



**Performance Audit Report of the
Comptroller and Auditor General of India
on
Outcomes of Surface Irrigation
Projects in Bihar**



लोकहितार्थ सत्यनिष्ठा
Dedicated to Truth in Public Interest



Government of Bihar
Report No. 3 of the year 2022

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Preface

This Performance Audit Report of the Comptroller and Auditor General of India for the period 2015-21 containing the results of performance audit of outcomes of selected surface irrigation projects in Bihar has been prepared for submission to the Governor of Bihar under Article 151 of the Constitution.

The instances mentioned in this Report are those which came to notice in the course of test-audit of records of Water Resources Department. Matters relating to the period subsequent to 2020-21 have also been included, wherever pertinent.

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

Executive Summary

Performance Audit on “Outcomes of Surface Irrigation Projects in Bihar”

Executive Summary

Agriculture in Bihar is highly dependent on rains and ground water. Thus, strengthening of infrastructure for adequate and assured supply of water for surface irrigation is very much required. This Performance Audit attempted to analyse the achievements of outcomes of surface irrigation projects as envisaged in Detailed Project Reports (DPRs) and the factors for under-achievement, if any in the sampled projects.

The five sampled surface irrigation projects were (i) Extension, Renovation and Modernization (ERM) of Eastern Gandak Canal System (EGCS) pertaining to 2015-21 across East Champaran, West Champaran, Muzaffarpur and Vaishali districts; (ii) ERM of Eastern Kosi Canal System (EKCS) pertaining to 2015-21 across Araria, Katihar, Purnea, Madhepura, Saharsa and Supaul districts; (iii) ERM of Uderashthan Barrage Scheme (UBS) pertaining to 2017-21 across Jehanabad, Nalanda and Gaya districts; (iv) Jamania Pump Canal Scheme (JPCS) pertaining to 2015-21 covering Kaimur district; and (v) Chanken Irrigation Project (CIP) pertaining to 2018-21 covering Munger district.

Key Facts

Particulars	EGCS	EKCS	UBS	JPCS	CIP
Project evaluation period	2015-21	2015-21	2017-21	2015-21	2018-21
Project status	Complete	Complete	Ongoing	Ongoing	Incomplete
Project expenditure ₹ crore)	723	764	752	134.56	35.78
Culturable Command Area (CCA) (lakh Ha)	4.81	6.12	0.41	0.09	0.10
Irrigation intensity (<i>per cent</i>)	138	120	100	157.10	100
Gross area to be irrigated during evaluation period (lakh Ha)	39.80	42.82	1.64	0.85	0.30
Reported Irrigation during evaluation period (lakh Ha)	28.09	29.91	1.29	0.58	Nil
Maximum possible irrigation during evaluation period based on net water availability (lakh Ha)	11.85	8.16	0.85	0.51	Not operational
Post-project yearly agriculture produce contemplated (lakh MT)	45.58	25.74	1.73	0.71	Not operational
Maximum possible post-project agriculture produce (attributable to surface irrigation) <i>vis-à-vis</i> contemplated produce (<i>per cent</i>)	24 to 34	11 to 27	42 to 59	53 to 76	Not operational

As contemplated in the projects deliverables, 85.41 lakh Ha was to be irrigated during the evaluation period. According to the Department's reporting, irrigation was provided to 59.87 lakh Ha (70 *per cent*) only. However, audit observed that the report of the Department was not correct. As per net availability of water in the canal system and duty of water (*i.e.* relationship between the volume of water and the area of crop it matures) decided by the Department, irrigation was possible maximum in 16.58 lakh Ha for *Kharif* crops and 4.79 lakh Ha for *Rabi* crops. Thus, against the reported irrigation to 59.87 lakh Ha, irrigation was possible maximum in 21.37 lakh Ha (25 *per cent*) only.

Low irrigation was attributable to non-operational field channels and outlets, siltation, breaches in canals, shortage of funds for operation and maintenance, ineffective Participatory Irrigation Management including non/inadequate formation of Water User Association *etc.* Resultantly, intended objective of the project to maximise the farm production through creation/restoration of irrigation facilities could not be achieved.

Contemplated agricultural production of sampled irrigation projects was 73.76 lakh MT annually. But, agricultural production attributable to surface irrigation ranged from 11 to 76 *per cent* only against contemplated agricultural production per year.

Besides, post-project cropping pattern varied from proposed post-project cropping pattern in DPR. Variation ranged from (-)99 to 262 *per cent* and (-)94 to 40 *per cent* in EGCS and JPCS respectively.

Scrutiny of records related to project execution disclosed instances of deficit planning of construction of settling basin and desiltation leading to non-achievement of intended purpose even after incurring expenditure of ₹ 90.92 crore, double payment to Contractor ₹ 1.93 crore, rescinding/closure of contract leading to loss of ₹ 15.66 crore to the Department (which includes fraudulent liquidation of Performance Guarantee ₹ 1.32 crore), excess payment of ₹ 14.57 crore *etc.*

Contrary to Bihar Irrigation Rules, 2003, elaborate monitoring mechanism *viz.* maintaining register of outlets, preparation of *Sudkar* by Irrigation Divisions, Scrutiny of *Sudkar* by Executive Engineer/Superintending Engineer, inspection of Circle Offices by Chief Engineer were not duly followed.

Shortage of front line field engineers *i.e.* Junior Engineer and Assistant Engineer were 46 to 76 *per cent* and 60 to 83 *per cent* respectively under the divisions of four irrigation projects (except Chanken). Shortage of frontline field staff led to under-preparation of *Sudkar/Khatiyani*, short raising of demand as well as collection of water charges. Audit observed that revenue demand of ₹ 111.38 crore was to be raised against reported irrigation. However, demand of ₹ 5.67 crore (five *per cent*) only was raised. Against that, revenue collection was ₹ 1.73 crore only.

Besides, Chanken Irrigation Project (for Culturable Command Area of 10,251 Ha) was meant only for irrigation during *Kharif* season and was to be completed by May 2015. Despite expenditure (January 2018) of ₹ 35.78 crore, it could not be completed as the work related to distributary system was not carried out. Therefore, irrigation potential utilization was nil. Joint physical verification disclosed that even the executed work was damaged at some places.

Department should contemplate measures to improve actual irrigation at the field level. Developing command area with construction of sufficient number of *pucca* field channels duly connected with outlets/water courses, Participatory Irrigation Management with formation of sufficient number of Water User Associations, desiltation of canals, lining of canals, repairing of non-functional outlets may facilitate better irrigation. Besides, Department may further strengthen existing control mechanism to avoid excess/irregular payments. Adequate availability of manpower may help in improvement of raising demand and effective revenue collection.

