CHAPTER - III
PLANNING AND EXECUTION OF PROJECTS

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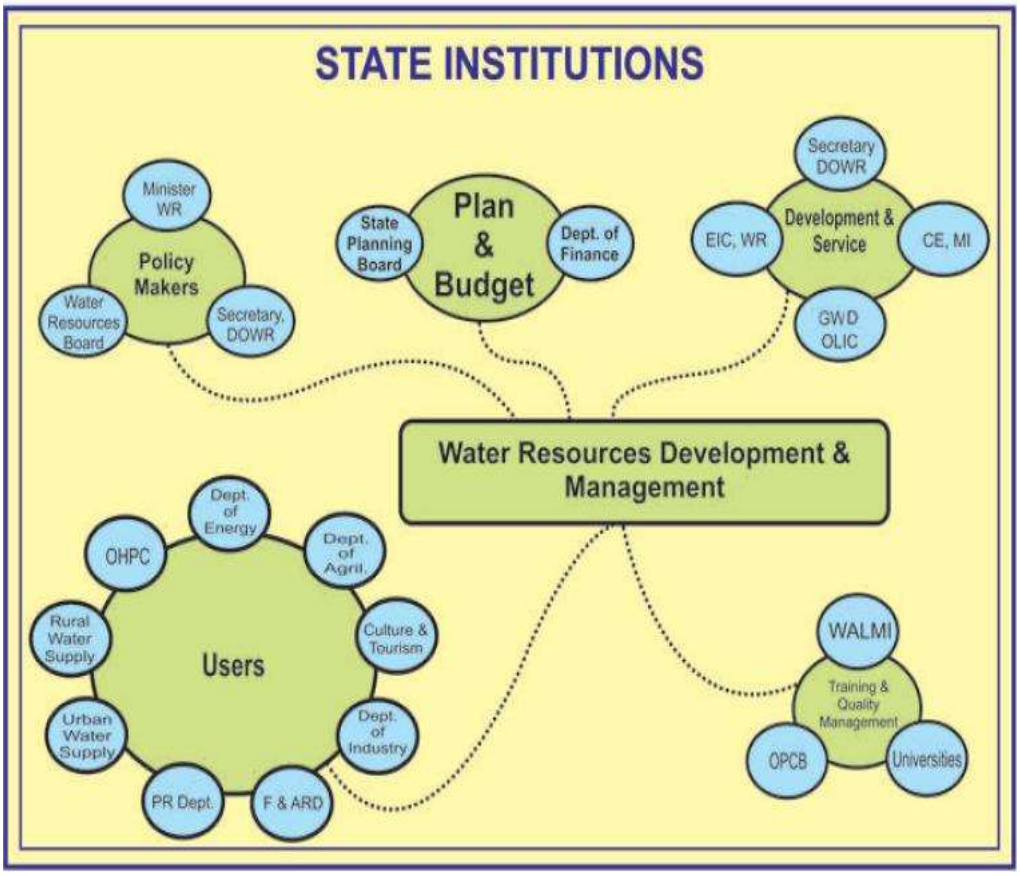
Planning and execution of projects

3.1 Planning, Development & Management of State's Water Resources

Competing demands on water resources from industrial, domestic, environmental and other sectors essentially warrants an integrated water resources development and management approach. The river basin is taken as a logical hydrological unit of management. To achieve this objective, policy initiatives, administrative initiatives and legal provisions have been made at the state and national levels. The State's Institutions responsible for Water Resource Development and Management is given in the chart 3.1 as detailed below:

Chart 3.1: Showing State's institutional framework responsible for Water Resources Development and Management



Despite an elaborate institutional arrangement at the State level, serious Planning and Management shortcomings were noticed in achieving targets of surface irrigation as discussed in subsequent paragraphs.

3.2 Creation and utilisation of Irrigation Potential (IP)

3.2.1 Targets and achievements of creation of IP in the State

The DoWR fixed year-wise targets for creation of Irrigation Potential (IP) during 2014-19. It was seen that out of 1.34 lakh ha of creation of IP, the state could create only 0.63 lakh ha (47 *per cent*) as given in table below:

Table 3.1: Year-wise target and achievement of IP creation in the State

Year	Target fixed for creation of IP in ha	IP created in ha	Percentage of non-achievement
2014-15	27,000	7,917	70
2015-16	10,000	9,229	8
2016-17	17,000	4,000	76
2017-18	34,000	21,747	36
2018-19	45,898	20,125	56
Total	**1,33,898**	**63,018**	**53**

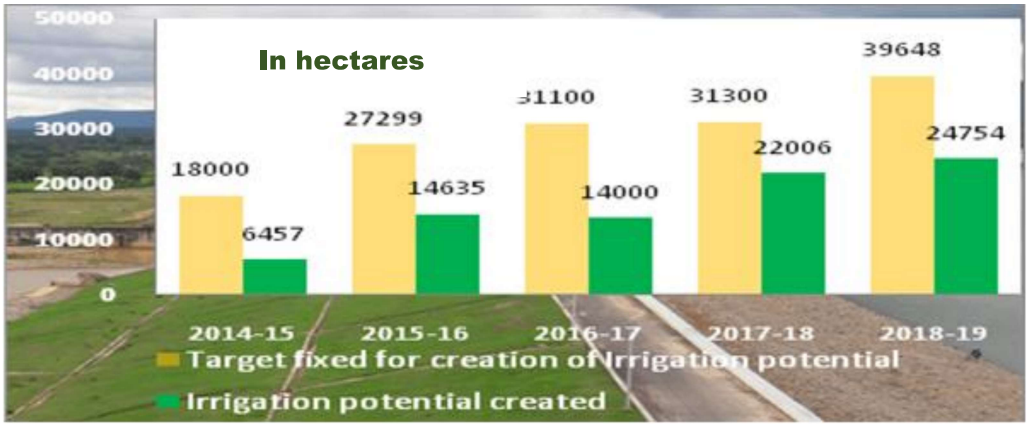
(Source: Data received from E-i-C (Water Resource-WR)

The non-achievement of target for creation of irrigation potential ranged between eight and 76 *per cent* of the target fixed during the said years.

3.2.2 Targets and achievements of creation of IP in selected Projects

The DoWR fixed targets for creation of irrigation potential of 1.47 lakh ha of Culturable Command Area (CCA) for the five test-checked major projects for 2014-19 and the achievement was only 0.82 lakh ha (56 *per cent*) as given in the Chart 3.2 below: -

Chart 3.2: Showing target fixed for IP creation and IP created in test checked projects.



The non-achievement of targets for creation of irrigation potential ranged between 38 and 64 *per cent*. This was due to delay in execution of work by the contractors, delay in land acquisition, delay in forest clearance, inadequate survey and investigation and delay in finalization of design *etc*., as discussed in subsequent paragraphs.

The details of the designed ayacut of the test checked project and the ayacut achieved as of March 2020 is given in the following Table:

Table 3.2: Showing the details of designed ayacut and IP achieved as of March 2020 in respect of test checked projects

Sl.No	Name of the project	Designed ayacut (in ha)	IP Achieved (in ha)	Percentage of achievement
1	SIP	1,00,568	33,899	34
2	UIIP	1,28,012	33,710	26
3	LIIP	29,900	3,860	13
4	RRBC	1,21,200	17,606	15
5	RLBC	1,14,300	28,471	25
6	Nine MLPs	7,250	4,100	57
7	10 MIPs	1,612	772	48
	Total	**5,02,842**	**1,22,418**	**24**

(Source: Compiled by Audit from the records of project authorities)

The achivement of ayacut ranged between 13 to 34 *per cent* in respect of five major test checked projects. Although, UIIP had been completed (March 2016), the achievement of ayacut was only 26 *per cent* of the designed ayacut.

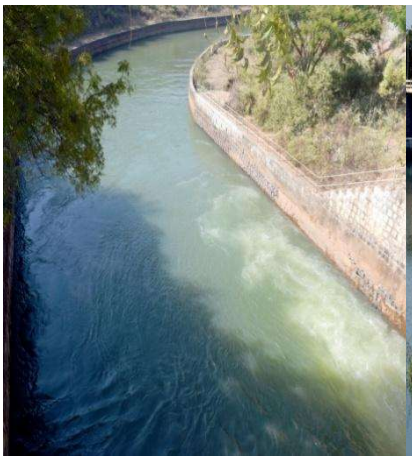
3.3 Need for irrigation and factors influencing the projects

The need for irrigation projects and the project proposals indicating deliverables and status of the test checked projects are given below:

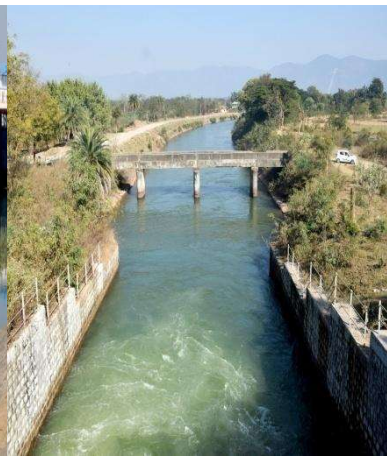
3.3.1 Upper Indravati Irrigation Project (Extension) (UIIP)

Upper Indravati Irrigation Project

In order to solve the problem of water scarcity and to improve the socio-economic conditions of the people in Kalahandi, Bolangir and Koraput (KBK) districts, the GoI proposed (May 1978) UIIP across Indravati River which has a gross storage capacity of 2,300 million cubic meters (MCM) to irrigate 1.28 lakh ha. In the first phase, irrigation to 0.76 lakh ha was provided during 1987-2004. In order to cover the remaining ayacut a proposal was mooted to irrigate through gravity of water flow and one lift project. Ministry of Water Resources, GoI approved (27 January 1999) the proposal for extension of Left and Right Canal system for ₹136.67 crore to irrigate 25,484 ha. Both the extension canals were completed during March 2016 with an expenditure of ₹761.63 crore (March 2020).


