CHAPTER-II

Project Planning

This chapter deals with issues related to conceptualisation and formulation of the projects to achieve the intended benefits.

Audit objective 1: *Whether the irrigation projects were planned in accordance with intended objectives.*

Brief snapshot of the Chapter:

- The project planning was deficient to achieve the intended objectives. While several significant works were not included in the DPR having adverse impact on the project outcomes, the Department took unexpected time to firm up drawings, designs and quantum of the works even after approval of the DPR and commencement of work.
- The scope of the projects underwent multiple revisions due to which, not only the cost of the project kept on changing but also the time schedules were not adhered to.
- In Bansagar Canal Project, Uttar Pradesh (BCP), the requirement of additional water was not assessed correctly for the existing canal systems and capacity enhancement of the existing canal system was included in respect of only limited number of canals, that too in an *ad hoc* manner.
- In Dhasan Canal System (DCS), the critical need of enhancement of water storage capacity of Lahchura and Pahari dams were not considered due to which the dams did not have adequate water to serve the need of DCS. Besides, provision for restoration of the DCS, receiving water from the Lahchura dam was not considered in the DPR despite the fact that it was in dilapidated condition.

2.1 Introduction

Detailed and well thought out planning is of great importance before conceptualising the implementation of an irrigation project. Lack of planning could hinder the fulfilment of the purpose of the irrigation project and as a result, the expected benefits would not be available even after spending huge amount of public money. In the planning of irrigation project, technical feasibility of the project formation, social and environmental impact, availability of water at source and its other uses, determination of project components and cost analysis, financial need and identification of financial sources, *etc.,* should be taken into consideration.

Paragraph 318 of Financial Handbook Volume-VI provides that detailed estimates must be prepared for every work proposed to be carried out, followed by Technical Sanction (TS) to the detailed estimate by the competent authority which gives guarantee that the proposals are structurally sound and the estimates are accurately calculated and based on adequate data.

According to the Guidelines of CWC, the Detailed Project Reports (DPRs) of the irrigation and multipurpose projects shall be prepared in accordance with applicable Indian standards and guidelines for preparation of DPRs of irrigation and multipurpose projects, issued by GoI after detailed survey and investigations.

Audit observed shortcomings in the project formulation which have been discussed in the succeeding paragraphs:

2.2 Shortcomings in Detailed Project Reports of Bansagar Canal Project (Uttar Pradesh)

2.2.1 Deficient planning leading to frequent revision of Detailed Project Reports

Survey work of BCP was taken up in 1977-78 and it was approved by the Advisory committee on Irrigation, Flood Control & Multipurpose Projects of Central Water Commission (CWC) in January 1994 at an estimated cost of ₹ 330.19 crore. However, further progress of the project remained slow and construction works of the project were taken up only in 1997-98. Even after 1997-98, the construction works were not performed adhering to the prescribed timeframe due to which scheduled date of completion was revised four times with consequential impact on time and cost overrun as detailed in **Table 2.1**.

Table 2.1: Revisions in project cost

(₹ in crore)

Year of sanction	Pre-revised estimated cost	Revised estimated cost	Percentage increase in project cost from original cost	Target date of completion	Level of completion of the project (in *per cent*)
(1)	(2)	(3)	(4)	(5)	(6)
1994 (Original)	330.19	-	-	2004	-
2003 (Ist revision)	330.19	955.06	189	2006	34
2007 (IInd revision)	955.06	2058.01	523	2010	43
2010 (IIIrd revision)	2058.01	3149.90	854	2013	75
2017 (IVth revision)	3149.90	3420.24	936	2018	90

(Source: CE, BCP)

The project was commissioned in July 2018 at an expenditure of ₹ 3,419.37 crore with a time overrun of 14 years and cost overrun of 936 *per cent*. The reasons cited in the variation statement of the DPRs of the project for delay in completion of the project were frequent changes in the scope of the project and insufficient release of funds by the State Government against the requirement placed by the CE during the execution of the project[1].

