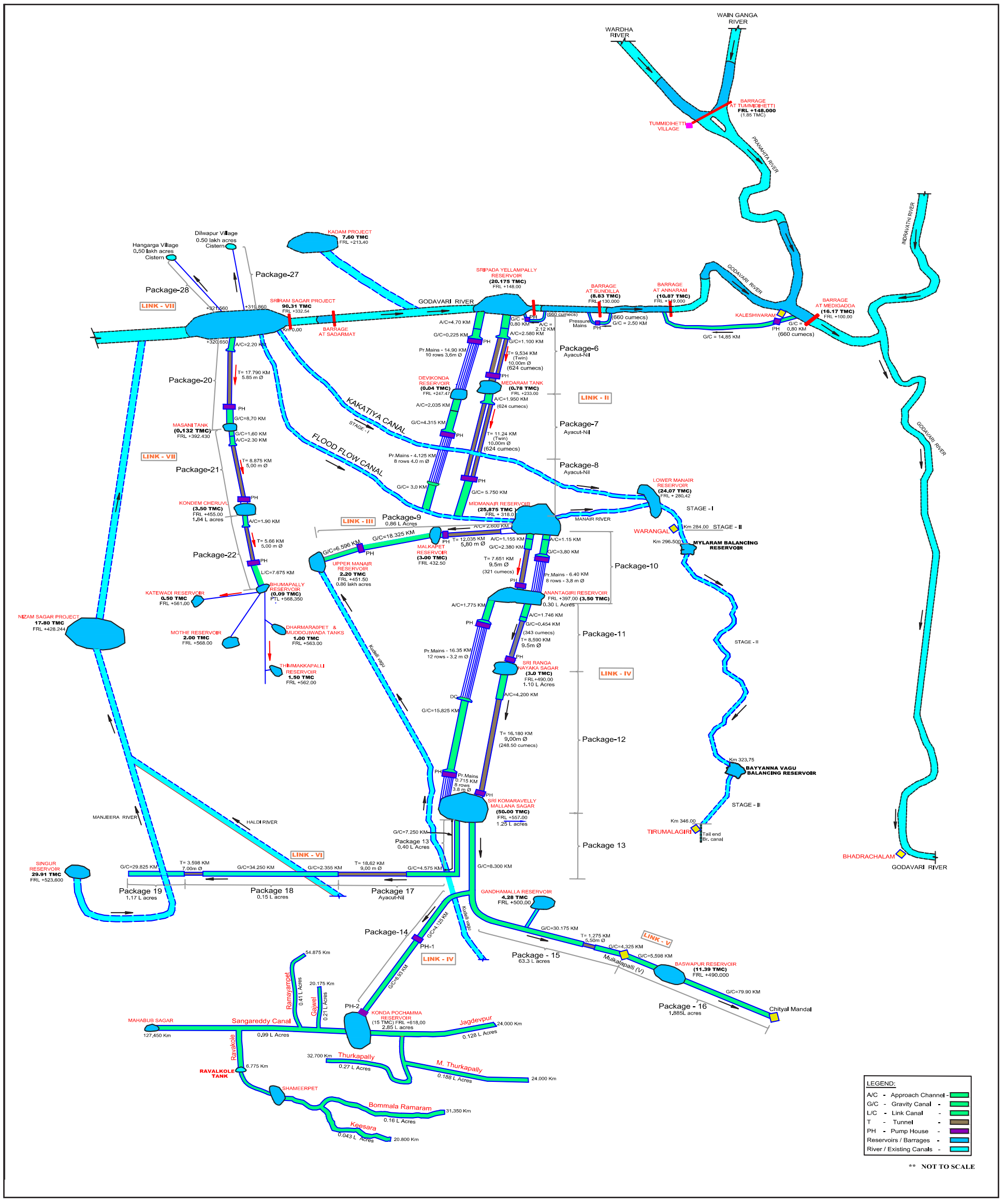


*(**Source:** DPR of the Kaleshwaram Project)*

Appendix 1.3

(Reference to Paragraph 1.1)

Line diagram of Kaleshwaram Project as being executed



*(**Source:** Records of the I&CAD Department)*

Appendix 3.1

(Reference to Paragraphs 3.2.2 and 4.7.3)

Details of the likely energy consumption for operation of lifts under Kaleshwaram Project