Left Main Canal of UIIP


Hati Barrage of UIIP


Right Main Canal of UIIP

The project proposals comprised of the following:

- ✓ The Right Canal system was designed for 50 cumecs discharge at the head, of which 33 cumecs of water had been utilised in first phase for providing irrigation to 27,195ha up to river Sagada and balance 17 cumecs was proposed to provide irrigation to 15,260 ha through extension of canal. No irrigation could be provided through Right extension canal due to defective construction of alignment of Right main canal.

- ✓ The Left Canal system was designed for 69.77 cumecs, of which the existing consumption up to River Tel was 59.56 cumecs for providing irrigation to 49,085 ha and the balance 10.21 cumecs of water was available to provide irrigation to 10,224 ha through extension of canal. Against the above, irrigation to 9,001 ha only could be provided.

- ✓ The Lift project was taken up in March 2015 for completion by March 2020 to provide irrigation to 0.26 lakh ha in upland using 30 cumecs of water. The work was in progress (March 2021).

Though the Left and Right Canal system of UIIP had been extended with an expenditure of ₹761.63 crore (557 *per cent* excess), trial irrigation[12] to only 9,001 ha, against designed ayacut of 10,224 ha could be provided in left extension canal. The right extension canal could not provide any irrigation against proposed area of 15,260 ha due to defective construction of alignment of Right main canal.
Government stated (July, 2021) that as the existing Right Main Canal needs immediate renovation and restoration, no trial irrigation could be provided up to March, 2020.

3.3.1.1 Assessment of Project deliverables with the intended objectives

The DPR of the Project envisaged to provide irrigation only to the designed ayacuts. The details of component-wise IP proposed and achieved in the project and gist of Audit comments are given in the following table:

[12] Irrigation provided on trial basis to check the functioning of canal system

Table 3.3: Component wise up-to-date Target and achievement of IP of UIIP

Project components	Designed length of canal (in km)	Completed canal length (in km)	Cost involved (₹ in crore)	IP proposed (in Ha)	IP Achieved (in Ha)	Gist of Audit comments
Right main canal	84.00	84.00	199.07	27,195	5,306	There was shortfall in IP due to defective construction of canal alignment.
Left Main canal	52.00	52.00	702.04	49,085	19,403	Due to insufficient release of water after power generation by Odisha Hydro Power Corporation (OHPC), and non-verification of ayacut, there was shortfall in ayacut.
Right canal extension	22.18	22.18	332.92	15,260	0	No IP created due to defective construction of alignment of Right Main canal.
Left canal extension	42.84	42.84	369.06	10,224	9,001	Due to insufficient water availability in Hati Barrage, there was shortfall in IP achieved. The utilisation of IP created has not been certified with Revenue Authorities. So actual utilisation could not be ensured in Audit.
Lift Project	45	45	679.59	26,248	0	The distribution system is under progress through UGPL.
Total				**1,28,012**	**33,710**	Pani Panchayats (PP) formed only in Golamunda distributory of left extension canal.

(Source: Compiled by Audit from the records of project authorities)

Audit analysis and the deficiencies observed on the components of the project are detailed in subsequent paragraphs. Audit also observed that due to defective alignment of canals, insufficiency of water in the project and overlapping of ayacut, the IP designed could not be achieved as detailed below:

3.3.1.2 Non execution of work as per DPR

The DPR of UIIP (Extension) envisaged execution of canals/distributaries with lining[13]. The Golamunda distributaries of left extension canal of UIIP were completed without lining in 2012-13. As such, the side slope of the canal had slipped in a number of places and there were rain cuts[14] due to which the siltation had taken place in the canal. In order to restore the slipped portion as well as for silt clearance, the division had incurred expenditure of ₹7.08 crore (between 2013 and 2015). Thus, non-execution of work with proper design as visualised in the DPR, EE, UILC Division No. II, Dharamgarh incurred ₹7.08 crore towards restoration subsequently, which was avoidable.

The State Government accepted (July 2021) that due to shortage of land, steep slope was provided to the outer sloped portion of the canal causing seepage and slippage of earth necessitating construction of the wall. The reply is not acceptable as the reasons for non-adherence to technical requirements as per DPR was not explained.

3.3.1.3 Improper canal alignments led to non-supply of water to the designed ayacut

The extension project of UIIP had been completed with an expenditure of ₹761.63 crore (557 *per cent* excess). The Right Canal system was designed for 50 cumecs discharge at the head, of which 33 cumecs of water had been utilised in first phase for providing irrigation to 24,133 ha and balance 17 cumecs was proposed to provide irrigation to 15,260 ha for which the extension of canal was executed at a cost of ₹332.92 crore.

Audit observed that though the right extension canal had been completed, no irrigation was provided due to defective construction/alignment of right main canal. Audit conducted joint physical inspection of UIIP right extension canal and found that water was not coming to the right extension canal at all due to excavation of right main canal above bed level ranging between 0.31 m and 1.88 m in two patches for 1.20 km (between RD 26.27 km and RD 29.57 km) and in three places for 1.13 km (between RD 61.10 km to RD 65.64 km). As such, the maximum discharge of water in the right main canal

Rock zone in the Canal bed and side at RD 64.5 to 65.5KM of Right Main Canal

[13] Canal lining is an impermeable layer provided for the bed and sides of canal to improve the life and discharge capacity of canal

[14] The erosion of soil in the earthen embankment due to rain is generally called rain cut

was 18 cumecs during 2014-19 against the required discharge of 33 cumecs, as revealed from the discharge data of the division.

Despite knowing the fact that water was not reaching the end point of the right main canal, the CCE without proposing rectification of the canal to its design level chose to propose the extension of canal which rendered expenditure of ₹332.92 crore not only unfruitful, but the farmers also could not derive benefits of crop production (estimated at ₹657.95 crore per annum envisaged in the DPR) from the designed ayacut of 15,260 ha.

Further, due to non- supply of water in the canal system for more than five years, the canals were filled up with earth and damaged in a number of places. There were breaches in embankment in many places, lining was damaged severely and canal bed was filled with mud and trees. Audit conducted Joint physical verification of the Chandapalla distributaries near village Phukujodi in the presence of the representatives of the department and found that it was filled with mud and trees and was in damaged condition.

Breach in embankment near Phukujodi village

Sliding &silting of lining near Phukujodi village

Thus, the extension of right canal of UIIP without restoration work of right main canal rendered expenditure of ₹332.92 crore unfruitful and the farmers were deprived of the benefits of irrigation.

Government admitted (July 2021) the fact and stated that there are incorrect alignments of bed which necessitated restoration and renovation of the existing main canal under Canal Lining and System Rehabilitation Programme (CLSRP). The reply is not acceptable as the department had not taken any action rectifying defects of the main canal since 2004.

3.3.1.4 Assessment of water availability in the project

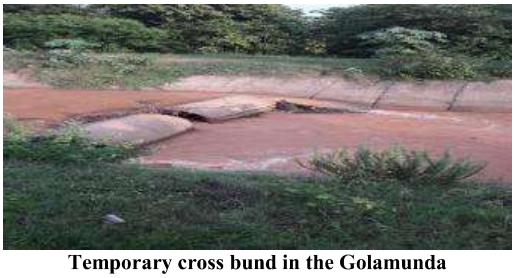
- **Construction of projects without flow of sufficient water**

The UIIP had two completed canal systems (Left Main Canal including Left extension canal for 69.77 cumecs of water and Right Main Canal including Right extension canal for 50 cumecs of water) to provide irrigation to 1.02 lakh ha by drawing 119.77 cumecs (rounded to 120 cumecs) of water from Hati Barrage charged by release of water after power generation by OHPC. This requirement of water of 120 cumecs was for kharif season i.e for the period from 15 June to 15 November. But, Audit noticed that the release of water to the extent of 120 cumecs was from nine to 59 days during the same period against the requirement of 154 days in a kharif season.

The release of water after generation of power by OHPC was insufficient and therefore, the barrage could not meet the requirement of water for irrigation. This rendered the project unviable and could not meet the water requirements of the targeted beneficiaries.

Further, it was noticed that the Full Supply Depth (FSD) of the Left Extension canal of UIIP Project was 1.48m. The CCE, UIIP made a proposal for extension of the length of left canal to DoWR for approval without proper assessment of water. The DoWR approved (May 2003) the proposal accordingly and the extension work of left canal was completed during 2013-14 with expenditure of ₹369.06 crore.

Audit noticed that against the requirement water level of 1.48 m, water for irrigation was released up to 0.6 m only. Besides, this level of water was also not regular as per the requirement of farmers. As the discharge outlets were above 0.6 m, water could not be discharged to irrigate the fields. Therefore, farmers had to construct temporary cross bunds so that water level could be raised up to required level to get water through outlets. Thus, due to erroneous assessment of water availability by the CCE, UIIP, the expected results could not be attained despite an expenditure of ₹369.06 crore on the extension work of left canal.



Temporary cross bund in the Golamunda Distributaries at RD2.345 km

Government stated (July 2021) that during appraisal of DPR water availability study was conducted and water availability was ensured by the Hydrology Directorate of CWC. It was also confirmed that constructing cross bund in the canal bed was a fact which was on account of erratic power generation by OHPC. Evidently, the water supplied was insufficient for irrigation and expenditure on extension of work of left canal was infructuous (September 2021).

3.3.1.5 Overlapping of ayacut

Twelve Minor Irrigation projects with an ayacut of 1,053 ha had an overlapping area by the ayacut of UIIP. Though the canals of UIIP for this ayacut have already been completed no water could be supplied due to defective construction of alignment of main canals. The EE, incurred an expenditure of ₹2.80 crore on maintenance of nine of the twelve MI projects during 2017-19. Had the water been supplied through this canal, there would not have been any requirement for repair and maintenance of MIPs. Hence the expenditure of ₹2.80 crore incurred by EE of MI Division was avoidable.