Chapter-1

Introduction

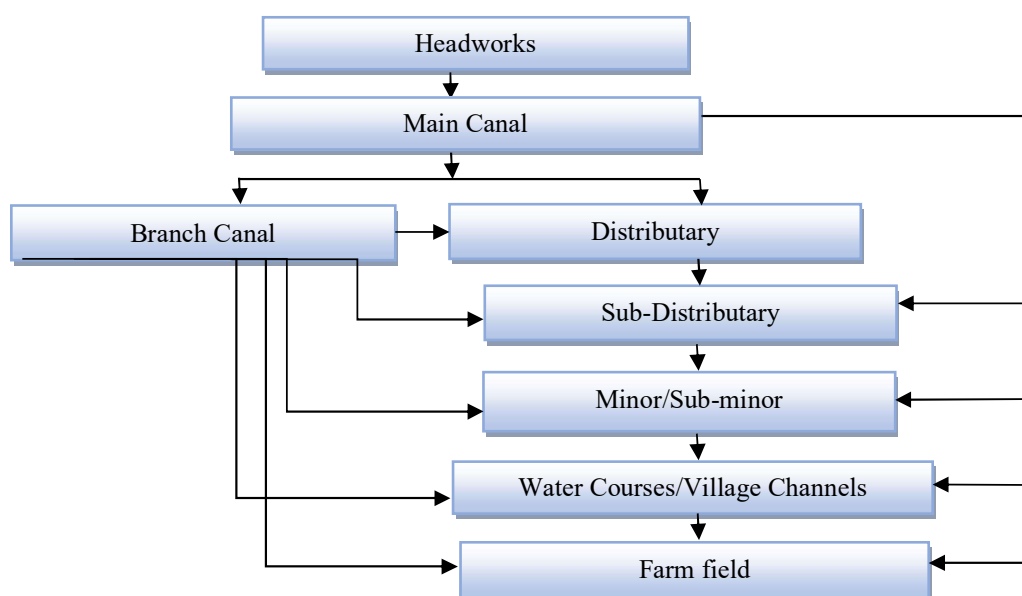
Chapter -1

Introduction

Agriculture in Bihar is dependent upon ground water and is largely rain-fed. However, erratic rainfall and its irregular spatial distribution is of concern for achieving stability in agriculture production as well as for sustainability of ground water resources. It is necessary to check the excessive ground water outflow by surface irrigation. Thus, strengthening of infrastructure for adequate and assured supply of water for surface irrigation in Bihar is very much required. Besides, surface irrigation also works as catalyst for development of hydropower, tourism, pisciculture *etc.*

In surface irrigation, water is either ponded on the soil or allowed to flow continuously over the soil surface for the duration of irrigation. The surface irrigation network broadly consists of Headworks/Reservoir, main canal, branch canal, distributary, sub-distributary, minor/sub-minor and water courses/village channels through which water is supplied to farm field, as shown in **Chart 1.1**.

Chart 1.1: Surface Irrigation System



(Source: Central Water Commission guidelines for preparation of DPR)

Planning process of irrigation project included a proposal from Water Resources Department (WRD), preparation of Detailed Project Report (DPR), scrutiny of DPR by Central Water Commission (CWC) for determining the techno-economic viability of the project, investment clearance by the then Planning Commission, issue of administrative and technical sanction for the project by State Government after clearance of project from CWC in case of projects with inter-state/inter-country ramification.

This Performance Audit (PA) attempted to analyse the achievements of outcomes envisaged in DPR and the factors for under-achievement, if any.

1.1 Organisational set-up

WRD is headed by the Principal Secretary. At the apex level, Principal Secretary and Engineers-in-Chief are responsible for management of major¹ and medium irrigation projects. Further, Chief Engineers, Irrigation Creation at Zonal level, Superintending Engineers at Circle level and Executive Engineers at Division level are responsible for management of irrigation projects at field level.

The core function of WRD is creation of irrigation potential and utilization of created potential through construction, operation/regulation, maintenance of major and medium irrigation projects and providing optimum benefits from them to beneficiaries. WRD is also responsible for documentation of delivery of irrigation services, measurement of irrigated land, preparation of demand statement and collection of water charges from the beneficiary farmers.

1.2 Audit objectives

The audit objectives were to assess whether:

- the project deliverables were planned, executed and monitored in accordance with the intended objectives;
- coordination with all stakeholders was ensured at all stages of the project for sustainable extension of benefits to the targeted audience.

1.3 Audit criteria

The Audit criteria were derived from the following sources:

- Bihar Irrigation Act, 1997 and Bihar Irrigation Rules, 2003;
- Bihar Public Works Department (BPWD) Code;
- Bihar Public Works Account (BPWA) Code;
- Bihar Financial Rules (BFR);
- Guidelines (2010) issued by Central Water Commission for preparation of DPRs;
- Forest Conservation Act, 1980;
- CWC guidelines for performance evaluation of irrigation system, 2002;
- DPRs of the respective projects;
- Clearance and approval of the project report by the then Planning Commission and CWC;
- Other related directions of the Government of Bihar (GoB) and Government of India (GoI), issued from time to time.

1.4 Scope of audit, methodology and limitations

According to Water Resources Department, expected Irrigation Potential (IP) of major and medium irrigation projects was 53.53 lakh hectare (Ha) in Bihar. Out of

¹ Irrigation projects are categorised as major, medium and minor if they serve command area larger than 10,000 Ha; between 2,000 to 10,000 Ha and less than 2,000 Ha respectively. Command area means all lands which are fit for cultivation. Major and medium irrigation projects are administered by Water Resources Department whereas minor irrigation projects are administered by Minor Water Resources Department.

53.53 lakh Ha, 36.55 lakh Ha of Irrigation Potential was created as of March 2018. It was noticed that 29 Major and 109 Medium Irrigation Projects were completed/ partially completed to achieve 36.55 lakh Ha of Irrigation Potential.

A summary of total projects and selected projects is indicated in **Table-1.1**.

Table 1.1: Summary of total projects and sampled projects

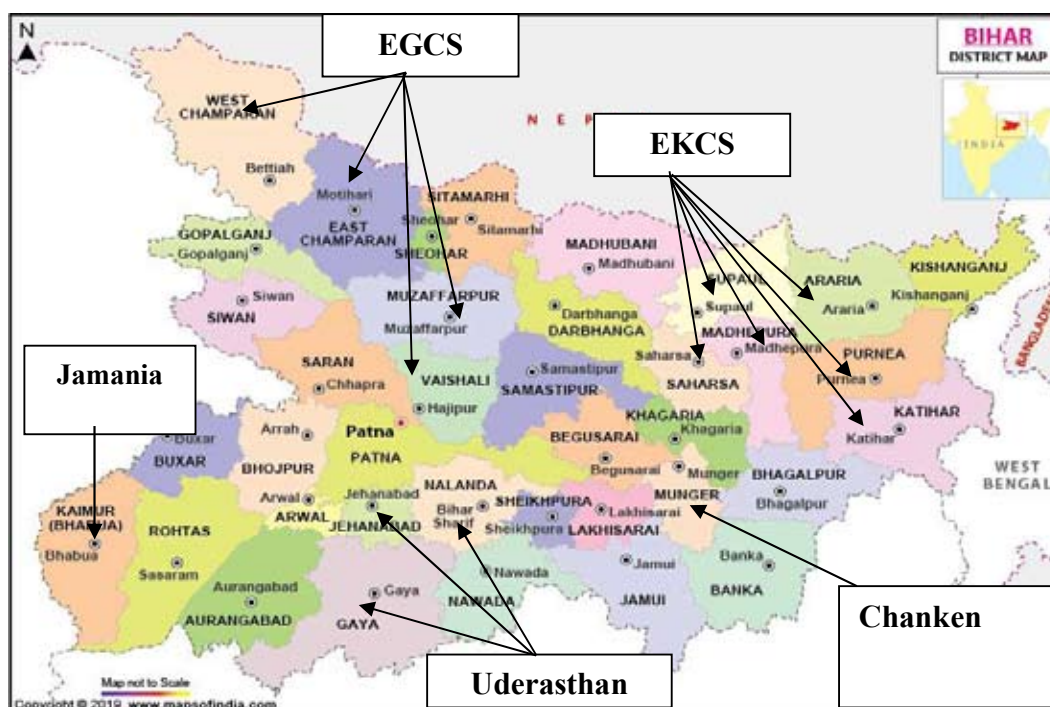
Type of irrigation project	Total Projects		Selected Projects for PA		Selection percentage of IP created
	No. of projects	IP created (in lakh Ha)	No. of projects	IP created (in lakh Ha)	
Major	29	34.48	4 (1 New & 3 ERM)	14.12	41
Medium	109	2.07	1	0.10	5
Total		36.55	5	14.22	39

Five irrigation projects selected for audit scrutiny based on judgemental sampling taking the highest percentage of irrigation potential created are as follows:

1. Extension, Renovation and Modernization (ERM) of Eastern Gandak Canal System (EGCS)
2. ERM of Eastern Kosi Canal System (EKCS)
3. ERM of Uderasthan Barrage Scheme
4. Jamania Pump Canal Scheme² and
5. Chanken Irrigation Project

Geographical expanse of the projects is depicted in **Chart-1.2** below.