Name of the work/lift	Quantity of water to be lifted	Total lifting capacity of the pumps (TMC per day)	No. of days of pumping needed to lift the water	Installed capacity of pumps (in MW)*	Energy consump-tion per day (in MU) @	Total consump-tion for the pumping period (in MU)	Energy consump-tion if 20% margin as contended by Government is considered
Medigadda Lift	195	3.10	63	680	16.32	1028.16	856.80
Annaram Lift	195	3.01	65	480	11.52	748.80	624.00
Sundilla Lift	195	3.12	63	560	13.44	846.72	705.60
Sub-total of Link-I						***2623.68***	***2186.40***
Package-6 + Additional 1.1 TMC Package-1	212.50	1.90+1.10	71	1596	38.30	2719.30	2266.08
Package-8 + Additional 1.1 TMC Package-2	212.50	1.90+1.10	71	1525	36.60	2598.60	2165.50
Sub-total of Link-II						***5317.90***	***4431.58***
Package-9 (Lift-1)	6.74	0.096	70	60	1.44	100.80	84.00
Package-9 (Lift-2)	1.18	0.013	91	4.5	0.108	9.83	8.19
Sub-total of Link-III						***110.63***	***92.19***
Package-10 + Additional 1 TMC Package-1	136.51	1.99	69	924	22.18	1530.42	1275.35
Package-11 + Additional 1 TMC Package-2	134.71	2.05	66	1287.76	30.90	2039.40	1699.50
Package-12 + Additional 1 TMC Package-4	128.11	1.77	72	668	16.03	1154.16	961.80
Package-14 (Lift-1)	20.43	0.65	31	162	3.89	120.59	100.49
Package-14 (Lift-2)	20.43	0.65	31	204	4.89	151.59	126.33
Sub-total of Link-IV						***4996.16***	***4163.47***
Package -20	33.42	0.21	159	90	2.16	343.44	286.20
Package -21	33.42	0.21	159	60	1.44	228.96	190.80
Package-21 A (2 lift)	12.54	0.097	129	41	0.984	126.94	105.78
Package-22 (3 lift)	20.88	0.11	190	91.95	2.2068	419.29	349.41
Package-27	3.43	0.033	104	7.85	0.1884	19.59	16.33
Package-28	3.43	0.033	104	12.38	0.2971	30.90	25.75
Sub-total of Link-VII						***1169.12***	***974.27***
Total energy consumption of all lifts						**14217.49**	**11847.91**
Energy requirement for lifting of groundwater						**126.90**	**126.90**
Grand total						**14344.39**	**11974.81**

@ Energy consumption per day (MU) = Capacity of pumps (in MW) X 1,000 X 24 hours ÷ 10,00,000

* In addition, there are four small lifts (in Package-9) involving submersible pumps (total capacity: 4.66 MW). These have not been taken into account for Audit analysis.

*(**Source:** Audit calculations based on information taken from the records of the I&CAD Department)*

Appendix 4.1

(Reference to Paragraph 4.1.1)

Timelines given for preparation of various project reports

Sl. No.	Name of the Work	Scope of the Work	Agreement No. and Value	Stipulated date of completion	Total payment made as of January 2022 (₹ in crore)
1	Preparation of Detailed Project Report (DPR) for Kaleshwaram Project, Govt. of Telangana	The Consultant scope of the work is 'Preparation of Detailed Project Report' of Construction of Barrage at Medigadda (Kaleshwaram) & Lift Irrigation Scheme, Mahadevpur (M), Karimnagar Dist with a discharge of 22,000 cusecs by lifting / gravity to Mid Manair Reservoir or any other such proposal as per the guidelines of CWC and clearance of the same by State & Central approving Agencies. Further the DPR report includes broadly following activities. ➢ Study of all Engineering data related to the project. ➢ Collection of data relating to the project from Project authorities and other sources. ➢ Reconnaissance survey of the project area. ➢ Conducting topographical survey using DGPS, ETS and/ or LiDAR and Hydrographic survey for planning and Design of project components and canal network. ➢ Geotechnical investigation ➢ Hydrological studies ➢ Power & Energy requirements studies ➢ Design & preparation of drawings various project components ➢ Study of infrastructural facilities ➢ Details of land required including for expansion of plant area and colony ➢ Backwater study for barrage upstream ➢ Detailed project estimate ➢ Economic and Financial analysis ➢ Liaison with Central Water Commission till the project is cleared ➢ EIA, EMP studies and preparation of R&R	1. SE, MIP Circle, Bellampally LS AB No. 01/2015-16, dt. 23.04.2015 for ₹5.99 crore 2. Supplemental Agt. No. 02/2015-16, dt. 20.01.2016 for ₹6.8 crore	21.08.2015 (4 months from the date of agreement)	₹ 6.70
2	Vetting of DPRs for lift irrigation scheme from Mid Manair-Tadkapally-Pamulaparthi-Nizam Sagar	The Consultant scope of work is: o Vetting of DPR for lift irrigation scheme from ➢ Mid- Manair- Tadkapally- Pamulaparthy ➢ Tadkapally- Gandhmalla- Baswapur ➢ Tadkapally- Nizamsagar ➢ Pamulaparthy- Bhumpally o Topographic surveys of the water conductor system from ➢ Mid- Manair- Tadkapally- Pamulaparthy ➢ Tadkapally – Gandhmala- Baswapur ➢ Tadkapally- Nizamsagar ➢ Pamulaparthy- Bhumpally	SE, MIPC Agt. No. LS AB No. 05/2015-16 dt. 28.10.2015 for ₹2.85 crore.	27.12.2015 (2 months from the date of agreement)	₹ 1.14