Government accepted (July 2021) that the MI projects were constructed by MI wing inside the command area of UIIP and were maintaining these projects. It was also stated that the MI authorities would be requested to transfer these projects to UIIP. The reply is not acceptable since incurring expenditure by MI wing within the command area of UIIP was redundant and avoidable.

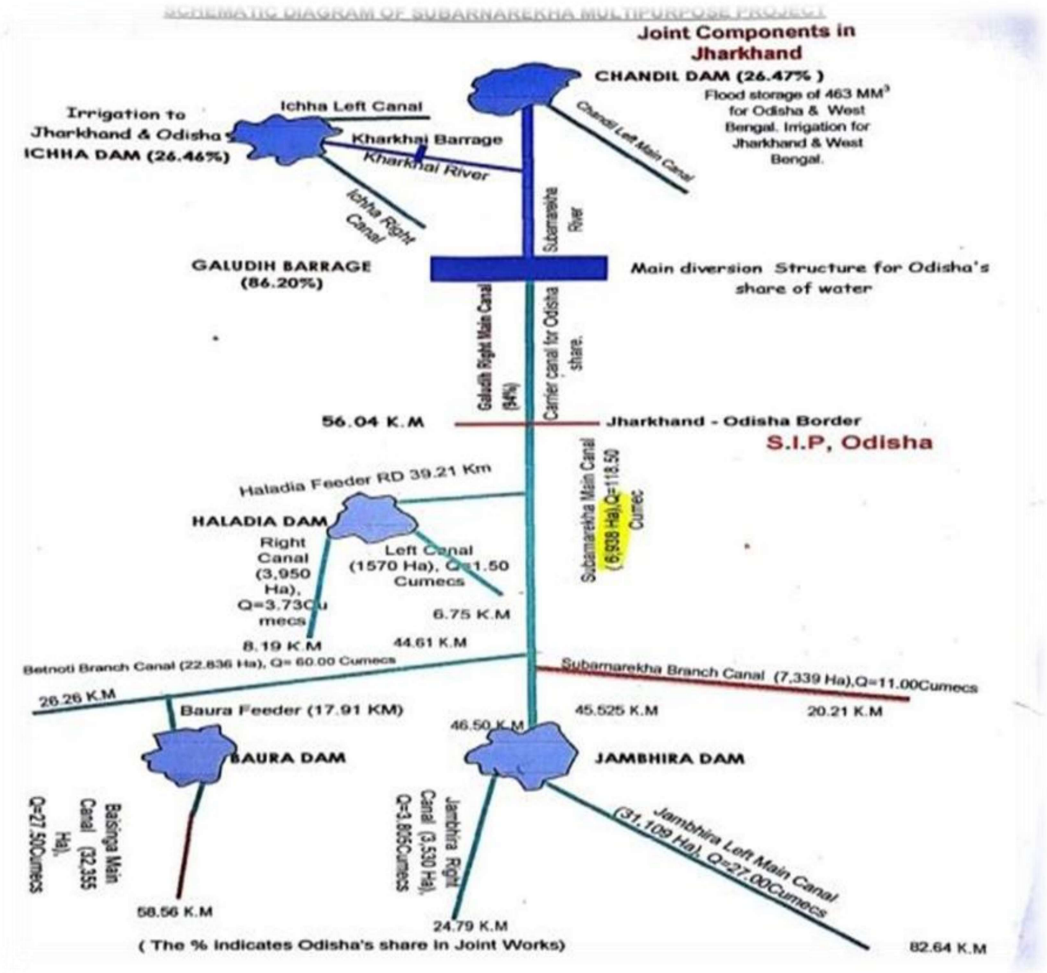
Despite completion of all components of the project, right extension canal could not provide irrigation to the proposed IP of 15,260 ha due to defective execution of alignment of the original right main canal constructed by the EEs, rendering the entire expenditure of ₹332.92 crore incurred on construction of the extension of canal unfruitful. Besides, the farmers were deprived of the irrigation benefit as envisaged in the Project Report for more than six years.

Similarly, the left extension of canal completed at a cost of Rs.369.06 crore could not provide irrigation to its full design ayacut of 10,224 ha due to insufficient water in the source for which the IP created was only 9,001 ha. The actual utilisation of ayacut could not be ensured since the ayacut has not been certified through joint verification with the revenue authorities.

3.3.2 Subarnarekha Irrigation Project (SIP)

In order to harness the water resources potential of Subarnarekha river, the SIP was taken up in the command area of 1.09 lakh ha in Mayurbhanj and Balasore districts. It is an interstate project of three States viz., Jharkhand (*erstwhile* Bihar), Odisha and West Bengal. For attaining the optimum utilization of water resources of Subarnarekha-Kharkhai Basin, a tripartite agreement was executed (August 1978) for allocation of water. A hydrological study of resources available was carried out in Chandili, Galudih, Ichha and Kharkhai complex. The States of Bihar and Odisha agreed to construct a barrage at Galudih and the right bank main canal up to Odisha border jointly. The Chief Engineer (CE), Odisha had prepared (April 1978) the Galudih joint project report in which share of water of Odisha was projected as 118.50 cumecs.

The SIP proposals comprised of the following as shown in schematic diagram below:



The SMC consists of 56 km in Bihar and 46.5 km contour canal in Odisha. The Scheme was originally accepted by Technical Advisory Committee (TAC) in 1982 for ₹221.68 crore. Subsequently, the project cost was revised four times with enhancement of 3,030 per cent to ₹6,715.96 crore till the year 2016 including Government of Jharkhand share of ₹1,208.46 crore. Out of which an amount of ₹1,000.46 crore has already been paid to Jharkhand Government. The project was funded under PMKSY for completion by March 2019. The project remained incomplete with trial irrigation to only 33,899 ha (31*per cent*) as of March 2021.

Restoration work of Subarnarekha Main Canal at RD 7.950 km

The SMC with a discharge capacity of 118.50 cumecs would feed three command storage reservoirs (Haldia, Jambhira and Baura) in addition to its own ayacut of 6,938 ha. Though the project was proposed for 1.09 lakh ha, it

was reduced to 1.01 lakh ha due to abandonment of Baura reservoir wherein the local people were resisting to part with their land. Accordingly, a new component of Baisinga feeder-cum-link canal was proposed with a reduction of 9,059 ha of Baura reservoir. The distribution system would irrigate 93,630 ha as under:

- ✓ Haldia Reservoir (existing) Project comprising of Right main canal of 8.19 km with discharge capacity of 3.73 cumecs would provide irrigation to 3,950 ha and Palbani main canal (left) of 6.75 km with discharge capacity of 1.50 cumecs would provide irrigation to 1,570 ha.
- ✓ Betnoti Branch Canal (BBC) with 26.26 km length would irrigate a net ayacut of 22,836 ha and would feed Baisinga feeder cum link canal. The Subarnarekha Branch Canal (SBC) of 20.21 km length would irrigate 7,339 ha.
- ✓ The Jambhira reservoir has two canals. The Right main canal of 24.78 km with discharge capacity of 3.81cumecs would provide irrigation to 3,530 ha and Left main canal of 82.46 km with discharge capacity of 27 cumecs would provide irrigation to 31,109 ha.
- ✓ Baisinga feeder cum link canal had been taken up during December 2016 with ayacut of 23,296 ha and a canal length of 26 km.

Though the cost of the SIP had been revised four times to ₹6,715.96 crore, by a whopping 3,030 *per cent* and rescheduling the date of completion as March 2019 (from March 2002 scheduled earlier), the project remained incomplete with trial irrigation commencing of 33,899 ha (31 *per cent*) as of March 2021.

3.3.2.1 Assessment of Project deliverables with the intended objectives

The DPR of the Project envisaged to provide irrigation only to the designed ayacuts. The details of component-wise IP proposed and achieved in the project and gist of Audit comments are given in the table below:

Table. 3.4: Component wise up-to-date Target and achievement of IP of SIP

Project components	Designed length of canal (in km)	Completed canal length (in km)	Cost involved (₹ in crore)	IP proposed (in Ha)	IP Achieved (in Ha)	Gist of Audit comments
SMC	46.5	46.5	491.39	6,938	7,260	IP achieved was not certified through joint verification with Revenue authorities. Hence, utilisation of IP could not be ensured by Audit.
BBC	26.26	26.26	240.05	22,836	15,359	Shortfall in IP creation was due to non-completion of distribution system for want of LA.
SBC	20.21	0	0	7,339	0	Canal work could not be started due to non-acquisition of land and not handing over the site to the contractor.

Project components	Designed length of canal (in km)	Completed canal length (in km)	Cost involved (₹ in crore)	IP proposed (in Ha)	IP Achieved (in Ha)	Gist of Audit comments
Haldia reservoir	14.94	14.94	333.02	5,520	3,580	Construction of spillway under progress and the IP achieved is out of the existing reservoir.
Jambira reservoir	107.25	107.25	1,178.67	34,639	7,700	Distribution system work is under progress and hence short achievement of IP.
Baisinga link cum feeder canal	58.56	20.00	189.36	23,296	0	Due to abandonment of Baura reservoir this new project component was taken up in 2016 with a reduction of ayacut of 9,059 ha. As construction of feeder canal is under progress no ayacut has been created.
Total	**273.72**	**214.95**	**2,432.49**	**1,00,568**	**33,899**	The actual utilisation of ayacut could not be ensured since the created ayacut has not been certified through joint verification with the revenue authorities. Only 6 PPs out of 19 PPs were formed. No PPs were involved in maintenance of canals.