Chart 1.2: Locations and coverage of sampled Projects



² Medium Irrigation Project.

Performance Audit, covering the period April 2015 to March 2021, was conducted during January to April 2021, July to September 2021 and December 2021 through test-check of records in the offices of the Principal Secretary, five³ Chief Engineers, Irrigation Creation; 29 Executive Engineers, Irrigation/Canal Divisions including two Headworks Divisions at the field level. Besides, other offices *viz.* District Agriculture Officer, District Statistical Officer, Directorate of Economics and Statistics and Energy Department were also visited for collection of relevant information.

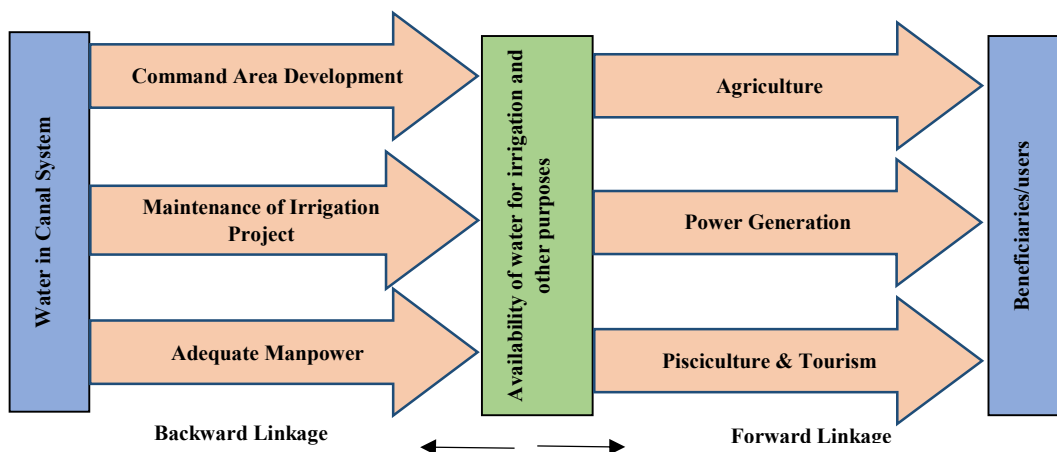
Audit methodology included examination of records, collection of information through questionnaire and proforma, beneficiary survey and joint physical verification. An Entry Conference was conducted (December 2020) with the Principal Secretary, WRD, wherein the audit objectives, audit criteria and methodology were discussed. An Exit Conference was held (April 2022) with the Department to obtain their views on the audit observations. Department's replies to audit observations have been duly incorporated.

Limitation of Performance Audit included non-availability/partial availability of vital records. These were preliminary survey reports for preparing project proposals, approved DPRs of ERM of EKCS *etc.* Unavailability of these information affected audit endeavour to precisely assess the project-wise comprehensive outcome such as assessment of crop water requirement at the field level, gauged discharge of water at the lower level of canal irrigation system *viz.* field channels, project specific crop yield, performance evaluation of projects *etc.*

1.5 Structure of the Performance Audit

For achieving the intended outcome of an irrigation project, it is imperative that appropriate backward and forward linkages are created. A schematic representation showing backward and forward linkages of Irrigation Projects is depicted in **Chart-1.3** below.

Chart 1.3: Schematic representation of backward and forward linkage of Irrigation Projects



³ Biharsharif, Bhagalpur, Dehri, Motihari and Saharsa.

As can be seen from above chart, backward linkage consists of availability of water for irrigation and other purposes, Command Area Development, maintenance of irrigation project, availability of manpower and forward linkage would mean giving appropriate and improved agriculture benefits, power generation, pisciculture and eco-tourism *etc.*

Considering the above, the audit findings in Chapter 2 to Chapter 5 have been structured for each of the projects selected (except Chanken Irrigation Project) in the following manner:

- Project planning-This introduces the need and scope of the project.
- Irrigation potential utilization-This discusses extent of actual irrigation *vis-à-vis* contemplated irrigation.
- Command Area Development-Efforts to bridge the gap between irrigation potential created and its utilisation through micro level infrastructure development has been discussed here.
- Capacity deficiencies of canal system-This includes non-functional outlets and decrease in water discharge capacity.
- Maintenance of irrigation project-This discusses requirement, allotment and expenditure of funds for maintenance of the irrigation project.
- Achievement of envisaged agricultural benefits-This discusses actual agriculture produce *vis-à-vis* contemplated agriculture produce.
- Achievement of cropping pattern envisaged in DPR-This compares proposed post-project cropping pattern and actual post-project cropping pattern (2019-20), except for EKCS.
- Project execution-This discusses economy, efficiency and effectiveness with which project was executed.
- Project monitoring-Here, deficiencies in monitoring and their impact have been discussed.
- Availability of manpower-Here, availability of manpower *vis-à-vis* sanctioned strength and its impact has been discussed.

Besides, Chapter-6 discusses about Chanken Irrigation Project wherein despite expenditure of ₹ 35.78 crore, irrigation potential utilization was nil and no benefits accrued to intended beneficiaries.

Chapter-2
Extension, Renovation
and Modernization
(ERM) of Eastern
Gandak Canal System
(EGCS)

Chapter -2

Extension, Renovation and Modernization (ERM) of Eastern Gandak Canal System (EGCS)

Eastern Gandak Canal System is the third largest major surface irrigation project of Bihar and ERM of EGCS was one of the important works carried out in Irrigation Sector during last decade. It is a diversion project through construction of a barrage on river Gandak and covers parts of East Champaran, West Champaran, Muzaffarpur and Vaishali districts. Audit scope pertained to the period 2015-21.

2.1 Project planning

Eastern Gandak Canal System project (Phase-I), with project cost of ₹ 52 crore was approved by the then Planning Commission in 1961. By 1985, canal was constructed only up to 164 Km (out of 277 Km) catering to 4.81 lakh Ha Culturable Command Area (CCA) and the work was stopped by the then Planning Commission. Subsequently, residual work (Phase-II) was taken up by WRD in 1990 and the work is still ongoing. Phase-II work was not part of audit scope.

The utilisation of irrigation potential created under Phase-I gradually decreased from 5.76 lakh Ha to 2.25 lakh Ha (39 *per cent*) by 2002 due to deposition of silt, erosion at some places, damages to canal structures *etc.* Discharge capacity of the main canal also reduced from 12,480 Cusec to 7,000 Cusec. Therefore, WRD planned for Extension, Renovation and Modernization of EGCS, with project life of 100 years, to restore lost irrigation potential.

Expected water discharge capacity of the Phase-I project was 12,480⁴ Cusec. Expected outcome of the project was to make water available for irrigation to 4.81 lakh Ha. Irrigation intensity⁵ of 138 *per cent* was contemplated. This would actually provide irrigation to 6.63 lakh Ha. Besides, annual agriculture produce of 45.58 lakh MT (*Kharif* 17.50 lakh MT, *Rabi* 9.16 lakh MT, Summer 3.32 lakh MT and Sugarcane 15.60 lakh MT) was envisaged.

Audit findings

Audit findings relating to outcomes of surface irrigation project have been discussed under the following categories:

2.2 Irrigation potential utilisation

(A) At the rate of the contemplated irrigation intensity of 138 *per cent* to CCA of 4.81 lakh Ha, gross irrigated area was proposed to be 6.63 lakh Ha every year which included irrigation for *Kharif* in 4.13 lakh Ha (86 *per cent* of CCA), *Rabi* 1.73 lakh Ha (36 *per cent* of CCA), Hot weather 0.53 lakh Ha (11 *per cent* of CCA) and Annual crops in 0.24 lakh Ha (five *per cent* of CCA). This indicated that GoB planned for providing lesser irrigation facility to *Rabi* and other crops *vis-à-vis Kharif* crops. In Bihar, generally rainwater is available in *Kharif* season due to south-

⁴ Designed discharge capacity of main canal was 15,645 Cusec for 6.03 lakh Ha of CCA including Phase-I and II. CCA of Phase-I is 4.81 lakh Ha, hence, discharge is limited to 12,480 Cusec.