Sl. No.	Name of the Work	Scope of the Work	Agreement No. and Value	Stipulated date of completion	Total payment made as of January 2022 (₹ in crore)
		○ Topographical surveys for construction of barrage on Pranahitha at Thummidihatti barrage with 152m FRL submergence area ➢ Study of all Engineering data related to the project. ➢ Collection of data relating to the project from project authorities and other sources ➢ Reconnaissance survey of the project area. ➢ Conducting Topographical survey using LiDAR, DGPS & ETS ➢ Geotechnical investigation ➢ Hydrological Studies ➢ Power and Energy requirements studies ➢ Design & Preparation of Drawings various project component ➢ Study of infrastructural facilities ➢ Detailed project estimate ➢ Economic and Financial analysis			
3	Preparation of DPR for diversion of 160 TMC of water by constructing a barrage cross river Godavari at Medigadda (Kaleshwaram and Lift Irrigation Scheme – LiDAR Survey of extra area (1900 sq.km)	The main scope of proposed consultancy services is LiDAR survey of additional are of about 1900 Sq.Km. covering Godavari River from Kanthanapally to Bhadrachalam& from SRSP to Dharmapuri, water conductor system alignment from Kondapochamma to Bhoompalli and Connection of Kaleshwaram LIS alignment with Kakatiya Canal.	Agreement concluded by SE, PCSS Circle, Siddipet vide Agt. No. 01/2015-16 dt.16-03-2016 for ₹7.90 crore	30.03.2016 (15 days from the date of agreement)	₹ 8.75
4	Preparation of DPR for Two Barrages between Yellampally – Medigadda, as well as the other reservoirs to increase its capacity and its integration with Kaleshwaram Lift Irrigation	The consultant scope of work is: Topographic Survey of the river and proposed alignment of the water conductor system using LiDAR,DGPS & ETS covering entire river where water area is likely to come under submergence area and 5 km wide alignment of water conductor system, Manchippa reservoir, Gujjulu reservoir, Gandivaram reservoir, Fatehpur reservoir, Tapasupally reservoir, Ramadugu reservoir Basheerabad reservoir, Pachala Nadikudi reservoir, Isaipet reservoir, Katchapur reservoir (Kaalwala) and adjoining area (about 2100 Sq.Km)	Agreement concluded by the SE, Kaleshwaram Project, Circle No.1, Ramagundam, Karimnagar, vide Agmt. No.LS. AB. No. 01/2015-16, dated 25.03.2016 for ₹12.96 crore	24.05.2016 (2 months from the date of agreement)	₹ 13.48

Sl. No.	Name of the Work	Scope of the Work	Agreement No. and Value	Stipulated date of completion	Total payment made as of January 2022 (₹ in crore)
	Scheme (2100 Sq. Km)	a. Study of all existing date related to the project b. Collection of data relating to the project from project authorities and other sources c. Reconnaissance survey of the project area d. Conducting topographical survey using DGPS, ETS and / or LiDAR and hydrographic survey for planning& design of project components & canal network e. Geotechnical Investigation f. Hydrological Studies g. Power & Energy Requirement Studies h. Design & preparation of drawings of various project components i. Study of Infrastructural Facilities j. Detailed project estimate k. Economic and financial analysis			
5	Preparation of DPR for Vetting of alignment from KomarelliMallanna Sagar to Singur reservoir (350 Sq. Km)	The Consultant scope of work is: Topographic survey of the command area and proposed alignment of water conductor system (KomarelliMallanna Sagar to Singur reservoir) (about 350 Sq. Km) a. Study of all existing data related to the project b. Collection of data relating to the project from project authorities and other sources c. Reconnaissance survey of the project area d. Conducting topographical survey using DGPs, ETS and / or LiDAR and hydrographic survey for planning & design of project components & canal network e. Geotechnical Investigation f. Hydrological Studies g. Power & Energy Requirement Studies h. Design & Preparation of drawings of various project components i. Study of Infrastructural Facilities j. Details of land required including expansion of Plan area and colony k. Command area survey l. Detailed project estimate m. Economic and financial analysis n. Liaison with CWC till the project is cleared o. EIA, EMP studies & Preparation of R&R Plan	Technical Sanction accorded vide CE, KP Proc.No. CE/KPH/DCED EE-3/AEE-9/WAPCOS/2016/1082, dt.9.9.2016 Agt. no.02/16-17 dt. 21.11.2016 for ₹2.72 crore	20.01.2017 (2 Months from the date of agreement)	₹ 1.49

(Source: Information furnished by I&CAD)

Appendix 4.2

(Reference to Paragraph 4.1.2)

Cost of works initially awarded in Kaleshwaram Project after re-engineering and the latest value of works as per revised estimates