(Source: Compiled by Audit from the records of project authorities)

Audit analysis and the deficiencies observed on the components of the project are detailed in subsequent paragraphs. Audit also observed that due to deficiencies in DPR, overlapping of ayacut and short creation of ayacut, delay in land acquisition, delay in finalisation of design and etc. in the project, the IP designed could not be achieved as detailed below:

3.3.2.2 Deficiencies in the DPR

- **Avoidable extra expenditure due to execution of excess length of spillway**

Haldia dam project of SIP was an existing reservoir project with 16 m height, 1.74 km length with live storage capacity of 11.15 mcm that provided irrigation to 2,428 ha. The project was included in SIP to provide irrigation to 5,520 ha by increasing the length of the dam to 3.52 km and height to 23.5 m with a live storage capacity of 46.87 mcm. The reservoir was planned to be filled up with water conveyed through SMC. In order to discharge the excess water from the reservoir due to heavy rainfall, there was a provision in the DPR for construction of un-gated spillway of 17m

on Haladia dam. Against the above provision, the division had constructed a 50 metre long gated spillway at a cost of ₹104.35 crore without any hydraulic assessment. As the Central Water Commission (CWC) had approved the SIP initially, any major technical changes in design by increasing length and switch over to gated spillway required the approval of CWC which had not been obtained. Besides, the WAPCOS[15] report had approved provision of 17m length of un-gated spill way instead of 50 m gated spillway. Thus, construction of 33 meters of excess length of gated spillway by the EE, Subarnarekha Irrigation Division No-I without any hydraulic assessment and without obtaining approval from CWC had rendered an extra expenditure of ₹73.20 crore infructuous. Responsibility may be fixed on the EE for such extra expenditure.

Government stated (July 2021) that the TAC accepted the proposal for construction of 50 m gated spillway but necessary approval of CWC had not been received. The reply is not acceptable since the provision of 17 m length of un-gated spillway had the approval of CWC.

3.3.2.3 Improper survey and investigation and deficiencies in design

- **Avoidable expenditure due to faulty design and drawings**

The canal work of SMC from RD 7.95 km to 8.84 km of SIP completed in 1992 was seen breaching gradually and canal slopes were slipping due to presence of Kaolin soil. As the canal was breached, no water has been supplied for irrigation since 2012-13. TAC could not finalise the design for restoration and referred (November 2012) the matter to CWC for providing the design which was received in August 2015. The CE had taken up (August 2016) restoration work at a cost of ₹67.28 crore for completion by August 2018. The work was in progress (September 2020) with a booked expenditure of ₹70.90 crore. Thus, failure on the part of department in proper survey and investigation and to design the canal as per soil condition delayed the work depriving irrigation to the farmers for more than 28 years. Besides, the department incurred an avoidable expenditure of ₹9.82 crore towards replacement and disposal of entire Kaolin soil from the canal embankment constructed originally.

Accepting the delay in finalisation of design and drawing for technical reasons, Government stated (July 2021) that the unsuitable soil was excavated and dumped at the available Government land. The reply is not acceptable since the department failed to carry out a proper survey and canal design as per the soil condition that led to avoidable expenditure.

3.3.2.4 Overlapping of ayacut

The left main canal and its distributaries, minors and sub-minors of Jambhira Dam of SIP were in progress. The local people of Basta distributaries were not allowing ayacut survey of 4,500 ha in the command area, since their land had already been irrigated through MIP/LIP. This overlapping of ayacut was due to the time lag in proposal mooted for Jambhira Left Main Canal (LMC)

[15] Water and Power Consultancy Services (India) Limited is a government undertaking and consultancy firm wholly owned by Ministry of Jal Shakti, Government of India

during 1982-83 and commencement of work during 2016. This resulted overlapping of ayacut of 4,500 ha of SIP. Despite availability of water, Government had not taken any action to provide alternate ayacut in the project.

3.3.2.5 Land Management

- **Acquisition of private land and alienation of Government land**

The requirement of acquisition of private land and alienation of Government land for the project is given below: -

Table 3.5: Statement showing land requirement and land acquired for construction of the project

(in Acres)

Land Required			Land Acquired/alienated			Balance		
Govt.Land	Private Land	Total	Govt. Land	Private Land	Total	Govt. Land	Private Land	Total
12,328.40	45,204.25	57,532.65	4,989.80	17,383.85	22,373.65	7,338.60	27,820.4	35,159

(Source: compiled by audit)

From the above table it could be noticed that against the requirement of 45,204.25 acres of private land for the project, the Special Land Acquisition Officer (SLAO) could acquire 17,383.85 acres (38 *per cent*), despite availability of funds for the said purpose. The LA processes for 1,305.78 acres of private land are at various stages and the requisition for LA for the balance area of 26,514.62 acres of private land has not yet been submitted by the EEs to SLAO (October 2021). Similarly, the SLAO of the project failed to alienate 7,338.60 acres of Government land against the requirement of 12,328.40 acres.

OPWD code stipulates that no work should be commenced unless land for the purpose was available. As such, before execution of any project/work, land acquisition should have been completed. In the following cases the execution/commencement of works were delayed due to non-acquisition of land on time.

- **Delay in land acquisition led to increase in project cost**

The land acquisition process for Ichcha Reservoir in SIP had been carried out between 1982-83 and 1998-99 as per LA Act, 1894 which was amended in 2007 and again revised in 2013. The delay in acquisition for Ichcha reservoir was on account of delay in finalisation of construction of Ichcha Dam which was entrusted to the contractor only during August 2019 for completion by August 2022. The land compensation for acquisition of land of 2,737.30 acres for the reservoir was increased to ₹123.13 crore as per 2013 amendment as against ₹58.15 crore as per 2007 amendment, resulting in extra cost of ₹64.98 crore.

The Government stated (July 2021) that LA is a lengthy process and changes in LA Act are unavoidable causing extra project cost. The reply is not acceptable as authorities should consider the timelines for land acquisition while proposing the project for approval to avoid delay in providing irrigation facilities.

- **Non-acquisition of land delayed the execution of works**

The Betonati Branch Canal of SIP with a length of 26.26 km, along with minors/sub-minors was taken up for construction at a total cost of ₹ 779.63 crore (December 2016). While the branch canal was completed, the distributaries could not be completed due to non-acquisition of required land (March 2021) for which an expenditure of ₹ 588.30 crore had been incurred. Against the requirement of 2,446.57 acres of land, only 1,401.24 acres could be acquired. As a result, irrigation potential of only 15,359 ha had been created so far (May 2020) against designed ayacut of 22,836 ha despite incurring expenditure of ₹588.30 crore.

Accepting the factual position, Government stated (July 2021) that irrigation to the designed ayacut could not be provided due to LA issues and for want of forest clearance*, etc.*

3.3.2.6 Rehabilitation and Resettlement

R&R measures are governed by the LA Act, 1894 and the LA, R&R Act, 2013 of the Union and relevant State Acts. Timely implementation of R&R measures is necessary for undertaking land acquisition, obviating public opposition to projects and for taking up key components of projects such as dams and reservoirs. The deficiencies noticed in test checked projects is given below:

- The R&R assistance of ₹7.43 crore had been paid to 1,304 displaced persons (DP) of eleven villages of Jambhira reservoir of SIP between 1992 and 1997. DPs were not evacuated from the reservoir area and demanded additional compensation as per new Odisha R&R Policy (ORRP) 2006. The Collector & District Magistrate, Mayurbhanj recommended (April 2017) the demand to DoWR for sanction of additional ex-gratia payment at ₹2 lakh each amounting to ₹26.08 crore. Since, the displaced persons were not evacuated, despite paying an amount of ₹7.43 crore, the reservoir could not be utilised optimally to provide irrigation to its designed ayacut.

  Government stated (July 2021) that budget provision had been made in the current year budget and payment would be released soon on receipt of approval of Government. The reply is silent on the reasons for delay in recommendation for payment of additional ex-gratia after 20 years and payment was still not complete.

  Further, due to non-evacuation of DPs from Haldia earth dam site of SIP, the completion of the Haldia project was delayed for which unwarranted escalation of ₹19.46 crore had been paid to the contractor, besides payment of additional compensation as ex-gratia of ₹84 lakh to the DPs.

Despite increase in project cost from ₹221.68 crore to ₹6,715.96 crore, the achievement of ayacut was only 33,899 ha (34 *per cent*) even after 39 years of commencement of the project which was mainly due to delay in LA, non-evacuation of DPs from the project site even after payment of R&R assistance coupled with irregular execution of spillway and defective survey and investigation. The utilization of the ayacut achieved was also not ensured as the same was not certified by joint verification with revenue authority.

3.3.3 Lower Indra Irrigation Project (LIIP)

The Planning Commission approved (February 1999) the LIIP for ₹211.70 crore for completion by three years. The project was constructed at the confluence point of River Indra and River Sundar to provide irrigation to 29,900 ha in Nuapada and Bolangir districts. It envisages construction of an earthen dam on Indra River intercepting a total catchment area of 931 sq.km with a reservoir of 303 MCM gross storage capacity. The reservoir project proposals comprised of the following:

Lower Indra Irrigation Project

- ✓ The Right Canal system was designed for 4.51 cumecs to provide irrigation to 3,452 ha.
- ✓ The Left Canal System was designed for 35.23 cumecs to provide irrigation to 26,448 ha. Both the main canals and branch canals were completed through open excavation. The distributaries, minors and sub-minors[16] taken up through UGPL and contemplated to be completed by March 2021 were in progress (September 2021).

The Right Canal system and the Left Canal system of LIIP were designed to provide irrigation to 3,452 ha and 26,448 ha respectively. Despite incurring an expenditure of ₹1,811.73 crore (March 2020) by revising cost five times to ₹1,925.63 crore (910 *per cent*) for completion by 2021, the project could not be completed due to delay in land acquisition as DPs could not be evacuated even after payment of R&R assistance, delay in award of work (March 2018) though proposed (December 2016) for distribution system of the project etc., thereby denying the intended benefits to the farmers of Nuapada and Bolangir districts.