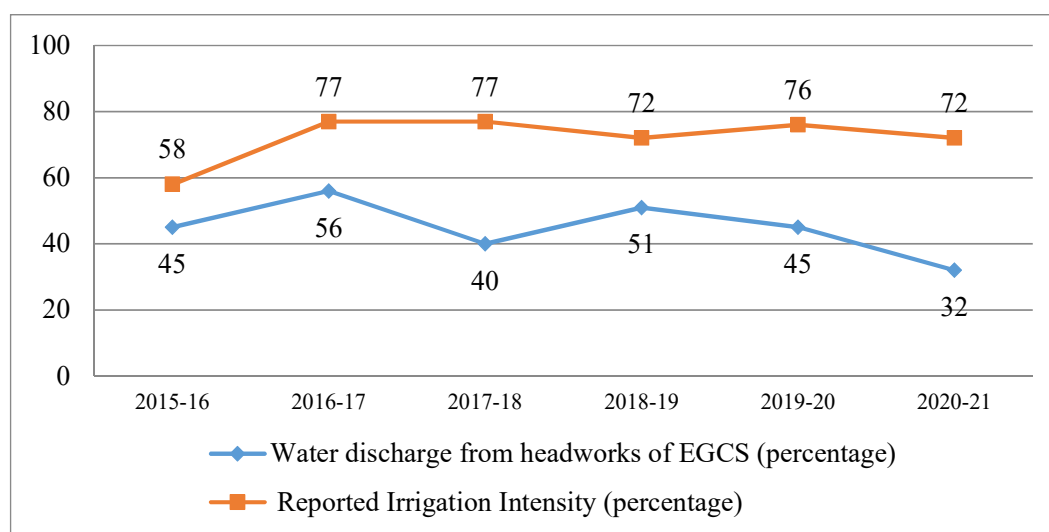
⁵ Irrigation intensity is the ratio of gross irrigated (including all types of crops) area to the net irrigated (CCA) area expressed as percentage.

west monsoon, whereas there is lesser rainfall in *Rabi* season indicating higher requirement of irrigation facility to *Rabi* crops. No reason for such exclusion at the planning level was found on record.

(B) Further, at the proposed level of irrigation intensity (*i.e.* 138 *per cent*) and gross irrigated area (*i.e.* 6.63 lakh Ha per year), during evaluation period of 2015-21, 39.80 lakh Ha area should have been irrigated. However, according to Department's reports, during this period, gross irrigated area was 28.09 lakh Ha (71 *per cent*) only, ranging from 59 to 78 *per cent*.

Discharge of water from headworks was the only source of water in canal system for surface irrigation. Though water discharge during *kharif* season (2015-21) from headworks decreased, but reported irrigation intensity increased or remained almost constant, as shown in the **Chart 2.1** below.

Chart 2.1: Trend of comparison between water discharge[#] and Irrigation reporting for EGCS during *Kharif* 2015-21



(Source: Water Resources Department)

Percentage of water discharge against designed discharge

Thus, reported irrigation achievement was not in conformity with water discharge during the period 2015-21, which indicated incorrect reporting of irrigation achievement.

Further scrutiny disclosed that according to net availability and duty of water (*i.e.* relationship between the volume of water and the area of crop it matures) decided by the Department, irrigation was possible maximum in 8.93 lakh Ha and 2.92 lakh Ha for *Kharif* and *Rabi* seasons respectively (**Table-2.1**). No irrigation was provided for annual crops and irrigation provided for hot weather was included by the Department in *Kharif* irrigation. Thus, against the claim of irrigation potential utilisation of 28.09 lakh Ha (71 *per cent*) by the Department, irrigation was possible maximum for 11.85 lakh Ha (30 *per cent*) only, ranging from 26 to 45 *per cent* and 17 to 34 *per cent* of contemplated irrigation for *Kharif* and *Rabi* seasons respectively during 2015-21 as shown in **Table 2.1** below.

Table 2.1: Achievement of Irrigation intensity

Sl. No.	Year	Contemplated irrigation in CCA of 4,80,670 Ha at the proposed intensity rate				Average net water availability [#] (in Cusec ⁶)		Maximum irrigation possible (Ha) based on net water availability @ 40 Ha per Cusec [@] (percentage irrigation in comparison to contemplated irrigation)		
		Kharif @ 86 per cent	Rabi @ 36 per cent	Others @ 16 per cent	Total (c+d+e)	Kharif	Rabi	Kharif (g x 40)	Rabi (h x 40)	Total (i + j)
a	b	c	d	e	f	g	h	i	j	k
1	2015-16	4,13,376	1,73,041	76,908	6,63,325	3,744	1,289	1,49,760 (36)	51,560 (30)	2,01,320 (30)
2	2016-17	4,13,376	1,73,041	76,908	6,63,325	4,641	972	1,85,640 (45)	38,880 (22)	2,24,520 (34)
3	2017-18	4,13,376	1,73,041	76,908	6,63,325	3,305	732	1,32,200 (32)	29,280 (17)	1,61,480 (24)
4	2018-19	4,13,376	1,73,041	76,908	6,63,325	4,232	1,394	1,69,280 (41)	55,760 (32)	2,25,040 (34)
5	2019-20	4,13,376	1,73,041	76,908	6,63,325	3,764	1,453	1,50,560 (36)	58,120 (34)	2,08,680 (31)
6	2020-21	4,13,376	1,73,041	76,908	6,63,325	2,648	1,458	1,05,920 (26)	58,320 (34)	1,64,240 (25)
	Total	24,80,256	10,38,246	4,61,448	39,79,950	22,334	7,298	8,93,360 (36)	2,91,920 (28)	11,85,280 (30)

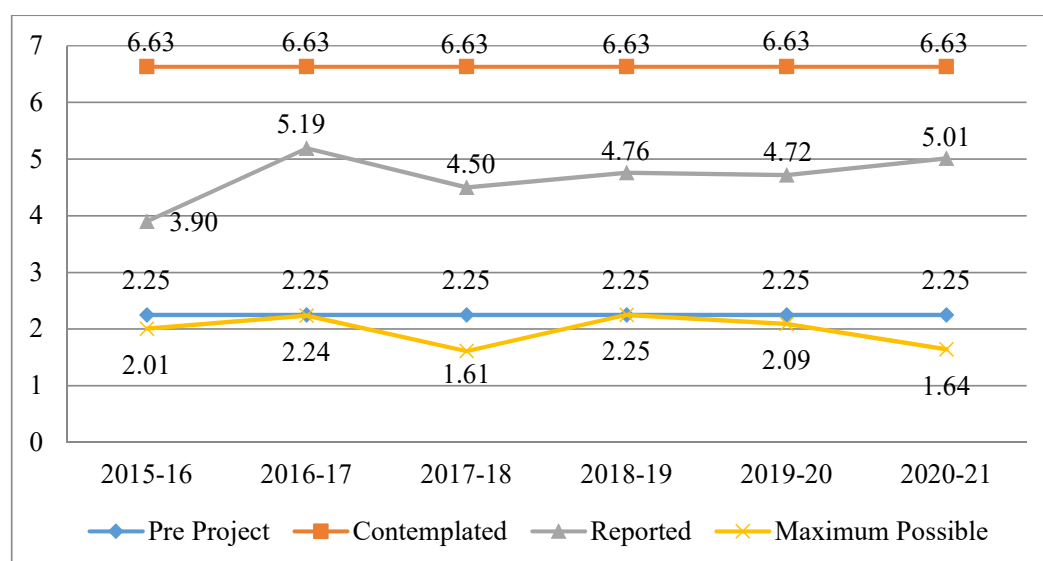
(Source: Water Resources Department)

[#] Net availability of water has been calculated after taking into account, project irrigation efficiency (Kharif - 53 per cent and Rabi - 41 per cent) as mentioned in DPR/CWC guidelines.