Audit analysis further revealed that CE, BCP did not properly assess requirement of various item of works, both at the time of project formulation in 1994 and also during subsequent revisions. As a result, not only quantities of these works were continuously revised but new items were added during the entire course of execution of the project. Audit examination of variation

[1] The work of BCP continued upto March 2019 after commissioning of the project.

statement in this regard disclosed that quantity of different structures, viz., regulators, cross drainage, canal bridges, escape, service roads were increased manifold (20 *per cent* to 581 *per cent*) during the entire period of execution of work (1994-2019). Besides, change in design of the structures also led to revisions in the cost of the project[2]. Details of changes in design was not available in the records in respect of all changes. However, it was observed from available records that in Bansagar feeder canal, design was changed from Cement Concrete (CC) lining to much costlier Reinforced Cement Concrete (RCC) lining in 2008 as the Department felt the need of RCC lining on the ground that the alignment of the canals was lying in the slip zone. Apart from this, increase in cost of the structures by the passage of time also adversely impacted the cost of project. Details of cost variations has been summarised in the **Table 2.2** and detailed in **Appendix-2.1.**

Table 2.2: Details of variations in the DPRs

(₹ in crore)

Period	Total cost variation	Broad reasons for variation			
		Inadequate provision	Change in design	Additional requirement	Price Escalation
1994 to 2003	355.46	122.80	26.25	Nil	206.41
2003 to 2007	969.08	209.81	330.80	154.86	273.61
2007 to 2010	913.73	140.08	311.35	175.57	286.73
2010 to 2017	507.85	82.87	252.36	Nil	172.62
Total		**555.56**	**920.76**	**330.43**	**939.37**

(Source: DPRs)

Furthermore, Audit observed that in the last project cost revision (2017), cost of six items were partly excluded from the scope of project, viz., earth work (₹ 42.73 crore), service road (₹ 42.00 crore), communication (₹ 9.83 crore), environment and ecology (₹10.26 crore), plantation (₹ 1.92 crore) and miscellaneous items (₹ 3.73 crore). In case of earth work, the estimated cost was reduced from ₹ 595.23 crore to ₹ 552.50 crore due to which execution of earth work was limited to 386.678 lakh cum (87 *per cent*) against the original estimated quantity of 442.085 lakh cum. In case of service road on canal banks, the executed length (26.706 km) was 15 *per cent* of estimated length (180.290 km). In case of other four items, viz., plantation, communication, environment and ecology and miscellaneous items, there was no detail in the DPR regarding quantum of reduction in the work vis-à-vis reduced cost of ₹ 25.75 crore. The exclusion of various works from the scope of the project after 23 years from the date of formulation of first DPR indicated the *ad hoc* approach of the Department. As a result of these exclusion, several works remained incomplete even after commissioning of the project in July 2018, affecting the project outcomes as discussed in Paragraph 4.2.1.

Thus, the drawing, design, scope and quantity of the works in BCP could not be firmed till 2017 and these were changed during the entire period of project implementation. As a result, not only the cost of the project kept on changing but also the time schedules were not adhered to.

[2] Audit observation related to inadequate funding has been discussed in **Paragraph 3.2.1.2**.

The State Government in its reply stated (July 2022) that BCP had been built in the region of southern slope of Kaimur hill and lower Vindhya range. Due to being rocky strata, need of the site changed from time to time. The Government further stated that Central Water Commission had also given directions time to time which necessitated changes in drawing and design in several structures.

The fact remained that the geographical and geological condition of the region was known to the Department before taking up BCP. Before starting BCP, extensive surveys, investigations and studies should have been carried out. However, the work of the project was started without adequate and accurate survey as shown by frequent revisions, in spite of the Department taking 17 years just to complete the survey and take decision on its basis. As a result, during the implementation of the project, the scope of the project kept on changing, the project got delayed by 14 years and the cost of the project increased manifold. Besides, the public was deprived of the benefits of the project for 14 years and public exchequer suffered due to huge cost overrun. The State Government, therefore, should investigate and fix the responsibility of erring officers for insufficient and incorrect surveys and should identify the circumstances due to which the scope of the project kept changing during the entire execution period of 23 years.

2.2.2 Incorrect assessment of need of water

BCP envisaged to increase irrigation intensity in 1,50,132 hactare (ha) area through augmentation of additional water to the existing nine canal systems in Prayagraj and Mirzapur Districts. In the DPR, the department analysed the additional water required for increasing the irrigation intensity to the targeted level after taking into account the existing water availability in these nine canal systems.

Audit observed from the DPR and records[3] of the Divisions that the assessment of the Department for additional water requirement was not correct. Out of nine canal systems, water availability in two canal systems[4] was lesser (37 to 62 *per cent*) than that was assessed in the DPR. In respect of other seven canal systems, the respective Divisions did not provide records of availability of water in the canal systems before BCP.