3.3.3.1 Assessment of Project deliverables with the intended objectives

The DPR of the Project envisaged to provide irrigation only to the designed ayacuts. The details of component-wise IP proposed and achieved in the project and gist of Audit comments are given in the table below:

[16] Water supply from the main canal or distributaries with a head discharge of less than one cumecs is called "Minor" and water supply from Minor is termed as "Sub-Minor"

Table 3.6: Component wise up-to-date Target and achievement of IP of LIIP

Project components	Designed length of canal (in km)	Completed canal length (in km)	Cost involved (₹ in crore)	IP proposed (in Ha)	IP Achieved (in Ha)	Gist of Audit comments
Right canal	8.22	8.22	1,811.73	3,452	3,860	Trial irrigation for 3,860 ha provided though the ayacut has not been verified. UGPL work is under slow progress due to shortage of manpower though the work was entrusted under EPC contract and scheduled to be completed by February 2019.
Left canal	49.38	49.38		26,448		
Total	**57.6**	**57.6**	**1,811.73**	**29,900**	**3,860**	The actual utilisation of ayacut could not be ensured since the created ayacut has not been certified through joint verification with the revenue authorities. No PPs were formed though trial irrigation has been provided.

(Source: Compiled by Audit from the records of project authorities)

Audit analysis and the deficiencies observed on the components of the project are detailed in subsequent paragraphs. Audit also observed that due to deficiencies in DPR and delay in land acquisition etc. in the project, the IP designed could not be achieved as detailed below:

3.3.3.2 Deficiencies in the DPR

- **Wasteful expenditure on construction of a distributary**

As per DPR, the water of the Duajhar distributaries of LIIP would enter into the Dumerjore MIP to provide irrigation to its ayacut. The work of Duajhar distributaries from RD 8.76 km to 18.54 km with its minors and sub-minors having ayacut of 490.72 ha with the estimated cost of ₹19.17 crore was partly completed (September 2017) with an expenditure of ₹12.55 crore. The balance portion of the work with Command Area Development (CAD) work was included in UGPL for ₹6.62 crore and was under progress (March 2021).

Dumerjore MIP has sufficeint water to irrigate to its own ayacut

Audit noticed from the available records that the ayacut of Duajhar distributary from RD 8.76 km to 18.54 km had already been irrigated through Dumerjore and Rajamunda MIPs. Both the MIPs were renovated during 2014-19 at a cost of ₹1.92 crore and were providing irrigation to their respective designed ayacut. Thus, the construction was unwarranted and led to wasteful expenditure of ₹12.55 crore as well as cost overrun in the project.

Accepting the factual position, the Government stated (July 2021) that after completion of UGPL work, Minor Irrigation authorities would hand over the said ayacut to this project without explaining the reasons for deviation from DPR and incurring avoidable expenditure on constructing minors/sub-minors.

3.3.3.3 Land Management

- **Acquisition of private land and alienation of Government land**

The requirement of acquisition of private land and alienation of Government land for the project is given below:

Table 3.7: Statement showing land requirement and land acquired for construction of the projects

(in Acres)

Land Required			Land Acquired/alienated			Balance		
Govt.Land	Private Land	Total	Govt. Land	Private Land	Total	Govt. Land	Private Land	Total
1,155.57	10,445.27	11,600.84	1,155.57	10,425.16	11,580.73	0	20.11	20.11

(Source: compiled by audit)

From the above table it could be noticed that against the requirement of 10,445.27 acres of private land for the project, the Land Acquisition Officers (LAOs) could acquire 10,425.16 acres (99 *per cent*), despite availability of funds for the said purpose.

OPWD code stipulates that no work should be commenced unless land for the purpose was available. As such, before execution of any project/work, land acquisition should have been completed. In the following cases the execution/commencement of works were delayed due to non-acquisition of land on time.

- **Delay in land acquisition led to increase in project cost**

The LIIP envisaged construction of dam with maximum reservoir level[17] at 265 m for providing irrigation to 29,900 ha, in which case National Highway (NH) No.217 would submerge 9.97 km (from RD123.00 km to RD 132.97 km) at water level of 259.30 m. For construction of a bypass road and a high-level bridge, 3.17 acre of land was to be acquired in the above stretch. An estimate for ₹24.19 crore (December 2007) was sanctioned by the LIIP authorities. The work was taken up by NH Division, Kesinga but could not be executed due to non-acquisition of land by SLAO on account of agitation by the villagers demanding DP status. The evacuees of LIIP Dam site did not accept the amount of compensation and appealed to the Hon'ble Court of Senior Civil Judge, Nuapada who directed payment of ₹5.12 crore including interest of ₹3.04 crore at 15 *per cent.* The estimate for the work was revised for ₹30.63 crore leading to extra cost of ₹6.44 crore. The work is in progress thereby depriving the beneficiaries of rabi irrigation for more than five years.

The Government accepted (July 2021) that the delay in execution of diversion of NH work was mainly due to agitation by the villagers demanding DP status and consequent revision of compensation and project cost. Evidently, the project authorities had delayed handing over of clear site to the contractor which led to escalation of project cost.

[17] Water level that is ever likely to be attained during the passage of the designed flood

- **Wasteful expenditure on land acquisition for open excavation of canals**

The LIIP was planned (February 1999) as per DPR to provide irrigation through open excavation of canals. DoWR sanctioned an amount of ₹13.91 crore between 2003 and 2012 for acquisition of 564.48 acres of land for excavation of 33 minors/sub-minors, of which an amount ₹8.50 crore had been paid between 2005 and 2015 and possession for 132.73 acres of land was taken (August 2019). During progress of payment, the department had taken up these minors/sub-minors through UGPL (March 2018) for which no LA was required, rendering the expenditure of ₹8.50 crore on acquiring land for open excavation, wasteful.
The Government accepted (July 2021) that due to implementation of UGPL no land needed to be acquired. Evidently the payment therefore made for acquisition of land was wasteful.

3.3.3.4 Rehabilitation and Resettlement

R&R measures are governed by the LA Act, 1894 and the LA, R&R Act, 2013 of the Union and relevant State Acts. Timely implementation of R&R measures is necessary for undertaking land acquisition, obviating public opposition to projects and for taking up key components of projects such as dams and reservoirs. The deficiency noticed in LIIP is given below:

- In LIIP, the displaced persons were identified prior to 2006 and the R&R assistance were paid in phased manner. After payment of R&R assistance, the displaced persons had not been evacuated from the reservoir area. Due to non-eviction, additional 367 displaced persons, who have attained the age of 18 had become eligible for R&R assistance. The DoWR sanctioned an amount of ₹28.10 crore between December 2017 and July 2019 and the payment was in progress. Thus, failure on the part of Department to evacuate the persons after payment of R&R assistance resulted in avoidable expenditure of ₹28.10 crore.

  Government stated (July 2021) that final notice had been issued during 2017 to evacuate DPs and action had been initiated by the PD (R&R), LIIP on those who were responsible for non-eviction causing extra payment.

3.3.3.5 Deficiencies in execution of project

- **Wasteful expenditure on construction of minor/sub-minor**

The EEs, LIIP constructed (2008 to 2016) 68 minors/sub-minors through open excavation at a cost of ₹110.95 crore. Audit scrutiny revealed that since the irrigation was provided through UGPL by diverting the water from distributaries to UGPL, the minors/sub-minors executed through open excavation were not put to use for carrying water to their downstream. Thus, the expenditure incurred on construction of 68 minors/sub-minors through open excavation was rendered wasteful. Audit conducted (August 2019) joint physical verification of two sub-minors (Darlipada and Thagpali) in presence of the representatives of the department and found that the entire water was

passing through the intake wells and supplied to the field through UGPL directly from Kikribeda distributory bypassing minors/sub-minors.

The Government stated (July 2021) that where minors and sub-minors in open channel system were available, UGPL CAD work could draw water from these, and where these were not available, UGPL distribution network was being provided to feed the UGPL CAD network. The reply is not acceptable as audit observation was based on a joint physical verification.

During exit conference (August 2021) the E-i-C had also agreed to look into the issue.

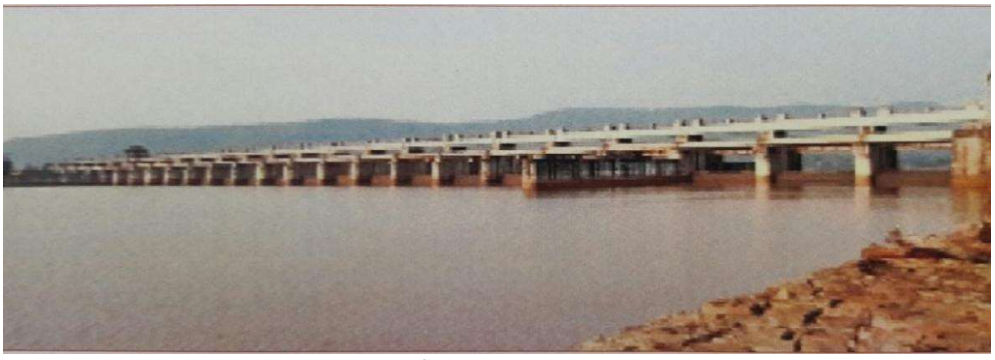
Inspite of incurring expenditure of ₹1,811.73 crore (March 2020) by revising the project cost five times to ₹1,925.63 crore (910 *per cent*) for completion by 2021, the project could not be completed due to delay in land acquisition, non-evacuation of DPs even after payment of R&R assistance, overlapping of ayacut, etc., thereby denying the intended benefits to the farmers of Nuapada and Bolangir districts.

3.3.4 Rengali Multipurpose Project (RRBC & RLBC)

The Planning Commission approved (March 1978) Rengali Multipurpose Project with an estimated cost of ₹233.64 crore. The project was planned to be executed in two stages. Stage-I envisaged construction of a dam across River Brahmani to generate 250 MW hydro-power

Rengali Multipurpose Project

and to provide flood relief to 2,600 sq km in the Brahmani Delta. Stage–II projected construction of Samal Barrage at about 34 km below the dam with a length of 533.40 m with two head regulators. It aimed to provide irrigation to



Samal Barrage

2.35 lakh ha through RRBC and RLBC. The construction of Dam and Barrage were completed in 1985 and 1995 respectively.