S. No.	Package No./Work name	Cost of works initially awarded after re-engineering (₹ in crore)	Latest cost of works as per revised estimates/suppl. Agreements/ work slips (₹ in crore)	Percentage increase/ decrease
	Link I			
1	Medigadda Barrage	1849.31	4321.44	134
2	Medigadda Lift	2826.10	4915.37	74
3	Annaram Barrage	1452.82	2565.51	77
4	Annaram Lift	1669.23	3772.56	126
5	Sundilla Barrage	1248.27	2148.45	72
6	Sundilla Lift	1737.57	3573.78	106
	Subtotal of Link I	**10783.30**	**21297.11**	
	Link II			
7	Package 6	4961.31	5936.11	20
8	Package 7	1353.31 77.04	1984.48	39
9	Package 8	4900.39	5911.51	21
10	Package-I (Additional 1.10 TMC)	6339.99	6339.99	0
11	Package-II (Additional 1.10 TMC)	3203.85	3203.85	0
12	Package-III (Additional 1.10 TMC)	226.82	226.82	0
13	Package-IV (Additional 1.10 TMC)	218.86	218.86	0
	Subtotal of Link II	**21281.57**	**23821.62**	
	Link III			
14	Package 9	911.32	1029.33	13
15	Malkapet reservoir	472.28	513.12	9
16	Additional Lift - Package 9	138.74	194.83	40
	Subtotal of Link III	**1522.34**	**1737.28**	
	Link IV			
17	Package 10	2715.40	3135.52	15
18	Package 11	3127.58	3767.84	20
19	Sri Ranganayak Sagar Reservoir	461.17	493.66	7
20	Package 12	3348	4018.80	20
21	Sri Komaravelli Mallanna Sagar Reservoir -Reach I	1893.68	2196.94	16
22	Sri Komaravelli Mallanna Sagar Reservoir -Reach II	1546.65	1638.11	6
23	Sri Komaravelli Mallanna Sagar Reservoir -Reach III	2118.27	2494.56	18
24	Sri Komaravelli Mallanna Sagar Reservoir - Reach IV	1482.75	1620.20	9
25	Package 13	549.16	634.59	16
26	Ramayampet Canal	373.22	411.83	10
27	Package-I (Additional 1TMC)	3352.17	4037.93	20
28	Package-II (Additional 1TMC)	6314.49	7181.26	14
29	Package-III (Additional 1 TMC)	695.54	793.78	14
30	Package-IV (Additional 1TMC)	1613.69	1882.61	17

S. No.	Package No./Work name	Cost of works initially awarded after re-engineering (₹ in crore)	Latest cost of works as per revised estimates/suppl. Agreements/ work slips (₹ in crore)	Percentage increase/ decrease
31	Shankarampet Canal	154.87	155.27	0.3
32	Package 14	1856.34	2709.32	46
33	Konda Pochamma Sagar Reservoir-Reach-I	884.47	1029.82	16
34	Konda Pochamma Sagar Reservoir – Reach-II	696.24	732.97	5
35	Gajwel Canal System	89.52	210.71	135
36	Jagadevpur Canal System	105.11	121.80	16
37	Kistapur Canal System	69.99	76.54	9
38	Upparapally Branch Canal	60.51	73.79	22
39	Thurkapally Canal	164.78	201.29	22
40	M Turkapally Canal System	85.52	108.05	26
41	Sangareddy Canal System, Reach-I	363.71	470.66	29
42	Sangareddy Canal System, Reach-II	372.92	372.92	0
43	Ravalkole Link Canal System	363.83	618.94	70
Subtotal of Link IV		**34859.58**	**41189.71**	
Link V				
44	Package 15	844.69	844.69	0
45	Gandhamalla Reservoir	719.08	719.08	0
46	Package 16	1059.75	1059.75	0
47	Baswapur Reservoir	1578.57	1701.09	8
Subtotal of Link V		**4202.09**	**4324.61**	
Link VI				
48	Package 17	986.18	986.18	0
49	Package 18	758.07	758.07	0
50	Package 19	762.47	762.47	0
Subtotal of Link VI		**2506.72**	**2506.72**	
Link VII				
51	Package 20	892.67	892.67	0
52	Package 21	1143.79	699.93	-39
53	Package 21 A	2413.53	3073.98	27
54	Package 22	1446.48	1446.48	0
55	Package 27	714	492.69	11
	Package 27 balance work		298.51	
56	Package 28	486.68	486.68	0
Subtotal of Link VII		**7097.15**	**7390.94**	
Grand total		**82252.75**	**102267.99**	

*(**Source:** Records of the I&CAD Department)*

Appendix 4.3

(Reference to Paragraph 4.5.4)

BC Ratio considering the latest market rates of crop produce, 20 *per cent* reduction in energy cost and removing IDC from the present likely project cost

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	26903.88	15175.00	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)	6936.96	3912.76	
	Less: Income of farm produce in pre-project scenario	682.65	1160.505	Indexed 10% per annum
	Net value of farm produce, post-project	**33158.18**	**17927.26**	
2	Revenue from Drinking Water Supply	1,019.30	1,019.30	As per Department
3	Revenue from Industrial Water Supply	7882.62	914.50	As per the rates prescribed by Government
4	Revenue from Fisheries	1,75.00	154.12	As per the actual water spread area of the reservoirs
Total annual benefits		***42,235.10***	***20,015.18***	---
Annual costs				
1	Interest on capital @ 10% of estimated total cost of the project	12,348.54	12,787.10	As per the present likely cost of the project excluding IDC
2	Annual energy cost of pumping water for irrigation and other purposes	8,712.48	8,881.72	Energy consumption considering 20 *per cent* reduction.
3	Depreciation of the project @ 1% of the cost of the project for 100 years life	1,220.07	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	1,546.15	1,577.42	Calculated on the actual cost of pumping system including additional works taken up
7	Depreciation of the raising mains @ 3.33% of the cost of the raising mains assuming life of the system as 30 years	461.15	500.48	Calculated on the actual cost of pumping mains including additional works
Total annual costs		***24,401.36***	***24,633.06***	---
B.C. Ratio = Annual Benefits/Annual costs		**1.731**	**0.813**	**Project is economically unviable**