As a result of incorrect assessment of existing availability of water in the two canal systems, provision was made for only 2,087 mcft water[5] against the requirement of 4,434 mcft water[6]. As a result, the Department would be able to irrigate 26,935 hectare against 38,670 hectare[7] envisaged in the DPR with a shortfall of 30 *per cent* in the command areas of these two canal systems.

The State Government stated (July 2022) that the computation of the quantity of water required in various canal systems was made according to the crop cycle, season, available water resources and after examining the technical aspects in the Chief Engineer Committee.

[3] Gauge register indicating flow of water
[4] Lower Khajuri (406 out of 1,071 mcft; 62 *per cent)* and Garai canal systems (2,877 out of 4,559 mcft; 37 *per cent)*
[5] Lower Khajuri: 416 mcft and Garai canal system: 1671 mcft
[6] Lower Khajuri: the additional requirement of water was 1081 mcft, including existing shortfall of 665 msft; Garai canal system: the additional requirement of water was 3353 mcft including shortfall of 1682 mcft.
[7] Total requirement of water 7717 mcft (6230 mcft for Garai + 1487 mcft for Lower Khajuri) for 38670 ha.

The reply is not acceptable, as the DPR was prepared on incorrect data of water availability in Lower Khajuri and Garai canal systems.

2.2.3 *Ad hoc* selection of canals for remodeling

BCP envisaged to augment additional 637 MCM water from Bansagar Dam to the existing nine canal systems for crop water requirement. As such, Department was required to assess the water carrying capacity of existing nine canal systems and remodel these accordingly.

Audit observed that the Department proposed only 52 canals (length: 487 km) out of total 413 canals (length 1,851 km) in the existing nine canal systems for remodeling. Out of the 52 canals, 44 canals (length 468 km) were remodeled at the cost of ₹ 86.65 crore. However, Audit did not find evidence of comprehensive assessment for taking up only 52 canals (26 *per cent* canal length) and leaving the remaining canals out of the scope of remodeling.

Since capacity of 369 canals (length 1,383 km) covering command area 1.59 lakh hectare (69 *per cent*) was not augmented through remodeling of these canals, there was no assurance that the targeted enhancement of irrigation intensity to 150 *per cent* in this 1.59 lakh hectare would be achieved.

CE, BCP stated (July 2022) that the need of the remodeling work was assessed in respect of 52 canals by formulating area statistics. Further, Department did not provide reasons for not carrying out remodeling work in respect of these canals. Thus, the DPR of BCP was prepared in *ad hoc* manner with reference to remodeling of existing canals.

2.3 Shortcomings in Detailed Project Reports of Lahchura Dam Project and Pahari Dam Project

2.3.1 Multiple changes in DPR of Lahchura Dam Project

The State Government approved the project of Modernisation of Lahchura Dam, in Jhansi[8] district of Uttar Pradesh in February 1979 at an estimated cost of ₹ 7.04 crore. However, only ₹ 1.89 crore was allotted on the project till September 1983 due to which the progress of the project remained slow. In September 1983, heavy flood occurred in the Bundelkhand Region and the highest flood level at the Lahchura Dam was recorded at 17,995 cumecs. Since the head regulator of the Lahchura Dam was designed for the water discharge of only 16,000 cumecs, the need to reassess the hydrology of the river was felt for safe designing of the structures of the Lahchura Dam. From 1983 to February 2001, the process of changing the design of dam was under consideration at the levels of Chief Engineer (Betwa Project), Directorate of Design, Irrigation and Water Resources Department, Uttar Pradesh and Central Water Commission (CWC), GoI. In February 2001, CWC approved the hydrology of Lahchura Dam and on the basis of the revised hydrology, it accorded the technical sanction in March 2003. After getting technical clearances from CWC, the project was taken forward by revising the estimated cost to ₹ 94.18 crore. The cost of the project was again revised to ₹ 99.66 crore

[8] Now in Mahoba district.

in 2005 due to price escalations and process of executing contracts was taken up (December 2005). Details of revisions in the project cost are given in **Table 2.3.**

Table 2.3: Revisions in project cost under Modernisation of Lahchura Dam

Year of sanction	Pre-revised estimated cost	Revised estimated cost	Percentage increase in project cost from original cost	Target year of completion
1	2	3	4	5
1979 (Original)	7.04	Not applicable	Not applicable	Not available
2003 (Ist revision)	7.04	94.18	1238	Not available
2005 (IInd revision)	94.18	99.66	1316	Not available
2008 (IIIrd revision)	99.66	299.36	4152	2010
2012 (IVth revision)	299.36	328.30	4563	2015

The project was completed in March 2015 at an expenditure of ₹ 328.30 crore (229 *per cent*[9]) with a delay of more than six years[10].