The net increase in annual production of food grains was estimated at 1.33 million tons. Besides, after development of irrigation, agro-industries and

allied economic activities were to develop in the area. The details of project proposals comprised of the following:

RRBC was designed to provide irrigation to 1.21 lakh ha in Angul, Dhenkanal, Cuttack and Jajpur districts using 111.30 cumecs of water through 95 km long main canal. The ayacut had been curtailed to 84,406 ha and the original estimate of ₹69.64 crore (March 1978) had been revised to ₹1,962.33 crore (2,818 *per cent*). As of March 2020, only trial irrigation to 17,606 ha had been provided. The balance ayacut would be achieved after completion of the branch canals with its minors and sub-minors. The Department had assessed that the project would be completed in 2021-22 at a cost of ₹3,200.78 crore (4,596 *per cent* increase). However, the Department after incurring an expenditure of ₹2,267.19 crore (71 *per cent*) could create irrigation potential of 17,606 ha (21 *per cent*).

RLBC was approved for ₹164 crore in March 1978 to provide irrigation to 1.14 lakh ha in Angul, Dhenkanal, Jajpur and Keonjhar districts using 151.86 cumecs of water. The construction of canal was taken up in four phases as given in Table below:

Table: 3.8 Phase-wise status of projects

Name of the phase	Chainage[18]	Year of completion	Designed Ayacut	Loan assistance
1st phase	RD 0 to 29.18 km	2003-04	8,483 ha	Water Resources Consolidation Project (WRCP) for ₹173.53 crore
2nd phase	RD 29.18 to 71.31 km	2012-13	26,946 ha	Loan from (JICA) for ₹627.16 crore
3rd phase	RD 71.31 to 123.50 km	In progress	39,416 ha	State plan funds for ₹799.69 crore and JICA loan of ₹1,787.30 crore
4th phase	RD 123.50 to 141.00 km	Not taken up		

(Source: Compiled by Audit from the records of project authorities)

Although the designed ayacut of RLBC up to 71.31 km was of 35,429 ha, the actual ayacut achieved as per the departmental verification report was only 28,471 ha (80 *per cent*). The cost of the project also increased to ₹6,469.27 crore (3,945 *per cent*) from the original cost of ₹164 crore with a reduction of ayacut to 74,845 ha (34 *per cent*) as construction of canal from RD 123.50 km to 141.00 km could not be taken up. The cost escalation was due to improper planning and execution of the project components which are discussed in subsequent paragraphs.

3.3.4.1 Assessment of Project deliverables with the intended objectives

The DPRs of the Projects envisaged to provide irrigation only to the designed ayacuts. The details of component-wise IP proposed and achieved in the projects and gist of Audit comments are given in the table below:

[18] The term chainage is used in surveying to refer to a distance.

Table 3.9: Component wise up-to-date Target and Achievement of IP RRBC and RLBC

Project Name	Project components	Designed length of canal (in km)	Completed canal length (in km)	Cost involved (₹ in crore)	IP proposed (in Ha)	IP Achieved (in Ha)	Gist of Audit comments
RRBC	Main Canal with four completed branch canals in 1st phase	165	165	1353.59	33,700	17,606	Delay in completion of branch canals and industrialisation of ayacut is the cause for short creation of IP.
	Darpani branch canal	97.5	42.18	201.08	50,147	0	Due to delay in LA process, the construction of branch canals was taken up only in patches which were in progress.
	Narasingpur branch canal	46.46	18.37	61.90	11,109	0	
	Athagarah branch canal	24.26	11.31	49.61	5,544	0	
	Lift project	-	-	-	20,700	0	Not yet taken up.
RLBC	RD 0 to 29.18 km with one completed branch canals in 1st phase	58.63	58.63	366.89	8483	28,471	Delay in execution of main and branch canals and also overlapping of ayacut by MI projects, there was shortfall in IP.
	RD 29.18 to71.31 km with one completed branch canals in 2nd phase	76.91	76.91	1,185.41	26,946		
	RD 71.31 to 100.49 km with two completed branch canals in 3rd phase	71.66	43.37	610.52	19,650	0	As the canal works are in progress, no ayacut has been created so far.
	RD 100.49 to 123.50 km	23.01	0	0	19,766	0	Not yet taken up
	RD 123.50 to 141.00 km	17.5	0	0	27,139	0	
	Lift Project	-	19	26.35	12,316	0	Non-functional of lift project due to lack of proper maintenance/ watch and ward.
	Total				**2,35,500**	**46,077**	The actual utilisation of ayacut could not be ensured since the created ayacut has not been certified through joint verification with the revenue authorities. As against 69 PPs, 67 PPs were formed without conducting re-election to 30 PPs.

(Source: - Compiled by audit from the records of project authorities)

Audit analysis and the deficiencies observed on the components of the projects test-checked are detailed in subsequent paragraphs. Audit also observed that due to repeated survey and planning, overlapping of ayacut, short creation of ayacut, delay in land acquisition, and etc. in projects test-checked, the IP designed could not be achieved as detailed below:

3.3.4.2 Deficiencies in the DPR

- **Avoidable extra cost on repeated survey and planning**

The EEs of RRBC awarded the work of survey, planning, design of macro irrigation of Darpani, Narasinghpur and Athagarh Branch Canal to five contractors for ₹1.71crore for completion by March 2011. The contractors provided macro planning data for 62,838 ha which included construction of branch canals and distributaries system. While the branch canals were constructed, distribution system had not been taken up as per the plan.

In order to provide irrigation to all the ayacuts, the concerned EE of Right Canal Division No.I, Khuntuni again awarded (March 2019) macro planning such as distribution system of the branch canals to a contractor that resulted in ₹5.47 crore avoidable and extra cost to the state exchequer.

Government stated (July 2021) that macro planning of UGPL was awarded for ₹5.47 crore which was highly essential for distribution system. The reply is not acceptable since the contractors were paid (March 2011) for conducting macro planning of distributaries and minors/sub-minors after a proper survey had been done. As such award of work again for macro planning was unwarranted. During Exit Conference (August 2021) E-i-C stated that the matter would be examined and a report would be submitted.

3.3.4.3 Assessment of water availability in test-checked projects

- **Non-supply of water through distributaries**

The construction of RRBC from RD 00 to 79 km had been completed with trial irrigation since 2015-16. The distributary off-taking at RD 210 m with an ayacut of 135 ha has also been completed (2016). Audit noticed that no water had been supplied through the distributary since the outlet point was more than two feet above the water level of the canal. Audit conducted the physical verification of the project in presence of the representatives of the department and found that no water had been supplied as per design. Audit also interacted with the farmers whose land was situated adjacent to the canal and confirmed that no water had been discharged through this canal. Due to non-supply of water to its design level by the CCE, water could not be supplied to the distributaries for irrigation.

Government stated (July 2021) that Full Supply Level could not be maintained at the main canal resulting in non-supply of water in the distributary. Evidently, providing irrigation through this distributary for an ayacut of 135 ha looks remote now.

3.3.4.4 Overlapping of ayacut

- Construction of Bhuban Branch Canal off-taking at RD 75.71 km of the RLBC with its distributaries had been taken up for ₹85.25 crore between December 2016 and August 2018 for completion between December 2018 and August 2020 to provide irrigation to 7,216 ha. The branch canal had been completed by widening the existing Damsal MIP canals having ayacut of 1,500 ha. The ayacut of Damsal MIP was not shown in the DPR of Bhuban Branch Canal. The distribution system was in progress. The canal was not completed but the trial irrigation could provide water to 2,000 ha during 2019-20. Out of this, 1,500 ha had already been achieved through the existing Damsal MIP. In effect, so far only an extra 500 ha could be irrigated after an expenditure of ₹43.78 crore.

  Accepting the factual position, Government stated (July 2021) that the available unutilised storage water of Damsal MIP would be utilised for creation of new ayacut in the upper uncommand zone of Bhuban Branch Canal. The reply is not acceptable since the DPR did not show the ayacut pertaining to Damsal MIP while proposing the IP to be created.

3.3.4.5 Short creation of Ayacut

The RLBC was designed from RD 00 m to 141.00 km to provide irrigation to 1,14,300 ha including 12,316 ha through lift irrigation. The designed ayacut of the canal up to RD 123.50 km was 74,845 ha. The canal had been completed with an ayacut of 35,429 ha up to RD 71.31 km. The canal from RD 71.31 km to 123.50 km with an ayacut of 39,416 ha was in progress and the balance canal from RD 123.50 to 141.00 km with an ayacut of 19,033 ha had not yet been taken up. Thus, the total ayacut would have to be 93,878 ha. On verification of ayacut by the Department it was found that the actual ayacut was only 78,859 ha[19] with a shortfall of 35,441 ha (1,14,300 ha – 78,859 ha). The reduction in ayacut was mainly due to defective construction of works and overlapping of MI projects. There was also uncertainty in providing up-land irrigation of 12,316 ha through lift projects since no irrigation could be provided despite deposit of ₹26.35 crore with EE, Lift Irrigation Division, Dhenkanal since 2004-05.

The Government stated (July 2021) that the total ayacut of RLBC on completion may be around the design ayacut. The reply is silent regarding achievement of only 28,471 ha ayacut against the design ayacut of 35,429 ha (80 *per cent*) in respect of completed portion of the canal from RD.00 km to 71.31 km. Hence achievement of designed ayacut after completion is remote.