Appendix 4.4

(Reference to Paragraph 4.7.2.1)

Details of loans raised by KIPCL for Kaleshwaram Project

S. No.	Name of the Bank/ Financial Institution	Date of Agreement	Loan Amount sanctioned			Amount released upto March 2022			Rate of interest * per annum
			Hard Cost	IDC	Total	Hard Cost	IDC	Total	
1	Union Bank of India Consortium	15.02.2017	6000.00	1400.00	7400.00	6000.00	1342.32	7342.32	10%
2	Punjab National Bank Consortium	27.09.2017	9790.30	1609.70	11400.00	9745.75	1527.37	11273.12	9.20%
3	Bank of Baroda Consortium	31.01.2018	1939.33	210.67	2150.00	1939.33	210.67	2150.00	9.10%
4	PFC (EM&HM)	28.03.2018	9467.74	2599.62	12067.36	8974.76	2599.62	11574.38	9.20%
5	PFC (Pkg 21A)	23.01.2019	2055.79	323.77	2379.56	1681.37	323.77	2005.14	9.45%
6	PFC (Link-I)	23.01.2019	4443.14	962.25	5405.39	4441.62	962.25	5403.87	10.41%
7	REC (Link-I)	09.09.2019	4154.59	503.36	4657.95	3267.63	503.36	3770.99	10.90%
8	REC (Link-IV)	09.09.2019	12570.42	1523.01	14093.43	5342.64	187.61	5530.25	10.90%
9	NABARD (Pkg 12,13)	11.09.2019	1500.00	0.00	1500.00	1125.01	0.00	1125.01	9.75%
10	PFC (Ass. Works)	13.09.2019	3500.00	575.11	4075.11	3455.72	575.11	4030.83	10.90%
11	REC (Link-II)	05.06.2020	10585.00	1199.70	11784.70	3124.96	191.13	3316.09	10.90%
12	NABARD (SKMS)	15.10.2020	4674.83	0.00	4674.83	3728.64	0.00	3728.64	7.80%
13	PFC (additionalLoan)	26.03.2021	2111.51	313.03	2424.54	1008.34	52.33	1060.67	10.90%
14	NABARD (Link-V)	11.10.2021	2051.14	0.00	2051.14	677.89	0.00	677.89	7.80%
15	PFC (additional IDC)	28.03.2022	1385.14	0.00	1385.14	1294.20	0.00	1294.20	10.90%
	TOTAL		**76228.93**	**11220.22**	**87449.15**	**55807.86**	**8475.54**	**64283.40**	

* *These are the initial rates of interest as mentioned in the respective loan agreements. The rate of interest was variable and would depend on lending rates fixed by the respective banks/lending agencies from time to time.*

PFC: Power Finance Corporation; **REC:** Rural Electrification Corporation; and **NABARD**: National Bank for Agriculture and Rural Development

*(**Source:** Records of the KIPCL)*

Appendix 5.1

(Reference to Paragraph 5.1.1)

Package/Work-wise status of Kaleshwaram Project

S. No.	Package No./ Name of the work	Stipulated period of completion	Final value of work to be done (₹ in crore)	Expendi--ture upto March 2022 (₹ in crore)	Percen--tage of financial progress	Time overrun as of March 2022 (months)
			Link-I			
1	Medigadda Barrage	August 2018	4321.44	3348.24	77	Completed with a delay of 22 months
2	Medigadda Lift	February 2018	4915.37	4721.49	96	Completed with a delay of 21 months
3	Annaram Barrage	August 2018	2565.51	2326.83	91	Completed with a delay of 15 months
4	Annaram Lift	February 2018	3772.56	3003.98	80	Completed with a delay of 21 months
5	Sundilla Barrage	July 2018	2148.45	1671.80	78	Completed with a delay of 41 months
6	Sundilla Lift	February 2018	3573.78	2869.41	80	Completed with a delay of 21 months
	Subtotal of Link I		**21297.11**	**17941.75**		
			Link-II			
7	Package 6	June 2019	5936.11	5405.04	91	Completed with a delay of 5 months
8	Package 7	June 2019	1984.48	1738.14	88	Completed with a delay of 5 months
9	Package 8	June 2019	5911.51	5396.66	91	Completed with a delay of 5 months
10	Package-I (Additional 1.1 TMC)	June 2022	6339.99	2457.49	39	No delay
11	Package-II (Additional 1.1 TMC)	June 2022	3203.85	1327.68	41	No delay
12	Package-III (Additional 1.1 TMC)	June 2022	226.82	0.00	0	
13	Package-IV (Additional 1.1 TMC)	June 2022	218.86	0.00	0	
	Subtotal of Link II		**23821.62**	**16325.01**		
			Link-III			
14	Package 9	June 2019	1029.33	785.55	76	33
15	Malkapet reservoir	September 2019	513.12	420.89	82	30
16	Package 9 (Additional Lift)	March 2020	194.83	51.56	26	24
	Subtotal of Link III		**1737.28**	**1258.00**		