Audit analysed the reasons for delay in completion of the project and observed that the project went through four cost revisions during 2003 to 2015. Audit requisitioned the records in respect of the revisions of the project but records related to the revisions taken place in 2008 and 2012 only were made available to Audit[11]. Examination of the records disclosed that new items of work costing ₹ 17.89 crore was added in the project during 2008-09. Drawings of the project were also kept changing during the revisions due to which the cost of the project increased by ₹ 57.79 crore in 2008 and ₹ 19.75 crore in 2012. Audit further observed that even after the last cost revision in 2012, the scope of work could not be firmed up as quantities of items of works costing ₹ 32.38 crore was further increased ***(Appendix-2.2)***.

Further, in the cost revision in 2008-09, CE, *Pariyojna Betwa* (CE) stated that the price escalation was phenomenal, particularly for construction material and labour, which along with some other factors elaborated in the DPR necessitated revision in the project cost. However, no specific justification in support of addition of new items costing ₹ 17.89 crore and cost escalation due to change in design (₹ 57.79 crore) was recorded. However, at the time of cost revision in 2012, CE accepted that due to unavailability of all construction drawings previously, the cost of project could not be finalised hence the revised proposal was submitted. This also indicated towards apathy of the project authorities in formulating project which led to cost overrun manifold[12].

In reply, the State Government stated (July 2022) that before preparing the dam projects to be built on big rivers, various items and quantities of work were determined on the basis of General drawings. The Government further stated that according to the land, rock, strata of the river bed found at the time of excavation of the foundation, work was done by revising the estimates in

[9] As compared to cost of the project (₹ 99.66 crore) revised in 2005 after which the Department entered into MoU to execute the works.
[10] Initially in the year 2005, MoU with contractor was to complete the work in 36 months hence, delay calculated from 2008.
[11] Records related to revisions taken place in 2003 and 2005 were not made available to Audit.
[12] Cost overrun with respect to original project cost (1979) of ₹ 7.04 crore.

respect of foundation depth, design and drawing. The Government also added that in December 2007 and February 2009, changes were made in the design as per the instructions given by Irrigation Research Institute, Roorkee and accordingly new items of work were included.

The fact remained that the Department took more than 17 years between September 1983 and February 2001 to design the flood level of the Lahchura Dam. Further, even after revising the project in 2003 on the basis of revised hydrology, the scope of the project could not be firmed up and it kept changing upto the last cost revision in 2012 which led to delayed completion of project along with significant excess cost.

Further, the State Government approved (July 2016) another project (Construction of Appurtenant Works of Lahchura Dam) at an estimated cost of ₹ 19.30 crore to execute the items of several works related to Modernisation of Lahchura Dam which were not included in the original DPR of Lahchura Dam Project. Belated execution of project works also had adverse cost impact leading to excess expenditure of at least ₹ 1.73 crore because the cost of the same item of works[13] were increased in 2016 as compared to that of in 2012 ***(Appendix-2.3).*** The State Government in this respect stated (July 2022) that the works such as protection work in the downstream of the dam, computerisation of Flood Gates (SCADA system), construction of right guide bund and development of parks near Lahchura Dam could not be included in the original estimate. Taking up of another work (Construction of Appurtenant Works of Lahchura Dam) to complete the balance work of Lahchura Dam clearly indicates that a comprehensive assessment of the requirements was not done initially under the modernization of Lahchura Dam project. Responsibility needs to be fixed for inadequate survey before preparation of DPR of Lahchura Dam project.

2.3.2 Preparation of Detailed Project Reports of Pahari Dam Project without detailed survey

As discussed in paragraph 1.6.2, the Lahchura Dam was receiving water from the Pahari Dam which was situated in the upstream of Lahchura Dam on river Dhasan. Pahari Dam has a water storage capacity of 47.80 MCM and was trapping water from Dhasan river before the water of river reaches to the Lahchura Dam.

The State Government approved a project of Pahari Dam in February 2008 at the estimated cost of ₹ 76.68 crore. As was done in Lahchura Dam Project, in the Pahari Dam Project, the old shutter type arrangement to operate the gates of dam was replaced with the mechanical gates so that the water flow from the dam could be handled efficiently. The estimated benefits from the Pahari Dam Project were the same as that was expected from the Lahchura Dam Project. In this project also, no work was executed to increase the water storage capacity of the dam. SE, Construction Circle, Mahoba entered into two agreements with M/s Ghanaram Infraengineers[14] in February 2009 and October 2014 for

[13] Earth work in excavation, drilling holes, cement concrete works and bag filling which had major cost difference.
[14] Earlier it was M/s Ghanaram (engineers and contractors).

execution of work spill way and for erection of gates in the spill way of the dam respectively.