3.3.4.6 Land Management

- **Acquisition of private land and alienation of Government land**

[19] Verified ayacut of canal up to 71.33 km was 21,910 ha (17 MI ayacut for 1,484 ha excluded) + ayacut from 71.33 to 123 km was 37,916 (1,500 ha of one MIP is overlapped) +19,033 ha thereafter

The requirement of acquisition of private land and alienation of Government land for all the test checked projects is given below:

Table 3.10 Statement showing land requirement and land acquired for construction of the projects

(in Acres)

Name of the project	Land Required			Land Acquired/alienated			Balance		
	Govt.Land	Private Land	Total	Govt. Land	Private Land	Total	Govt. Land	Private Land	Total
RRBC	375.43	7,637.34	8,012.77	375.43	1,768.69	2,144.12	0	5,868.65	5,868.65
RLBC	1,866.25	2,932.39	4,798.64	1,866.25	1,976.87	3,843.12	0	955.52	955.52
Total	**2,241.68**	**10,569.73**	**12,811.41**	**2,241.68**	**3,745.56**	**5,987.24**	**0**	**6,824.17**	**6,824.17**

(Source: compiled by audit)

From the above table it could be noticed that against the requirement of 10,569.73 acres of private land for the two test checked projects, the Land Acquisition Officers (LAOs) could acquire 3,745.56 acres (35 *per cent*), despite availability of funds for the said purpose and the balance area of 6,824.17 acres had not been acquired. Besides, land acquisition for distribution system has not yet been taken up.

OPWD code stipulates that no work should be commenced unless land for the purpose was available. As such, before execution of any project/work, land acquisition should have been completed. In the following cases the execution/commencement of works were delayed due to non-acquisition of land on time.

- **Delay in land acquisition led to increase in project cost**

The GoI issued (during 1978) investment clearance for construction of RRBC. The required land for branch canals, minors and sub-minors of RRBC were not acquired till 2013 due to non-finalisation of alignment of canals. During 2014-19, ₹306.20 crore had been paid for acquisition of 2,798 acres of land for construction of three branch canals and five distributaries. Audit observed that the revision of compensation of LA increased by 35 *per cent*. Hence, delayed acquisition of land led to extra expenditure of ₹107.17crore[20].

The Government stated (July 2021) that LA is a lengthy process and changes in LA Act are unavoidable causing extra project cost. The reply is not acceptable as authorities should consider the timelines for land acquisition while proposing the project for approval to avoid delay in providing irrigation facilities.

3.3.4.7 Deficiencies in execution of project

- **Adoption of faulty design of canal**

Parjang Branch Canal (PBC) of RLBC including its distribution system had been completed under World Bank supported Water Resources Consolidation Project (WRCP) during 2004 to irrigate 5,580.30 ha but the water could not be supplied through the canal as the design depth was not achieved during execution of the canal in three locations which were above 0.6 m to 1.0 m of the bed level[21]of the canal. Thus, failure of the EE to adhere to the design bed

[20] 35 *per cent* of ₹306.20
[21] Bottom surface level of canal

level led to faulty construction of the canal for which water could not be supplied for irrigation.

To achieve the design depth of the canal, the department had taken up the work under CLSRP for ₹70.51crore during 2016-17. The works were in progress and the contractors had been paid ₹67.76 crore (September 2021). Hence, defective construction of canals deprived the targeted beneficiaries of irrigation during the period from 2004-18. Responsibility may be fixed on the EE and other officers for such lapses.

Government replied (July 2021) that since PBC ran through clayey and expansive soil with black cotton soil, the canals were silted in the bed level from 0.30m to 0.60m. The reply is not acceptable as the canal bed level was constructed above 0.60m to 1m, which necessitated further work and expenditure.

Though the Department had incurred an expenditure of ₹2,267.19 crore (71 *per cent*) as of March 2020 in RRBC project, it could create irrigation potential of 17,606 ha (21 *per cent*). Completion of the project has been delayed due to delay in LA, Forest clearance and finalisation of design of canals and improper survey and investigation.
Though RLBC was to provide irrigation to 1.14 lakh ha through 141 km long main canal, it was reduced due to short creation and overlapping of the ayacut. Due to defective construction, Parjang Branch canal could not provide irrigation to its ayacut for more than 14 years during 2004 to 2018.

3.3.5 Mega Lift Projects

Pump House of Amath Mega Lift Project

Mega Lift Projects (MLPs) aim at providing irrigation to the farmers in the upland area by lifting water from rivers and reservoirs which could not be irrigated by normal means of irrigation. The benefit of the MLP *inter alia* provides less land acquisition since irrigation is provided by lifting water by pumps from sources through pressurised networking distribution system. MLPs had been spread in 174 feasible sites in 15 clusters covering 23 districts with command area of 500 to 2,000 ha to provide irrigation to 2.14 lakh ha. Among those, nine sampled projects were completed with an ayacut of 7,250 ha, of which four projects[22] completed at a cost of ₹60.59 crore with an ayacut of 3,150 ha could not provide irrigation to its designed ayacut due to inadequate availability of water at source. In other three projects[23] water supply could not be made due to frequent power fluctuations and in respect of remaining two MLPs[24], trial irrigation had been provided but ayacut had not been verified by the department. The Department had constructed the MLPs with assessment of availability of water above

[22] Agalpur, Gudvella, Kapsila and Laitara
[23] Amath, Belgaon, and Utkela
[24] Bharsuga and Kusmal

threshold level. But the water level remained below the threshold level which indicate that the Department had not conducted hydrological study properly.

3.3.5.1 Assessment of Project deliverables with the intended objectives

The DPRs of the nine MLPs envisaged to provide irrigation only to the designed ayacuts. The details of component-wise IP proposed and achieved in projects and gist of Audit comments are given in the table below:

Table 3.11: Component wise up-to-date Target and achievement of IP in the project

Name of the project	Project components	IP proposed (in Ha)	IP Achieved (in Ha)	Gist of Audit comments
MLPs (Nine)	UGPL	7,250	4,100	Department constructed MLPs with assessment of water availability above the threshold level. But water level remained below the threshold level. Hence the shortage in IP created. The actual utilisation of ayacut could not be ensured since the created ayacut has not been certified through joint verification with the revenue authorities.

(Source: - Compiled by audit from the records of project authorities)

Audit analysis and the deficiencies observed on the projects are detailed in subsequent paragraphs.

3.3.5.2 Deficiencies in the DPR

- **Projects initiated without ensuring feasibility**

The DPR for construction of 26 MLPs in Tel Basin of Kalahandi district envisaged (November 2012) that the water would be supplemented by Hati Barrage under UIIP through the flowing water to be received in the river Tel. Accordingly, the EEs executed 26 MLPs at a cost of ₹ 587.78 crore in August 2013 for completion by February 2016 in Tel Basin to provide irrigation to 34,200 ha during Kharif season i.e. from June to November every year.
Out of 26 MLPs, five projects with ayacut of 4,500 ha were completed during 2017 with an expenditure of ₹82.37 crore. Of these completed MLPs, one MLP with ayacut of 900 ha could not provide irrigation due to inadequate water at source. The works of other projects were in progress with total expenditure of ₹591.16 crore.

Audit further noticed that the Tel river had no barrages and could provide water only when there was sufficient rainfall. In case of scanty rainfall or drought situation, the system would not provide any irrigation. Besides, the Hati Barrage under UIIP had insufficient water to meet the ayacut of UIIP as discussed in the **paragraph 3.3.1.4.** As such, Hati Barrage also could not supplement water to Tel river in normal condition except in case of heavy rains or flood.

While confirming Audit findings, the Government stated (July 2021) that construction of temporary cross bund would allow water to enter sump well

through intake system to meet the demand. However, to improve its efficiency, construction of an in-stream structure had been suggested.

3.3.5.3 Assessment of water availability in test-checked projects

- **Construction of Mega Lift Projects with dry source**

Out of nine completed sampled MLPs; four[25] projects with designed ayacut of 3,150 ha were constructed at a cost of ₹60.59 crore. These projects could not provide irrigation due to non-availability of sufficient water in the source as the water source was dry in one project (Kapsila project) and in the remaining three projects the water level remained below the trash back bottom level [26]. To make the projects functional, the Project Director-cum-Chief Engineer, MLP approved (October 2019) construction of low height in-stream storage structures which have not yet been taken up (September 2021).

As the lift projects were not made functional due to non-construction of in-stream storage structures, the designed ayacut of 3,150 ha could not be irrigated rendering expenditure of ₹60.59 crore infructuous.

Government while accepting the findings stated (July 2021) that if the dry spell within rainy season persisted for a longer period, then water depth in river might deplete below the designed depth causing inconvenience in providing irrigation as the inlet of the system was kept at 0.6 m above average bed level of river to restrict free intrusion of sand into the system. However, to improve its efficiency, construction of an in-stream structure had been suggested. The reply is not acceptable since this aspect should have been addressed during execution of the projects.

Audit noticed that since the Tel river had no barrages and could provide water only when there was sufficient rainfall, construction of MLPs taken up without ensuring feasibility and sufficiency of water at source was unfruitful.

3.3.6 Minor Irrigation Projects

The MIPs provide irrigation from the availability of water of perennial sources through Nullahs or through existing canal system. MIPs are popular due to its low gestation period, adaptability to all regions, speedy creation of irrigation potential, rare or no R&R issues, low cost and easy

Head works of Talijore MIP

[25] Agalpur, Gudvela, Kapsila and Laitera

[26] Refers to the bed level of water to be maintained for Lift Irrigation projects.

operation and maintenance. Government approved 10 MIPs under Accelerated Irrigation Benefit Program (AIBP) during 2007-08 in KBK districts[27] to provide irrigation to 1,612 ha at a cost of ₹14.70 crore. The projects were completed at a cost of ₹20.34 crore (38 *per cent* increase) with achievement of Ayacut as 772 ha (48 *per cent*). The escalation of project cost varied from Nil (Damkipalli) to 242 *per cent* (Ankamara).

Although the Department had shown that 10 MIPs were completed, in two projects[28] only head works had been completed and distribution system had not been taken up. In other six projects[29] the distribution system was partly completed for which irrigation could be provided to the ayacut of respective MIPs to the extent of 26 to 75 *per cent*. In other two projects[30], although the projects were completed in all respects, water could not be supplied due to protest by the land losers as compensation towards LA had not been paid.

During Exit Conference the Principal Secretary stated (August 2021) that the Department was in the process of introducing Enterprise Resources Planning, Project Management Information System, and Irrigation Management System etc., for intensively monitoring the progress of the irrigation projects under progress which were encountering issues of LA, Forest clearance, R&R problems and delay in execution of projects.