[@] Duty of water is relationship between the volume of water and the area of crop it matures. Duty of water fixed by the Department for Kharif and Rabi irrigation was 40 Ha per Cusec.

A comparison of pre-project, contemplated, reported and maximum possible irrigation during 2015-21 is shown in **Chart 2.2** below.

Chart 2.2: Comparison of pre-project, contemplated, reported and maximum possible irrigation during 2015-21 (lakh Ha)



As evident from the Chart above, pre-project irrigation was provided to 2.25 lakh Ha per year and contemplated post-project irrigation was 6.63 lakh Ha. Despite project expenditure of ₹ 723 crore, maximum possible irrigation hovered around the pre-project irrigation level of 2.25 lakh Ha or even less. Low irrigation being provided was also indicated during the beneficiary survey as only 24 per cent farmers stated that they got required water to their farm land.

⁶ Cusec is a unit to measure discharge of water per unit of time. 1 Cusec = 28.32 litres/second.

Low water discharge and water availability at the field level was mainly due to non-operational field channels and outlets, siltation, breaches in canals and ineffective Participatory Irrigation Management *etc.* Water indent⁷ was sent to the upstream canal division or Headworks Division without proper assessment of crop water requirement for irrigation. The concerned Division intimated that the indent was sent on the basis of farmers' demand; however, no record or document was made available to justify the basis.

Department replied that in due course of time, siltation might have caused decrease in the canal capacity. 39.80 lakh Ha could be irrigated only in ideal condition. Reply corroborated audit observation.

2.3 Command Area Development

The Command Area Development (CAD) programme was initiated (1974) and restructured (July 2005) by Government of India (GoI) with the objective to bridge the gap between irrigation potential created and its utilisation through micro level infrastructure development and efficient farm water management to improve agricultural production/productivity and socio-economic conditions of the farmers. Further, Participatory Irrigation Management Programme of GoI envisaged formation of Water User Associations (WUAs) to ensure beneficiaries' participation in irrigation management, collection of water charges, operation and maintenance of the project *etc.*

A Memorandum of Understanding (MoU) was signed (December 2010) between the Ministry of Water Resources, GoI and GoB for Gandak Command Area Development for the period 2010-19.

The MoU set the annual physical and financial targets for 11⁸ activities (excluding Establishment). Out of the 11, only one activity (field channels) was carried out up to 2018-19. Field drain and training work were carried out up to 2015-16 and 2016-17 respectively. Farmers' participation and survey planning and design were carried up to 2016-17 and 2017-18 respectively. Work related to reclamation of wet land, land leveling and correction of system deficiencies were not carried out. Department did not provide any funds since 2019-20 to Gandak Command Area Development Authority (GCADA) to perform any activity. Against the target of 20 evaluation studies for EGCS, only one was carried out (2015-16).

The details of target and achievement of construction of field channels under EGCS are as shown in **Table 2.2** below.

⁷ Water indent is demand of water for irrigation by a division situated at lower reach of main canal to upper reach division and lastly demand reached to the Headworks Division.

⁸ (i) Survey, Planning & Design; (ii) Field Channel; (iii) Field, Intermediate and link Drains; (iv) Warabandi; (v) Correction of System Deficiency; (vi) Adaptive Trials; (vii) Training; (viii) Demonstration; (ix) Reclamation of Wetland; (x) Evaluation Study; (xi) Farmers Participation.

Table 2.2: Details of Field Channels developed in Command Area of EGCS
(Area in Ha)

Command Area to be developed	Command Area developed out of 4.81 lakh Ha upto 2014-15 (through field channels)			Command Area developed upto 2020-21 (through field channels)		
	<i>Kutcha</i>	<i>Pucca</i>	Total	<i>Kutcha</i>	<i>Pucca</i>	Total
	(percentage of Command Area upto 2014-15 i.e. 3,75,408 Ha)		(percentage against total Command Area)	(percentage of Command Area upto 2020-21 i.e. 3,84,676 Ha)		(percentage against total Command Area)
4,80,670	2,56,047 (68)	1,19,361 (32)	3,75,408 (78)	2,56,047 (67)	1,28,629 (33)	3,84,676 (80)

(Source: Water Resources Department)

Audit observed that during 2015-21, only about two *per cent* additional command area was developed. Eighty *per cent* of Gandak Command Area was developed (March 2021) through construction of *kutcha* and *pucca* field channels. 67 *per cent* of total developed field channels were *kutcha*. Land acquisition was not required for construction of field channels; therefore, these were constructed on the farmers' land. As a result, *kutcha* field channels disappeared, as farmers gradually subsumed them in the farm. This was also confirmed during joint physical verification. Further, *pucca* field channels were 33 *per cent* only. However, these *pucca* field channels were functional for only 7,180 Ha (two *per cent*) of Gandak Command Area.

Further, Audit observed that only three Water User Associations (WUAs) were formed in Motihari, which too were non-functional.

Further, there was acute shortage of field staff (ranging between 68 and 100 *per cent* as of March 2021) in GCADA, which led to inadequate functioning, operation and maintenance of irrigation system.

Department replied that due to non-availability of water, farmers gradually subsumed the *kutcha* field channel in their farm but farmers again restore it as water is available to their farm. From reply, it appears that field channel restoration work was to be done by farmers on their own. In respect of shortage of staff, Department assured that action would be taken to strengthen the field staff as soon as possible.

2.4 Capacity deficiencies of canal system

2.4.1 Non-functional outlets

Joint physical verification of 216 outlets which ensures irrigation to fields at the micro level were carried out and only 49 *per cent* of them were found functional in EGCS. Remaining outlets were non-functional mainly due to low discharge of water in canal, shrubs/bushes at the exit of outlets, level of outlet being higher than water level *etc.* This indicated poor maintenance of irrigation projects leading to lower irrigation intensities.

2.4.2 Decrease in water discharge capacity

Audit observed that designed water discharge capacity of EGCS was 12,480 Cusec. However, average water discharge was 7,024 Cusec (56 *per cent*) only during 2015-21. Lower water discharge than designed discharge capacity was due to siltation; damaged/defunct structures *viz.* lining of canals, Cross Drainage (CD), head regulator, cross regulator and grasses and bushes in canal bed *etc.* Further, Audit also noted that some parts of canal system were non-operational due to heavy siltation, unavailability of CD at all the required places, encroachment, breaches of

embankment *etc.* The same was also confirmed during joint physical verification, details of which are given in **Appendix I-A**. Non-operational part of canals affected irrigation capacity as well as project outcomes.

Department replied that once Gandak Phase-II was complete, EGCS would be able to take full discharge. However, fact remained that at present, average water discharge was only 56 *per cent* of the designed discharge.

2.5 Maintenance of irrigation project

According to Eleventh Finance Commission, cost of operation and maintenance of irrigation project was ₹ 521 and ₹ 174 per Ha for utilised and unutilised potential respectively for the year 2003-04, with escalation at the rate of five *per cent* per annum.

The requirement of funds, allotment and expenditure pertaining to operation and maintenance for 2015-21 are given in **Table 2.3** below.