Audit further observed that the cost of Pahari Dam Project was revised to ₹ 354.20 crore in 2011-12 from the original cost of ₹ 76.68 crore in 2007-08. Examination of records revealed that increase in the cost (₹ 277.52 crore) was due to inadequate/no provision in the original project (₹ 100.53 crore), inadequate investigation (₹ 22.71 crore), change in design (₹ 67.16 crore) and price escalation (₹ 68.68 crore). In the DPR, details of above mentioned changes were not elaborated and CE, Project Betwa, in its report stated that price escalation during this period was phenomenal, particularly, for the construction material and labour, inadequate provisions in some items in original project and unavoidable items required to be executed at the time of project execution. CE however, did not mention the circumstances under which requirement of the new work items could not be determined earlier and change in design of the project had taken place. Due to this, the project cost was enhanced by 362 *per cent* within a short period of three years.

The State Government replied (July 2022) that the work of the project was started on the basis of tentative drawings which was revised subsequently in February 2009 on the basis of detailed surveys. In respect of cost escalation in Pahari Dam Project, the Government stated that the original project was based on the schedule rate of 2006 and due to increase in cost of construction material and labour rates during the construction period, the cost of the project was also increased.

Fact remains that the DPR of the Pahari Dam Project was prepared in 2008 without finalising the drawings and designs. The statement of the State Government that the drawing of the project was finalised in February 2009 was however not correct because as per the records of the Divisions, the drawings were handed over to the contractors in spells, upto November 2012. Thus, due to insufficient surveys, investigations and studies, the scope of the project arrived at the time of original project was not made accurate due to which the scope of the project changed extensively (362 *per cent*) in the very next cost revision in 2012. The State Government, therefore, should investigate the matter of incorrect surveys and investigation while formulating the project estimates and fix the accountability of the erring officers.

2.3.3 Insufficient water storage capacity of dams

Water supply to DCS was to be made from storage of water at the Lahchura Dam. Water of Dhasan river was collected at the Lahchura Dam during monsoon season for releasing to DCS during dry Rabi season. Besides, storage of Lahchura Dam is replenished by the water of Pahari and Saprar Dams. Pahari and Saprar Dams receive water from Dhasan and Sukhnai river respectively during monsoon season.

Scrutiny of records revealed that in the DPR of Lahchura Dam Project, it was estimated that 8.7 TMC[15] of water would be required for providing

[15] Rabi: 5.8 TMC, Kharif: 0.50 TMC, filling of tanks: 1.20 TMC and water loss: 1.20 TMC.

irrigation to 34,955 ha[16] area of DCS. However, DPR further mentioned that maximum 0.37 TMC of water could be stored in Lahchura Dam. Besides, 1.61 TMC of water at Pahari Dam and 1.25 TMC water at Saprar Dam would be available for replenishment of Lahchura Dam storage. Thus, against the total requirement of 8.7 TMC at Lahchura Dam, only a maximum of 3.23 TMC of water could have been made available leaving a shortfall of 5.47 TMC (63 *per cent*).

Audit observed that this fact was in the notice of the Department as it was mentioned by the Department itself in the DPR. Therefore, to trap and store more water from Dhasan river, it was necessary to increase the storage capacity of the dams. However, in the project of Lahchura and Pahari Dams, the work of increasing the water storage capacity of the dams was not considered. No feasibility study on the option of taking more water from the Dhasan river was carried out.

Notably, 38.25 TMC[17] of water was going downstream of Lahchura Dam in river Dhasan during monsoon season, even after storing the water up to the storage capacity of Lahchura and Pahari Dams. The Department only got the work done to replace the old structures of both the dams and the utmost requirement of DCS regarding increase in water storage capacity of dams was not addressed. As a result, the irrigation facility in command area of DCS could not be augmented even after spending ₹ 682.50 crore on the modernisation of Lahchura and Pahari Dams.

Thus, there was shortfall of water at the dams, as discussed above, even for 31,910 ha planned in the DPR out of total 97,169 ha CCA of DCS. For providing irrigation facility in the entire command area of 97,169 ha, 24.18 TMC water would be required, which was not planned at all. As would be seen subsequently, even this planned potential could not be delivered to the farmers as mentioned in Paragraph 4.4.2.

