

CHAPTER

III

Re-engineering of PCSS Project



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.

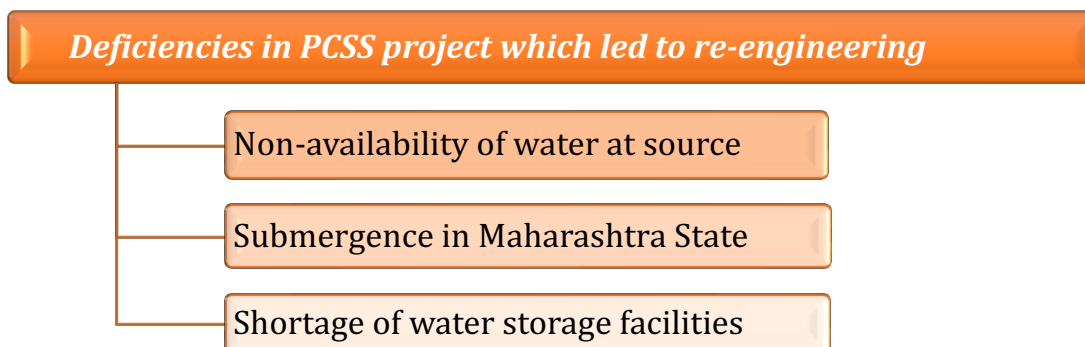
Role of CWC

- 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 Report¹¹, 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 therein¹² 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 approval¹³ 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 reservoirs¹⁴ (total capacity 50.2 TMC) pertaining to other existing/ongoing projects and seven reservoirs¹⁵ 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 Tummidiheiti (5 TMC), Anantagiri Reservoir (1.7 TMC), Imamabad Reservoir (1.5 TMC), Thadkapalli Reservoir (1.5 TMC), Tipparam Reservoir (1 TMC), Pamulaparthi 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.