Table 2.3: Year-wise allotment and expenditure for operation and maintenance

Year	Area of Irrigation Potential (in Ha) as reported by the Department		Rate of maintenance of Irrigation Potential (in ₹/Ha)		Requirement ⁹ of funds (₹ in crore)	Allotment (₹ in crore) (percentage of requirement)	Expenditure (₹ in crore)
	Utilised	Unutilised	Utilised	Unutilised			
2015-16	3,90,419	2,72,906	936	312	45.06	7.58 (17)	7.48
2016-17	5,19,208	1,44,117	982	328	55.71	11.40 (20)	11.31
2017-18	4,50,377	2,12,948	1,032	345	53.83	11.61 (22)	11.47
2018-19	4,76,168	1,87,157	1,083	362	58.34	12.66 (22)	12.07
2019-20	4,71,884	1,91,441	1,137	380	60.93	12.19 (20)	11.36
2020-21	5,01,366	1,61,959	1,194	399	66.33	10.21 (15)	9.62

(Source: Water Resources Department)

Implementing units (*i.e.* Irrigation/Canal Divisions) got only 15 to 22 *per cent* of the required funds for operation and maintenance during 2015-21. There was nothing on record to exhibit that action plan for operation and maintenance and commensurate budget requirement was prepared and submitted to controlling officer. Implementing units informed that operation and maintenance plans were prepared as per the availability of funds. This resulted in deficient capacity of irrigation system.

Department's response was not specific.

2.6 Non-achievement of envisaged agricultural benefits

Audit noted that though the post-project yield increased in the area covered by the project, however, this was not mainly attributable to surface irrigation. The use of private tube wells was main reason behind the increase of yield in the project command area. During beneficiary survey, it was found that 76 *per cent* farmers were dependent on other sources of irrigation including use of private tube wells in the area of EGCS project.

⁹ Requirement of funds = (Utilised Potential × Rate of maintenance for utilised potential) + (Unutilised Potential × Rate of maintenance for unutilized potential).

Post-project agricultural produce was worked out by the audit for the period 2015-21 on the basis of maximum possible irrigated land based on net water availability and yield envisaged in the respective DPR against contemplated irrigation. Agriculture production attributable to surface irrigation ranged between 24 and 34 *per cent* only during 2015-21 (*Appendix 1-B*).

Department's response was not specific and was silent on non-achievement of envisaged agricultural benefits.

2.7 Non-achievement of cropping pattern envisaged in DPR

As per Section 58 of Bihar Irrigation Act, 1997, State Government having regard to soil characteristics, climate, rainfall, water availability may issue order for the kind of crops that should be sown on the irrigable command area. It is the responsibility of the Canal Officer to publicise such order and thereafter regulate the supply of water from the canal for sowing, planting and growing such crops during the period specified in the order.

Audit observed that no such order specifying the cropping pattern to be adopted in the irrigable command area as envisaged in the DPR was issued by GoB. In the absence of notified cropping pattern, Canal Officer regulated the water in the canal system without any realistic basis which hampered outcome of irrigation. According to the Report of the Directorate of Economics and Statistics (2019-20) pertaining to four¹⁰ districts falling under EGCS, actual post-project cropping pattern varied from proposed post-project cropping pattern in DPR. The variation ranged between (-)99 and 262 *per cent*, as shown in *Appendix 1-C*.

Coverage of Green Gram, Oil seeds, Paddy and Maize decreased by 99, 76, 26 and 16 *per cent* respectively, whereas coverage of sugarcane and wheat increased by 262 and 117 *per cent* respectively. The coverage of Pulses did not change much.

Thus, cropping pattern as envisaged in DPR was not achieved which indicated that proposed cropping pattern in DPR was not planned properly in co-ordination with Agriculture Department and direction stipulated in Bihar Irrigation Act, 1997 was not followed.

Department's response was not specific and was silent on non-achievement of cropping pattern envisaged in DPR.

2.8 Off-farm development

Command Area Development (CAD) comprises off-farm work such as marketing centers, roads for communication, financial institution, cold storages, supply centres for inputs like seeds, fertilizers, pesticides, agricultural extension service *etc.* Audit noticed that neither any plan was prepared nor any work was executed regarding off-farm development by the Gandak Command Area Development Authority. This indicated that CAD authority failed to provide the facility to the farmers to increase their agriculture produce as well as to provide the facility of agricultural marketing to improve their socio-economic condition.

¹⁰ East Champaran, Muzaffarpur, Vaishali and West Champaran.

2.9 Project execution

Timely, efficient and economical execution of any project work is a pre-requisite for achievement of intended objectives of the project. During Audit, following discrepancies were observed in the execution of the Project:

2.9.1 Inaccurate survey

CWC Guidelines for preparation of DPR (2010) mentioned that preliminary designs of all important structures are made after proper survey to avoid steep rise in cost estimates. Scrutiny of estimate/Bill of Quantity (BoQ) and actual execution (Measurement Book) disclosed that the item-wise variation ranged from non-execution of a particular item of work to 66,186 *per cent*. Though all the variations (except variations discussed in [paragraph 2.9.4.3](#)) were approved by the competent authority, variations contributed to rise in cost and indicated that the original estimate was not prepared as per the site conditions and after proper survey.

2.9.2 Irregular award of work

WRD directed (November 2011) that work should not be awarded to an agency having poor work completion performance. While awarding the work (April 2014) for reconstruction of R.C.C aquaduct-cum-escape-SLR bridge by the Executive Engineer, Triveni Branch Canal (TBC), Narkatiyaganj to M/s Phular Construction Private Limited, its capability to execute the work and past poor performance was ignored. Thus, award of work was irregular. However, this work was completed by the Contractor in June 2015 with a delay of one year and ₹ 29.17 crore was paid.

2.9.3 Time overrun from 2007 to 2016 and cost overrun from ₹ 294 crore to ₹ 723 crore

According to administrative approval (August 2003), the project (₹ 294 crore) was scheduled to be completed by March 2007, however, the project execution could not even commence by then due to change in existing procurement consultant, award of work to incompetent bidder and subsequent litigation. WRD decided (July 2005) to remove the existing procurement consultant and carry out procurement related work on its own. Department invited bids in March 2006 and again in May 2006, but these too were cancelled, for which no reason was found on record. In the subsequent bidding process (May 2007), two bidders namely Bihar State Construction Corporation Limited (BSCCL) and Nagarjuna Construction Company Limited (NCCL) participated. Work was awarded (July 2007) to BSCCL by the State Empowered Committee on recommendation of the Departmental Tender Committee despite BSCCL not being qualified in 17 out of 19 parameters of technical evaluation. The Departmental Tender Committee argued that Government Corporation did not require fulfilment of technical and financial eligibility. As a result, the aggrieved bidder NCCL moved the court. Hon'ble Patna High Court observed that the tender committee was fully aware of the disqualification of BSCCL and the decision of the tender committee was arbitrary. In light of court's verdict (April 2009), agreement was finally executed (August 2009) by the Department with NCCL for ₹ 449 crore with scheduled completion by September 2011. The project cost was revised to ₹ 685 crore (May 2010) by the Department and agreed to by CWC and Planning Commission (November 2010). The project was completed in June 2016 after expenditure of ₹ 723 crore.

Thus, due to Department's unjustifiable decisions, project could be completed in June 2016 in place of March 2007. Moreover, project cost also increased from ₹ 294 crore to ₹ 723 crore and increase in cost (₹ 429 crore) was mainly attributable to price adjustment and variation in quantities.

Further, project expenditure of ₹ 723 crore was financed by GoI¹¹ (₹ 684.78 crore) under *Rastriya Sam Vikas Yojana* (RSVY)/Backward Region Grant Fund (BRGF) and GoB (₹ 43 crore). Audit observed that GoI funds of ₹ 680 crore were utilised and ₹ 4.62 crore were surrendered to GoI (March 2015) due to closure of RSVY (March 2015) whereas the project still required ₹ 58 crore. Thus, extra burden of ₹ 4.62 crore was created on state exchequer.

Department replied that increase in cost was attributable to increase in price of material and labour rate and inclusion of the cost of mechanical work of the Gandak barrage and canal gate. Reply is not tenable as the initial award of work to incompetent bidder and subsequent litigation were main reasons for delay in execution of work which led to increase in cost.