S. No.	Package No./ Name of the work	Stipulated period of completion	Final value of work to be done (₹ in crore)	Expendi--ture upto March 2022 (₹ in crore)	Percen--tage of financial progress	Time overrun as of March 2022 (months)
			Link-IV			
17	Package 10	June 2019	3135.52	2863.48	91	33
18	Package 11	June 2019	3767.84	3365.36	89	33
19	Sri Ranganayak Sagar Reservoir	April 2019	493.66	484.16	98	Completed with a delay of 35 months
20	Package 12	June 2019	4018.80	3672.82	91	33
21	SKMS Reservoir - Reach I	November 2020	2196.94	1607.09	73	16
22	SKMS Reservoir - Reach II	October 2020	1638.11	1235.70	75	17
23	SKMS Reservoir - Reach III	December 2020	2494.56	2070.01	83	15
24	SKMS Reservoir - Reach IV	November 2020	1620.20	1214.00	75	16
25	Package 13	May 2019	634.59	497.95	78	34
26	Ramayampet Canal	July 2019	411.83	269.82	66	32
27	Package-I (Additional 1 TMC)	June 2022	4037.93	1555.20	39	No delay
28	Package-II (Additional 1 TMC)	June 2022	7181.26	3214.68	45	No delay
29	Package-III (Additional 1 TMC)	June 2022	793.78	0.00	0[184]	No delay
30	Package-IV (Additional 1 TMC)	June 2022	1882.61	572.78	30	No delay
31	Shankarampet canal	August 2019	155.27	50.52	33	31
32	Package 14	May 2019	2709.32	2651.56	98	Completed with a delay of 16 months
33	KPS Reservoir-Reach I	May 2019	1029.82	955.28	93	Completed within time
34	KPS Reservoir-Reach II	May 2019	732.97	750.50	102	34
35	Gajwel Canal System	May 2019	210.71	117.78	56	34
36	Jagadevpur Canal System	April 2019	121.80	61.81	51	35
37	Kistapur Canal System	April 2019	76.54	18.81	25	35
38	Upparapally Branch Canal	April 2019	73.79	23.08	31	35
39	Thurkapally Canal	April 2019	201.29	114.08	57	35
40	M Turkapally Canal System	June 2019	108.05	44.15	41	33
41	Sangareddy Canal System, Reach-I	December 2020	470.66	117.19	25	15
42	Sangareddy Canal System, Reach-II	May 2021	372.92	0.00	0	10
43	Ravalkole Link Canal System	January 2021	618.94	126.66	20	14
	Subtotal of Link IV		**41189.71**	**27654.47**		

[184] Work commenced but no bills paid yet.

S. No.	Package No./ Name of the work	Stipulated period of completion	Final value of work to be done (₹ in crore)	Expendi--ture upto March 2022 (₹ in crore)	Percen--tage of financial progress	Time overrun as of March 2022 (months)
			Link-V			
44	Package 15	June 2019	844.69	560.62	66	33
45	Gandhamalla Reservoir	November 2019	719.08	0.00	0	28
46	Package 16	June 2019	1059.75	574.10	54	33
47	Baswapur Reservoir	November 2019	1701.09	1067.73	63	28
	Subtotal of Link V		**4324.61**	**2202.45**		
			Link-VI			
48	Package 17	June 2019	986.18	808.69	82	33
49	Package 18	June 2019	758.07	309.19	41	33
50	Package 19	June 2019	762.47	98.53	13	33
	Subtotal of Link VI		**2506.72**	**1216.41**		
			Link-VII			
51	Package 20	June 2019	892.67	861.67	97	33
52	Package 21	June 2019	699.93	455.91	65	33
53	Package 21 A	October 2020	3073.98	1653.33	54	17
54	Package 22	June 2019	1446.48	369.37	26	33
55	Package 27	June 2019	492.69	492.69	100	33
	Package 27 balance work		298.51	0.00	0	
56	Package 28	June 2019	486.68	235.41	48	33
	Subtotal of Link VII		**7390.94**	**4068.38**		
			102267.99	**70666.48**	**69**	

*(**Source:** Records of the I&CAD Department)*

Appendix 5.2

(Reference to Paragraph 5.2)

Work-wise details of the land requirement identified, requisitioned, acquired and yet to be acquired under Kaleshwaram Project

(in acres)