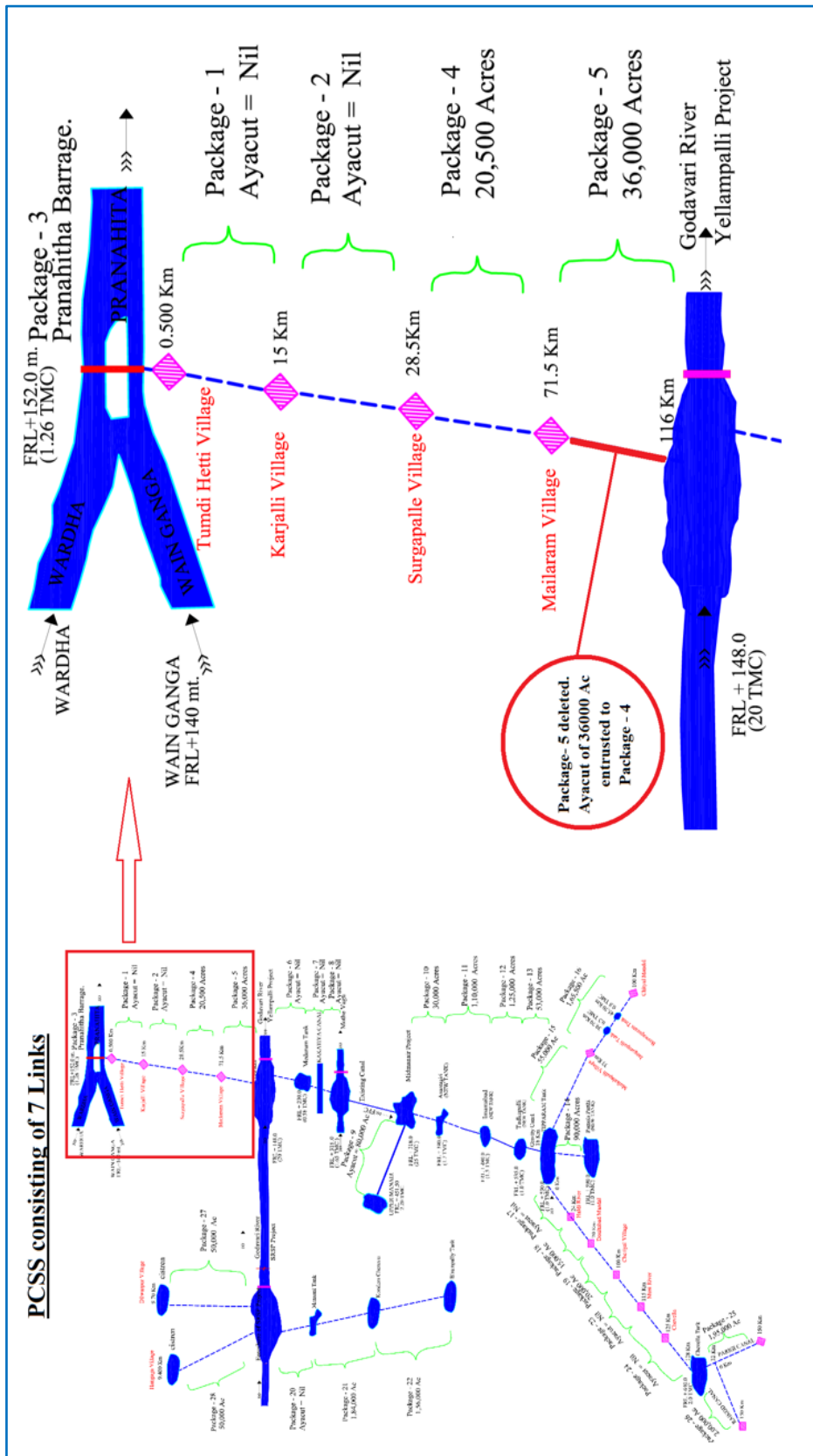
3.2.1 Changes in the project components

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



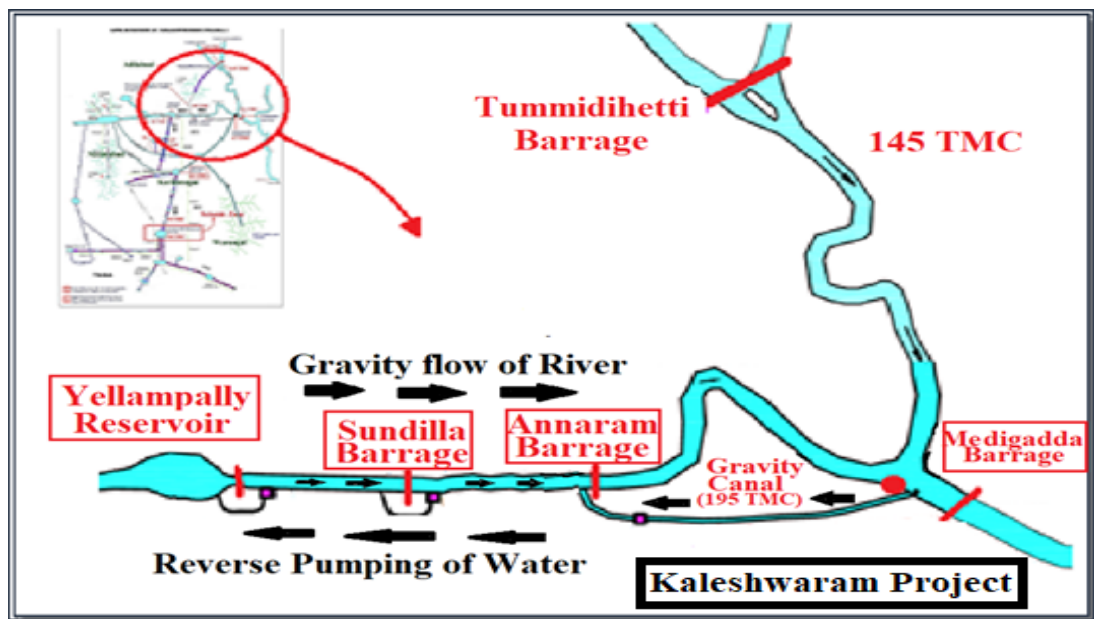
Source: Records of the I&CAD Department

- 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 TMC¹⁶ 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 Project¹⁷ (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