The State Government replied (July 2022) that the geographical location of the Lahchura Dam and Pahari Dam is such that their submergence area partially falls in the region of Madhya Pradesh and Uttar Pradesh due to which it was not possible to increase the storage capacity of these dams. It was also stated by the State Government that the shortage of 5.47 TMC water on Lahchura Dam is met from the water received from the river in the months of November to February.

The Government's argument was not acceptable that the water storage capacity of these dams could not be increased due to spread of the submergence area of the dams up to Madhya Pradesh. It is noteworthy that many inter-state irrigation projects have been constructed in the country, therefore, the work of increasing the water storage capacity of the dams could have been done by adopting the process of necessary approval from the competent authorities. In fact, the project authorities had not even planned about the aspect of increasing the capacity of the dams while conceptualising the project for Lahchura and

[16] Which was reduced to 31,910 ha in the DPR of 2008-09
[17] After diverting 111 MCM water to the Arjun feeder canal in 2020-21, another system offtaking from Lahchura dam.

Pahari Dams. Further, the reply of the Government that shortage of 5.47 TMC water was met, is also not acceptable as against the requirement of 5.26 TMC water for 31,910 ha area during Rabi season, actual release during 2014-15 to 2020-21[18] was in the range of only 28 to 73 *per cent*.

2.3.4 DPR did not include restoration of Dhasan canal system

In order to carry the required volume of water from the dam to the fields, the canal system should have the required carrying capacity. However, the department did not include the work of restoration of canals in the original DPR and took this work only in 2021 in a subsequent project. This subsequent project for repairing of DCS mentioned that the structures of DCS was of more than 100 years and very damaged and dilapidated affecting irrigation. The CE projected the requirement of repairing and renovation of structures such as regulator gates[19] (110 number) at the head of canals, falls (310 number) in the internal section of the canals, canal bridges (277 number) and prepared estimates costing ₹ 27.50 crore for carrying out above mentioned works. The Department allotted ₹ 5.82 crore in March 2021. However, the works could not be taken up due to paucity of time in the financial year 2020-21. The canal systems remained dilapidated and unable to carry water of required capacity. The poor condition of the canal structure was also noticed (August 2021) during the joint physical verification which are illustrated in following Photographs:

Regulator gate not installed at the head of Masoodpura minor of DCS

Water flow controlled by temporary gate (wooden planks) at the head of Islampur Branch of DCS

It is, therefore, evident that renovation of DCS was one of the most important need of the command area which should have been addressed while conceptualising the project of Lahchura and Pahari Dams. However, no provision for the same was made in the DPRs. Not considering the development/improvement of the canal networks, while remodelling the head regulators at the dams (modernisation works) was indicative of improper planning.

[18] Except 2019-20
[19] To regulate water flow in canal

The State Government replied (July 2022) that the work of restoration of DCS, reconstruction of outlets and other works had been proposed under Uttar Pradesh Water Sector Restructuring Programme-Phase III for completion by March 2026.

The fact remained that in the project for Lahchura and Pahari Dams, the work of restoration of the DCS was not considered even though it was found necessary in subsequent surveys of the Department and therefore another renovation project was taken up.

To sum up, insufficient survey before formulation of DPRs led to multiple revisions in the scope of the projects. The current availability of water in the canal systems of BCP was not assessed correctly, which would affect the envisaged irrigation intensity of the project. In the Lahchura Dam Project, the project authorities did not provide for increasing storage capacity of the Lahchura Dam to trap and store adequate water from the river. DCS was not taken up for renovation to use the available water efficiently.

Recommendation 1: *The State Government should carry out study to explore the feasibility for enhancement of the storage capacity of Lahchura Dam and Pahari Dam so as to store adequate water from the river Dhasan.*

Recommendation 2: *The State Government should take up remodeling/ restoration work in canals under nine canal systems of Bansagar Canal Project and Dhasan Canal System in an efficient and effective way.*

Recommendation 3: *The State Government should investigate the matter of defective surveys and faulty assessment of requirements of the projects and fix responsibility of erring officers.*

Recommendation 4: *There is an urgent need of formulating effective mechanism for stringent monitoring of irrigation projects for timely completion. Series of delays needs to be looked into and remedial measures may be taken to ensure competence of contractor, penalty for delays and timelines in contract conditions for future projects.*