Link	Name of the Package/Work	Total land required	Land requisitioned	Total land acquired	Balance to be acquired
I	Medigadda Barrage	2025.37	2025.37	1277.36	748.01
	Medigadda Lift	441.20	436	436	5.20
	Annaram Barrage	2323.52	1753.31	1753.91	569.61
	Annaram Lift	449.08	449.08	449.08	0
	Sundilla Barrage	1351.22	1351.22	761.05	590.17
	Sundilla Lift	563.38	563.38	563.38	0
	Link-I total	***7153.77***	***6578.36***	***5240.78***	***1912.99***
II	Package 6	469.55	469.55	469.55	0
	Package 7	1348.05	1348.05	1348.05	0
	Package 8	615.275	615.275	615.275	0
	Package-I (Additional 1.10 TMC)	777.33	777.33	777.33	0
	Package-II (Additional 1.10 TMC)	421.82	421.82	375.62	46.20
	Package-III (Additional 1.10 TMC)	294.48	294.48	0	294.48
	Package-IV (Additional 1.10 TMC)	344.93	344.93	0	344.93
	Link-II total	***4271.44***	***4271.44***	***3585.83***	***685.61***
III	Package 9	2132.30	2132.3	1507.2	625.1
	Malkapet Reservoir	774.27	774.27	774.27	0
	Additional command area lift	212.13	212.13	2.29	209.84
	Link-III total	***3118.70***	***3118.7***	***2283.76***	***834.94***
IV	Package 10 (including Ananthagiri)	6706.58	6706.58	6256.08	450.5
	Package 11	3786.00	3382.00	1835.00	1951.00
	Sri Ranga Nayak Sagar Reservoir	2184.00	2184.00	2184.00	0.00
	Package 12	2792.37	2538.37	1553.35	1239.02
	Package-I (Additional 1 TMC)	540.85	540.85	475.25	65.6
	Package-II (Additional 1 TMC)	455.38	455.38	455.38	0
	Package-III (Additional 1 TMC)	862.23	862.23	473.7	388.53
	Package-IV (Additional 1 TMC)	97.13	97.13	97.13	0
	Sri Komaravelli Mallanna Sagar Reservoir (4 works)	17865	17865	17865	0
	Package 13	2205.62	2182.32	1610.5	595.12
	Package 14	524.29	524.29	524.29	0
	Konda Pochamma Sagar Reservoir (2 works)	4771	4771	4771	0
	Konda Pochamma Sagar Canals (11 works)	6057.07	6057.07	2935.89	3121.18

Link	Name of the Package/Work	Total land required	Land requisitioned	Total land acquired	Balance to be acquired
	Link-IV total	***48847.52***	***48166.22***	***41036.57***	***7810.95***
V	Package 15	3841	2277	1723	2118
	Gandhamalla Reservoir	2618	2566	239	2379
	Package 16	5911	2686	1165	4746
	Baswapur Reservoir	4230.73	4230.73	2018	2212.73
	Link-V total	***16600.73***	***11759.73***	***5145***	***11455.73***
VI	Package 17	401.92	401.92	383.76	18.16
	Package 18	1586.68	1286.68	800.13	786.55
	Package 19	3100	1354	453	2647
	Link-VI total	***5088.6***	***3042.6***	***1636.89***	***3451.71***
VII	Package 20	661.37	661.37	661.37	0
	Package 21	250	250	248	2
	Package 21A	2166.2	2166.2	801.7	1364.5
	Package 22	4426	2926	1256	3170
	Package 27	2500	1824.26	1521.26	978.74
	Package 28	3026	981	555	2471
	Link-VII total	***13029.57***	***8808.83***	***5043.33***	***7986.24***
Grand Total		**98110.33**	**85745.88**	**63972.16**	**34138.17**

*(**Source:** Records of the I&CAD Department)*

Appendix 6.1

(Reference to Paragraph 6.4.5)

Details of cases where excess payments pointed out by Audit have been recovered

(1) Excess payment to contractor due to incorrect inclusion of steel in adit tunnels

The scope of work under Package-12 (in Link-IV), which was awarded under the earlier PCSS project, *inter alia*, included excavation of a 9.18 Km long tunnel with 9 metres diameter. An amount of ₹372.14 crore was provided in the estimate for this tunnel. During re-engineering, the Department made some changes in the scope of work which included increase in the length of tunnel by another 6.9 Km. These additional items of work were entrusted to the same contractor by concluding a supplemental agreement.

Audit observed that while working out the cost of the supplemental agreement, the Department included 13,228 MT of reinforcement steel for the main tunnel and another 13,228 MT of steel for the entrance portals of four adits. As per seen from the estimate, the total quantity of reinforced cement concrete (RCC) involved in the main tunnel was 64,530 Cu.M. whereas the RCC quantity involved in the entrance portals of adits was only 891 Cu.M. Thus, the quantity of steel required for 891 Cu.M. of RCC work in adits would work out to only 182.64 MT[185]. Thus, in the revised estimate, the Department provided about 13,045.36 MT of steel in excess of the actual requirement. This resulted in inflating the value of the supplemental agreement by ₹62.82 crore and excess payment to the contractor to that extent.

(2) Non-recovery of cost of stone and lead charges

The scope of work under the contract for construction of Kondapochamma Sagar (KPS) Reservoir (Reach-I), *inter alia* included several items requiring use of stone/metal. The rates payable to contractor were inclusive of the cost of stone/metal used in the work. In the estimates, the Department provided for the cost of stone including lead (conveyance) charges for 20 Km.