2.9.4 Financial irregularities

Financial irregularities relating to project execution are discussed in subsequent paragraphs:

2.9.4.1 Double payment to the Contractor

(A) Scrutiny of records of the EE, Headworks Division, Valmikinagar for construction work¹² (EGCS) disclosed that Running Account (RA) bill 13 and 14 were passed and paid to the Contractor on 30 March 2012 and 31 March 2012 respectively. During the payment of 15th RA bill (May 2012), previous 12th RA bill instead of 14th RA bill was deducted, hence payment made through 13th and 14th RA bill was again paid to the Contractor in 15th RA bill. Scrutiny of cash book also confirmed the payment. Thus, double payment of ₹ 1.58 crore¹³ was made to the Contractor. Final bill was passed (June 2019), but no action for recovery was taken (December 2021).

(B) Further, scrutiny of records of (Package 42) Tirhut Canal Division, Hajipur (EGCS) disclosed double payment of ₹ 35.19 lakh on account of payment of price escalation twice on same bill value. Final bill was passed (April 2019), but no action for recovery was taken (August 2021).

2.9.4.2 Excess payment on various items

Scrutiny of the Measurement Books (MBs) and other relevant records related to EGCS project disclosed excess payment of ₹ 1.34 crore in eight divisions as detailed in *Appendix 1-D*. Excess payment was on account of non-consideration of payment already made to Contractor, payment at higher rate, error in calculation of price escalation, non-deduction of settlement allowance *etc.*

¹¹ GoI released ₹ 684.78 crore, expenditure incurred ₹ 680.16 crore.

¹² Package 46.

¹³ Double payment = 13th bill amount (₹ 76.57 lakh) + 14th bill amount (₹ 81.65 lakh) = ₹ 158.22 lakh.

2.9.4.3 Payment on account of variation/extra items without approval of the competent authority

Rule 182 A of the BPWD Code stipulates that supplementary agreement should be executed for extra item¹⁴ and rate and BoQ shall be approved by the competent authority¹⁵. Scrutiny of records disclosed that in three divisions of EGCS, payment of ₹ 2.15 crore was made for variation/extra item of works without approval of the competent authority rendering irregular payment of ₹ 2.15 crore (*Appendix 1-E*).

2.9.4.4 Payment of price adjustment

According to Road Construction Department (RCD)¹⁶ (October 2013), while making payment of price adjustment, the revised percentage of each component shall be considered as per actual quantity of the work finally executed. Scrutiny of records/MBs related to ERM of EGCS disclosed that contrary to direction of RCD, price escalation was paid as per estimated original percentage of each component in place of revised percentage of each component. This resulted in payment of price escalation of ₹ 90.36 crore by the Divisions to Contractors (*Appendix 1-F*) without adhering to the direction of RCD.

2.9.4.5 Avoidable payment to Contractors

According to the work agreement, for embankment and borrow area, quoted rate of earth work shall include jungle clearance, removing grass *etc.* Scrutiny of MBs and Running Account bills of ERM of EGCS in test-checked divisions disclosed that Contractors were paid separately for jungle clearance and grass removing. This resulted in avoidable payment of ₹ 2.63 crore (*Appendix 1-G*). This was mainly attributable to incorrect inclusion of jungle clearance *etc.* in BoQ.

2.9.4.6 Pending recovery of Mobilisation advance and interest

In Chakia division, ₹ 22.40 crore were given (February-October 2010) to the Contractor as Mobilisation Advance. Subsequently, in August 2016, Mobilisation Advance was shown as nil implying that advance was recovered. However, scrutiny of records disclosed that ₹ 50 lakh was shown recovered without any supporting document and the divisional authorities failed to produce any supporting evidence for adjustment of ₹ 50 lakh. Further, against recoverable interest of ₹ 6.69 crore, only ₹ 5.43 crore was recovered till date of audit (March 2021). Thus, principal amount of ₹ 50 lakh and interest of ₹ 1.26 crore was still recoverable but the bill of the Contractor was finalised (October 2018) without making full recovery.

2.10 Project monitoring

Bihar Irrigation Rules, 2003 stipulates elaborate monitoring mechanism. Audit observed that contrary to Irrigation Rules, monitoring was deficient. Register of outlets within the jurisdiction of a section officer indicating therein name of village channels and location of outlets was not maintained by any Section Officer/Junior

¹⁴ Work not included in the BoQ shall be termed as extra item.

¹⁵ If it (item-wise and overall cost both) exceeds by 10 per cent, then one level higher in the hierarchy shall be the competent authority, if it is more than 20 per cent (item-wise and overall cost both) then Departmental approval shall be required.

¹⁶ RCD prepared (2006) Standard Bidding Document (SBD) for all the Work Departments of Bihar for work value more than ₹ five crore. Clause 10 CA/CC of SBD contained the provision of price adjustment/price neutralization which was modified by RCD in October 2013.

Engineer. Assistant Engineers did not inspect Sectional Offices. Irrigation Divisions could not ensure complete¹⁷ preparation of *sudkar*¹⁸, the Executive Engineers and Superintending Engineers did not check *sudkar* on sample basis by surprise inspection. Chief Engineers did not inspect each circle office under their respective charge once in every two years and each divisional office once in every three years. Besides, the report stating reasons thereof was also not submitted to Government. This indicated that effective monitoring was not ensured by the Department.

Also, Audit noticed that Department only monitored discharge and reach of water through canal systems. But, quantum of water discharged upto the field and the irrigation actually achieved was not monitored. Besides, history of maintenance work viz. types of work of maintenance, location, starting and finishing date of maintenance work, cost involved *etc.* was not monitored.

Deficient monitoring led to lower than contemplated irrigation intensities, financial irregularities such as double payment to the Contractor, excess and avoidable expenditure and non-recovery of advance from the Contractor *etc.* as discussed in the preceding paragraphs.

2.11 Availability of manpower

It was noticed that permanent posts of *Amin*¹⁹ and *Patrol*²⁰ were abolished (May 2005) in the Divisions. *Khatiyani* was prepared partially by the *Amin* deployed on casual basis. 75 per cent and 71 per cent posts of front line field engineers i.e. Assistant Engineer and Junior Engineer were vacant respectively as given in *Appendix 1-H*.

Shortage of manpower led to short preparation of *sudkar/khatiyani*²¹, short raising of demand as well as collection of water charges. Audit observed that revenue demand of ₹ 58.64²² crore was to be raised against reported irrigation during 2015-21. However, demand of ₹ 3.83 crore (seven per cent) only was raised. Against that, revenue collection was ₹ 1.01 crore (two per cent) only.

Besides, shortage of manpower also led to inadequate operation and maintenance of the irrigation system and lower irrigation intensity.

Department assured that action would be taken to strengthen the frontline field staff as soon as possible.

2.12 Conclusion

Due to Department's unjustified decisions, project was completed with delay of nine years and increase in cost by ₹ 429 crore. Despite project expenditure of ₹ 723 crore, against the contemplated gross irrigation to 39.80 lakh Ha, based

¹⁷ 94 per cent *sudkar* of reported irrigated land was prepared during 2015-21.

¹⁸ *Sudkar* is done for the land to which water is supplied. It is an initial register for irrigation, prepared by *Patrol*, in which approximate measurement of irrigated land, the name of owner and date of water supply is recorded.

¹⁹ An *Amin* is a technical person responsible for measurement of land.

²⁰ *Patrol* is responsible for preparation of initial register of irrigation (*sudkar*).

²¹ *Khatiyani* is an abstract of demand of water charges from farmers.