3.3.6.1 Assessment of Project deliverables with the intended objectives

The DPRs of all the test checked MI Projects envisaged to provide irrigation only to the designed ayacuts. The details of component-wise IP proposed and achieved in test checked projects and gist of Audit comments are given in the table below:

Table 3.12: Component wise up-to-date Target and achievement of IP in the selected projects

Name of the project	Project components	IP proposed (in Ha)	IP Achieved (in Ha)	Gist of Audit comments
MIPs (10 No.)		1,612	772	Shortage of IP created was mainly due to non-completion of distribution network, delay in LA and non-payment of compensation to land losers. No PPs have been formed yet. The actual utilisation of ayacut could not be ensured since the created ayacut has not been certified through joint verification with the revenue authorities.
Grand Total		**1,612**	**772**	

(Source: - Compiled by audit from the records of project authorities)

Audit analysis and the deficiencies observed on the projects are detailed below.

[27] The erstwhile districts of Koraput, Balangir and Kalahandi (popularly known as KBK districts) have since 1992-93 been divided into eight districts: Koraput, Malkangiri, Nabarangpur, Rayagada, Balangir, Subarnapur, Kalahandi and Nuapada

[28] Barahanalla, and Damnipalli

[29] Ankamara, Brahamanijore, Jatakhalia, Nagapara, Nuapali and Tiljodi

[30] Chitalparha, and Talijore

3.3.6.2 Non-acquisition of land delayed the execution of works

The CE, MI sanctioned (2010-11) ₹2.15 crore for construction of Barahanalla MIP in Kalahandi district to provide irrigation to 250 ha for completion by 2011-12. The EE, Kalahandi MI Division executed the head works of the project which was completed during 2011-12 with an expenditure of ₹1.14 crore. The distribution system with a length of 7.58 km had not yet been taken up due to non- acquisition of 27.89 acre of land situated in the scheduled area (August 2019). Thus, the farmers were deprived of irrigation for more than nine years with blockade of funds of ₹1.14 crore.

The Government accepted and stated (July 2021) that to avoid LA, the construction of distribution system has been proposed to be taken up under UGPL scheme in May 2021. Evidently, the project remained idle for more than 9 years.

10 MIPs were taken up at a cost of ₹14.71 crore to provide irrigation to 1,612 ha between 2006-08 were completed (2010-14) at a cost of ₹20.34 crore but could provide irrigation to only 772 ha (48 *per cent*) due to non construction of distribution system.

3.4 Benefit Cost Ratio (BCR)

BCR is the ratio of annual additional benefit on account of irrigation to the annual cost of providing those benefits. The calculations of BCR are incorporated in the DPRs, as it is an essential requirement for determining the economic feasibility of an irrigation project. It plays a vital role for execution of any project which depends upon the cost of project *vis-à-vis* benefit derived from various sources *viz*; irrigation, industrial water supply, drinking water supply *etc*. As per guidelines for preparation of DPRs of irrigation and multipurpose projects, the minimum BCR for approval of such projects in Drought Prone Areas was one and in other areas it was 1.5.

During test check of sampled projects, it was noticed that the BCR of the projects as envisaged in the DPRs were prone to changes because of the reasons as detailed below:

- In order to calculate the BCR, the department projected in the DPR that various crops like paddy and other cash crops like vegetables, pulses, oilseeds *etc.* were to be grown. Audit observed that in all of the test checked projects, though a multi-cropping pattern was envisaged in the DPRs, paddy was the only crop produced by the farmers, which had a negative impact on the BCR. Audit conducted joint physical verification in the presence of representatives of the department and found that the farmers produced only paddy in the irrigated areas. This was also confirmed by the CCE and by the farmers during interaction with them during field visit by the Audit.

  Due to non-creation of awareness programme and proper monitoring they adopted the traditional pattern of farming without following any muti-cropping pattern.

- Besides, the ayacut of three projects (SIP/RRBC/RLBC) were reduced to a large extent.
- Cost of the project was enhanced by more than five times the original cost (UIIP and LIIP).

The BCRs given in the DPR and BCR calculated basing upon the cropping pattern adopted, revised ayacut and higher project cost are given below:

Table 3.13: Project-wise BCR projected and calculated based on reduced ayacut

Name of the Project	Year of commencement	BCR of the project as per DPR	BCR calculated as per revised ayacut and cropping pattern	Designed ayacut in lakh ha	Reduced ayacut in lakh ha
SIP	1982	1.62	0.70	1.09	0.92
UIIP (Extension)	2003	2.44	0.79	0.25	0.25
LIIP	1999	1.27	0.71	0.30	0.30
RRBC	1978	2.27	0.79	1.21	0.67
RLBC	2016	Not calculated	0.84	1.14	0.79
MLP	2013-15	More than one	Less than one	0.59	0.59
MIP	2006-08	More than one	Less than one	0.01	0.01

(Source: compiled by Audit)

From the table above, it could be seen that BCR calculated by Audit, in respect of all the test checked projects ranged from 0.70 to 0.84 only. BCRs of all the projects were actually less than one rendering the projects economically unviable.

It was observed that BCR calculated while approving the projects/schemes was not sacrosanct as the actual BCR had reduced significantly due to increase in cost as outlined in earlier paragraphs and decrease in benefits in cases where the utilized IP was below the IP envisaged.

Government stated (July 2021) that crop diversification and farmers' awareness could not be achieved in a short period, as various departments were involved in this context and this was a State level problem and it was proposing capacity building for improvement of farmers' awareness.

3.5 Command Area Development

The GOI launched CAD Programme in 1974, in which assistance is provided to the States on matching basis for on-farm development works such as land levelling and shaping, field channels, field drains, farm roads, agricultural & irrigation extension services *etc.* The command area development works *inter alia* included agricultural extension services, major drainage channels, lateral drains *etc*. The required length and execution of CAD works on test checked projects are given below:

Table 3.14: Showing length of CAD works required and executed in test checked projects

Sl. No	Name of the Project	Required length of channel of CAD works (in km)	Channel length of CAD works executed (in km)
1	SIP	1,016.97	118.83
2	UIIP (extension)	764.52	627.31
3	LIIP	Taken up under UGPL	Taken up under UGPL
4	RRBC	507.68	Not yet taken up.
5	RLBC	701.82	Not yet taken up
6	MLPs	Being Lift projects, not required	Being Lift projects, not required
7	MIP	23.16	Not yet taken up
Total		**3,014.15**	**746.14**

(Source: - compiled by Audit from the records of project authorities)

❖ In SIP project, although the project was providing irrigation to 33,899 ha, CAD works for only 6,587 ha had been executed (2013-14). Further as per CAD guidelines 30 m of water course/field channel should have been executed for one ha. As such 197.61 km should have been executed for required length of 6,587 ha against which 118.83 km had been executed. This indicated that the CAD works were executed in some patches in deviation to the guidelines. Fewer execution of CAD work was due to failure of the Department to acquire land for the continuous stretch of distribution system. Further, it was noticed that against the cost norm [31]of ₹9.55 crore for construction of 118.83 km of CAD work, the department had incurred an expenditure of ₹26.31 crore leading to extra expenditure of ₹16.76 crore.

Government stated (July 2021) that steps were being taken to complete the CAD works by the end of December 2021 without explaining the delay and shortfall in length.

❖ The extension of canal of UIIP had been completed in 2015-16. The CAD work for 627.31 km (82 *per cent*) had been executed in the entire ayacut covering 25,484 ha against the requirement of 764.52 km as required under guidelines (30 m per ha) resulting in short execution of 137.21 km. The short execution of CAD work was due to improper assessement of the actual ayacut to be covered as per norm by the EEs. Audit also noticed that the construction of water course/field channel were executed with 150 mm thickness side wall and bed against the requirement of 75 mm as stipulated in BIS code. Against the cost norm of ₹36.12 crore, the EEs incurred an expenditure of ₹85.68 crore leading to extra cost of ₹49.56 crore.

Government stated (July 2021) that as per actual execution 627.31 km length of field channel had been constructed for 25,484 ha. The reply is not acceptable as there was short execution of 137.21 km and the reasons for shortfall was not furnished to audit.

❖ The EE, Rengali Right Canal Division-II had deposited ₹25 crore during 2016-20 with CAD Division No-10, Dhenkanal under DoWR for development of command area. Out of ₹25 crore, UC for ₹2.72 crore only

[31] As per norm of BIS code the actual cost per metre was calculated as ₹575.83 by Audit.

had been provided. Despite lapse of four years, the CAD, Dhenkanal division could execute the work of ₹2.72 crore. As a result the payment of ₹22.28 crore remained idle without rendering benefit of the irrigation through CAD to the farmers.

The Government stated (July 2021) that an expenditure of ₹9.76 crore towards execution of CAD works had already been spent and the balance work was under progress for completion, after which irrigation would be provided. The reply is not acceptable since funds had been released as early as in 2016 and the works were still in progress.

The CAD works were to be executed for equitable supply of water to the tail end of the ayacut. Due to non-completion of the work, the equitable distribution of water to the tail end users could not be ensured.

During Exit Conference (August 2021) the Principal Secretary to Government stated that the works would be taken up through MGNREGS *etc*.

Recommendations:

- **The State Government may evaluate performance of the components of individual projects to identify specific areas for focussed attention and direct all executants to intensify efforts for their expeditious completion.**
- **Government may ensure commencement of project works after acquisition of land as stipulated in OPWD code**.
- **Government may adopt suitable mechanism for timely acquisition of land and evacuation of the displaced persons immediately after payment of R&R assistance and fix accountability on officers responsible for delay in land acquisition and evacuation of the displaced persons resulting in extra payments.**
- **Responsibility needs to be fixed on executives for improper survey and adoption of defective design causing slippage of embankment necessitating avoidable restoration works.**
- **Accountability on executives needs to be fixed by the Department for defective execution of works.**