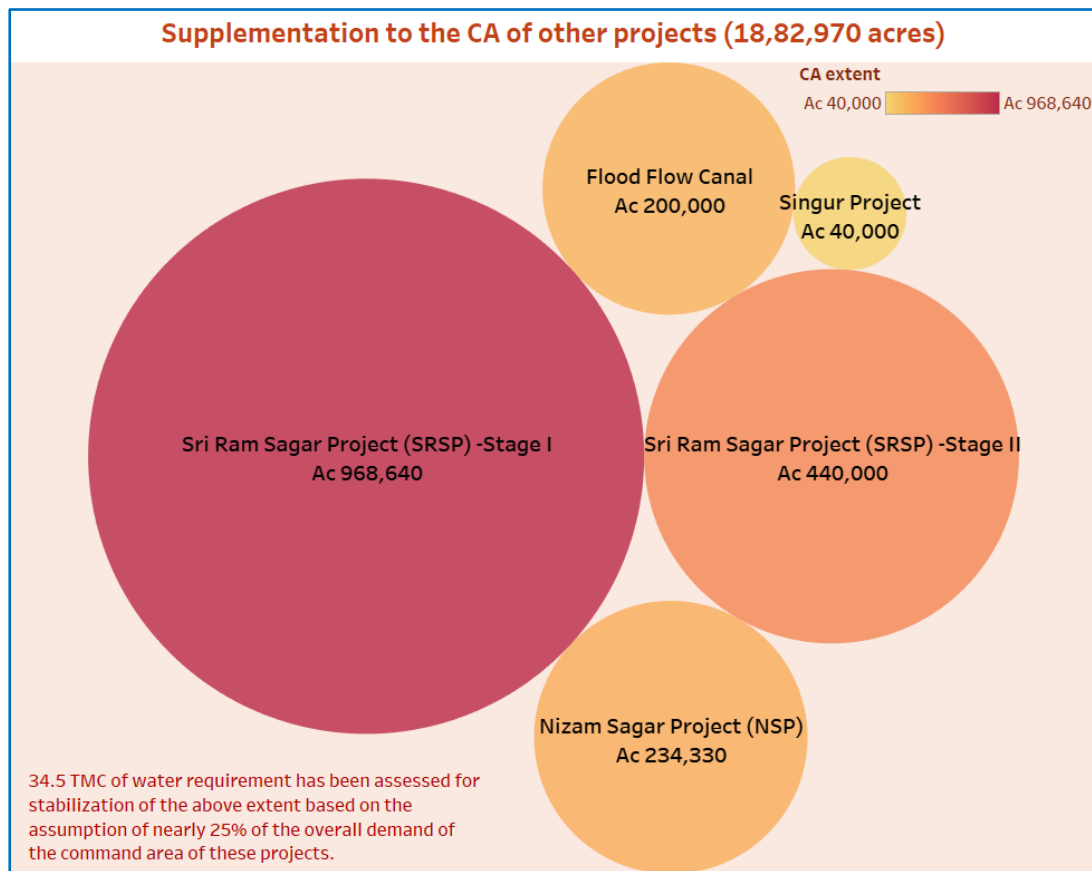
Location - Sundilla Village
FRL - 130 m
Length - 1426 m
Gates - 74
Discharge - 57,000 cumecs
Storage Capacity - 8.83 TMC

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 TMC¹⁸), 17 reservoirs¹⁹ were proposed to be newly constructed, taking the total storage capacity to 147.71 TMC (live storage²⁰: 125.18 TMC). The re-engineered project also proposes to utilize five existing reservoirs²¹ 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 projects²² 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 conveyer 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 be 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).

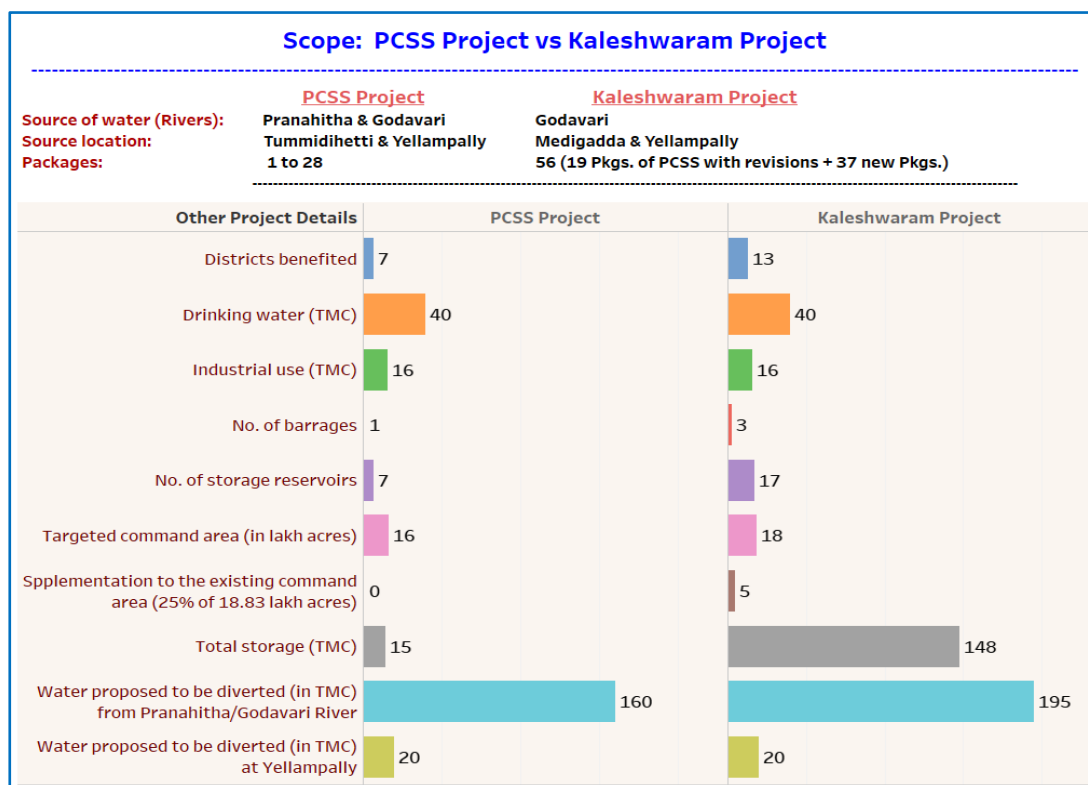
²⁷ The figure in column No.3 shows the number of districts prior to re-organisation of districts. The figure in column No.5 shows the number of districts post re-organisation