Audit observed that a total quantity of 3.57 lakh Cu.M. of stone/metal was used in the work, as seen from the XVI & part bill paid (May 2021) to the contractor. Audit further observed that during execution of the work, the Department had permitted (December 2017) the contractor to utilize the 58,888 Cu.M. of stone excavated in another work (Package-14) available in Chebarthy village, which was eight Km away from the KPS work site. However, in the measurement books of the work, the Department did not record the quantities of work executed by the contractor by re-using the excavated rock and did not recover the initial cost of stone (₹97 lakh) and difference of lead charges (₹79 lakh) from the bills paid to contractor, resulting in undue benefit of ₹1.76 crore to the contractor.

(3) Excess payment of price adjustment on POL

The price adjustment clause in the agreement of Package-15 stipulated that while calculating the price adjustment on POL, the average official retail price of diesel at the nearest consumers' petrol pumps nearest to work spot on 'the 15th day of the middle calendar month of the quarter for which the bill is being paid' shall be considered as the current price. For example, for the quarter January-March, the prevailing rate of diesel on 15th February is to be taken as the present price. Contrary to this, the Department paid price escalation to contractor by taking the diesel price prevailing on 'the 15th day of the month in which bills were paid' to the contractor. Due to this, an amount of ₹0.87 crore was excess paid toward price escalation to the contractor.

[185] Steel requirement projected for 64,530 Cu.M. of RCC in main tunnel: 13,228 MT. Pro-rata steel requirement for 891 Cu.M. of RCC in adit tunnels = 13,228 MT X 891 Cu.M./64,530 Cu.M. = 182.64 MT

Glossary

GLOSSARY

APPWD	:	AP Public Works Department
BCR	:	Benefit-Cost Ratio
BHEL	:	Bharat Heavy Electricals Limited
BOQ	:	Bill of Quantities
CA	:	Command Area
CE	:	Chief Engineer
CMD	:	Contracted Maximum Demand
CNS	:	Cohesive Non-Swelling
Cu.M.	:	Cubic Metre
Cumec	:	Cubic metres per second
Cusec	:	Cubic feet per second
CWC	:	Central Water Commission
CWPRS	:	Central Water and Power Research Station
CWR	:	Crop Water Requirement
DISCOM	:	Distribution Company
DLP	:	Defect Liability Period
DPR	:	Detailed Project Report
EAP	:	Emergency Action Plan
EC	:	Environmental Clearance
ECV	:	Estimated Contract Value
EE	:	Executive Engineer
EIA	:	Environmental Impact Assessment
EM&HM	:	Electro-Mechanical and Hydro-Mechanical
EMP	:	Environmental Management Plan
EnC	:	Engineer-in-Chief
EOI	:	Expression of Interest
EPC	:	Engineering, Procurement and Construction
FC	:	Forest Clearance
FCMP	:	Fisheries Conservation and Management Plan
FFC	:	Flood Flow Canal
FRL	:	Full Reservoir Level
GST	:	Goods and Services Tax
GWDT	:	Godavari Water Disputes Tribunal
HMWSSB	:	Hyderabad Metropolitan Water Supply and Sewerage Board
I&CAD	:	Irrigation and Command Area Development Department
IDC	:	Interest During Construction
KIPCL	:	Kaleshwaram Irrigation Project Corporation Limited
KPS	:	Kondapochamma Sagar
LA	:	Land Acquisition
LIS	:	Lift Irrigation Scheme
MA	:	Mobilization Advance
MCM	:	Million Cubic Metres
MMR	:	Mid-Manair Reservoir
MoEF	:	Ministry of Environment and Forests

MoTA	:	Ministry of Tribal Affairs
MSL	:	Mean Sea Level
MU	:	Million Units
MW	:	Mega Watt or 1000 Kilowatts
NABARD	:	National Bank for Agriculture and Rural Development
NGRI	:	National Geophysical Research Institute
O&M	:	Operation And Maintenance
PA	:	Price Adjustment
PAFs	:	Project Affected Families
PCSS	:	Pranahitha Chevella Sujala Sravanthi
PDFs	:	Project Displaced Families
PFC	:	Power Finance Corporation
POL	:	Petrol, Oils and Lubricants
PPIS	:	Pressurized Piped Irrigation System
R&R	:	Rehabilitation & Resettlement
RCC	:	Reinforced Cement Concrete
REC	:	Rural Electrification Corporation
RMD	:	Recorded Maximum Demand
SCCL	:	Singareni Collieries Company Limited
SE	:	Superintending Engineer
SKMS	:	Sri Komaravelli Mallanna Sagar
SLSC	:	State Level Standing Committee
SoR	:	Schedule of Rates
SPV	:	Special Purpose Vehicle
SRSP	:	Sri Ram Sagar Project
TDWSCL	:	Telangana Drinking Water Supply Corporation Limited
TMC	:	Thousand Million Cubic Feet
TSERC	:	Telangana State Electricity Regulatory Commission
TSNPDCL	:	Northern Power Distribution Company of Telangana Ltd.
TSSPDCL	:	Southern Power Distribution Company of Telangana Ltd.
TSTRANSCO	:	Transmission Corporation of Telangana Limited
WAPCOS	:	Water and Power Consultants Private Limited

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