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

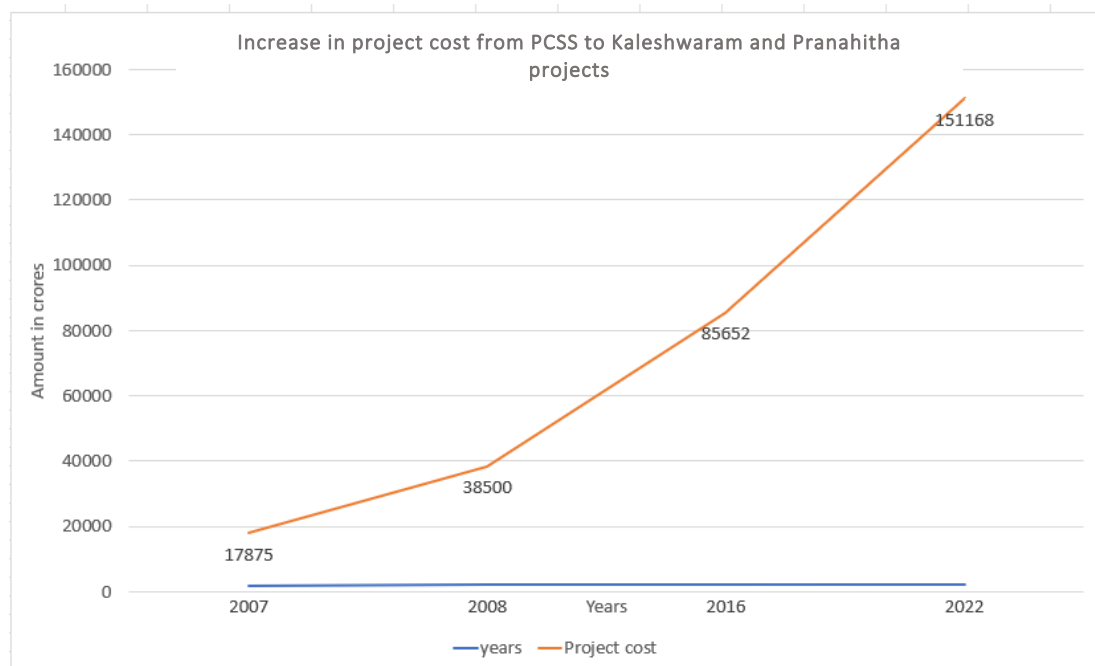
(i) Impact on the project costs and benefits: The earlier PCSS project contemplated providing irrigation to 16.4 lakh acres. The re-engineering substantially changed the scope of the command area (CA) proposed to be irrigated and the cost of the project(s). The Kaleshwaram Project proposes to create 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 tariff³¹ 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 crore³². 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 MU³³. 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 $(14,344.39 \text{ MU} \text{ minus } 8,701 \text{ MU}) \times ₹6.30 \text{ per unit}$

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 crore³⁴ 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	
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 deletion³⁶ 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, <i>inter alia</i> , 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 CWC³⁹ 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 crore⁴⁰.

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/unit⁴¹ 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 crore⁴² *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.