²² As per Departmental Irrigational Reporting, Revenue Demand of ₹ 58.64 crore was to be raised. The rate was ₹ 217 per Ha and ₹ 185 per Ha for Kharif and Rabi respectively. As per net water availability, revenue demand of ₹ 24.79 crore should have been raised.

on net water availability, irrigation was possible maximum to 11.85 lakh Ha (30 *per cent*) only during 2015-21. Agricultural produce, attributable to surface irrigation, was only 24 to 34 *per cent* of envisaged 45.58 lakh MT. Thus, intended benefits expected from the project were yet to accrue. This was mainly attributable to insufficient infrastructure and ineffective Participatory Irrigation Management. Through functional *pucca* field channels, only 7,180 Ha (two *per cent*) of Gandak Command Area was catered whereas *kutchha* field channels disappeared as farmers gradually subsumed them in their farms. Shortage of manpower ranged from 68 to 100 *per cent* in Gandak Command Area. Water User Association was not formed, except three in Motihari region and these too were non-functional.

2.13 Recommendations

- Department should develop command area with construction of sufficient number of *pucca* field channels duly connected with outlets and other water courses to ensure better irrigation at the field level.
- The implementation of participatory irrigation management should be ensured with formation of sufficient number of Water User Associations and providing them required infrastructure, financial means and imparting training to all stakeholders.
- Department should take necessary steps for de-siltation of canal, repairing of non-functional outlets, proper assessment of demand of water by the farmers and the water supplied to them.
- Existing control mechanism should be further strengthened to avoid double/excess/irregular payment.
- Existing process of survey and preparation of Detailed Project Report should be further improved to minimize subsequent variation in estimates.
- Department should ensure adequate deployment of manpower for preparation of vital records for raising of demands and efficient collection of revenue as well as operation and maintenance activities.

Chapter-3
Extension, Renovation
and Modernization
(ERM) of Eastern Kosi
Canal System (EKCS)

Chapter -3

Extension, Renovation and Modernization (ERM) of Eastern Kosi Canal System (EKCS)

Eastern Kosi Canal System is the largest major irrigation project of Bihar and ERM of EKCS was one of the important works carried out in Irrigation Sector during last decade. It is a diversion project through construction of a barrage on river Kosi and covers parts of Araria, Katihar, Madhepura, Purnea, Saharsa and Supaul districts. Audit scope pertained to the period 2015-21.

3.1 Project planning

The Kosi project is an international project between India and Nepal in accordance with Indo-Nepal agreement of 1954, subsequently revised in 1966. The barrage, canal headworks and head reaches of canal fall in the Nepal territory and lower reaches of canal in Indian territory. The project was finally closed in March 1985 after expenditure of ₹ 187.16 crore.

Due to heavy siltation in Kosi river, canal flow capacity of the head reaches of main canal and branch canals gradually reduced. Also, devastating flood of August 2008 in Kosi river breached the left afflux *bundh* at Kusha. The Eastern Kosi Canal System was severely damaged and it became non-functional and only 2,800 Ha of created irrigation potential was left. Accordingly, a DPR for Extension, Renovation and Modernization was submitted (June 2009) to CWC for approval which was finalised (August 2009) by CWC for ₹ 750.75 crore and the then Planning Commission accorded (October 2009) investment clearance.

Expected outcome of the project was to make water available with discharge capacity of 15,000 Cusec for irrigation to 6.12 lakh Ha. Irrigation intensity of 120 *per cent* was contemplated. This would actually provide irrigation to 7.344 lakh Ha. Besides, annual agriculture produce of 25.739 lakh MT was envisaged.

Audit findings

Audit findings relating to outcomes of surface irrigation of EKCS project have been discussed under the following categories:

3.2 Irrigation potential utilisation

(A) At the rate of the contemplated irrigation intensity of 120²³ *per cent* CCA of 6.12 Lakh Ha, gross irrigated area was proposed to be 7.35²⁴ lakh Ha every year which included irrigation for *Kharif* in 3.923 lakh Ha (64 *per cent* of CCA), *Rabi* 1.992 lakh Ha (32.50 *per cent* of CCA), Hot weather 1.348 lakh Ha (22 *per cent* of CCA) and Annual crops in 0.092 lakh Ha (1.50 *per cent* of CCA). This indicated that GoB planned for providing lesser irrigation facility to *Rabi* and other crops *vis-à-vis* *Kharif* crops. In Bihar, generally rainwater is available in *Kharif* season due to South-West monsoon, whereas there is lesser rainfall in *Rabi* season indicating higher requirement of irrigation facility to *Rabi* crops. No reason for such exclusion was found on record.

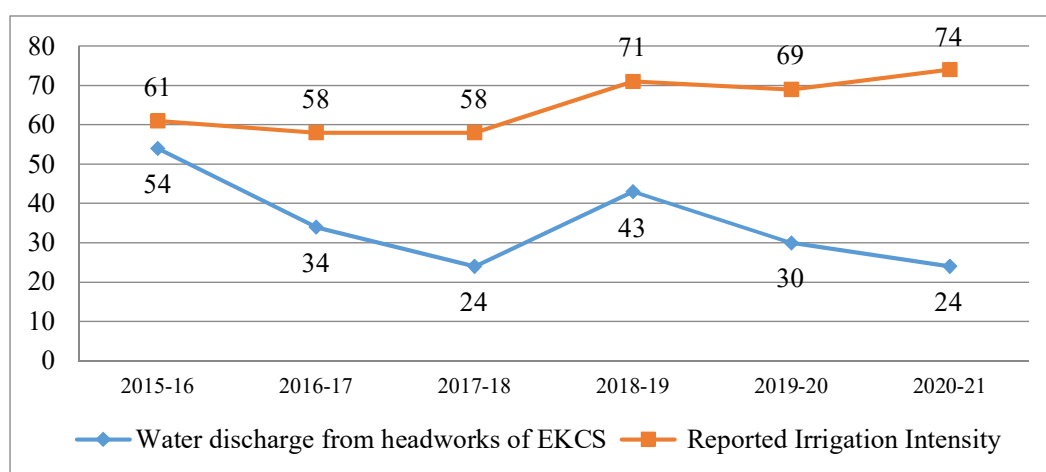
²³ *Kharif: 64 per cent; Rabi: 32.50 per cent; Hot weather: 22 per cent and Annual crops: 1.5 per cent.*

²⁴ $6.12 \times 1.2 = 7.344$, taken as 7.35 in Investment Clearance Report.

(B) Further, CCA of EKCS was corrected and revised from 6.12 lakh Ha to 5.95 lakh Ha and was reported as completely developed by the Department. At the proposed level of irrigation intensity (*i.e.* 120 *per cent*) and gross irrigated area (*i.e.* 7.14²⁵ lakh Ha per year), during evaluation period of 2015-21, 42.82 lakh Ha area should have been irrigated. According to Department's reports, during this period, gross irrigated area was 29.91 lakh Ha (70 *per cent*) only, ranging from 48 to 85 *per cent*.

Discharge of water from headworks was the only source of water in canal system for surface irrigation. Though water discharge during *Kharif* season (2015-21) from headworks decreased, but reported irrigation intensity increased, as shown in the **Chart 3.1** below.

Chart 3.1: Trend of comparison between water discharge[#] and Irrigation reporting for EKCS during *Kharif* 2015-21



(Source: Water Resources Department)

Percentage of water discharge against designed discharge

Thus, reported irrigation achievement was not in conformity with water discharge during 2015-21 which indicated incorrect reporting of irrigation achievement.

Further scrutiny disclosed that according to net availability and duty of water (*i.e.* relationship between the volume of water and the area of crop it matures) decided by the Department, irrigation was possible maximum in 6.38 lakh Ha and 1.77 lakh Ha for *Kharif* and *Rabi* respectively (**Table 3.1**). No irrigation was provided for hot weather and annual crops. Thus, against the claim of irrigation potential utilisation of 29.91 lakh Ha (70 *per cent*) by the Department, irrigation was possible maximum for 8.16 lakh Ha (19 *per cent*) only, ranging from 19 to 43 *per cent* and five to 20 *per cent* of contemplated irrigation for *Kharif* and *Rabi* respectively during 2015-21 as shown in **Table 3.1** below.

²⁵ $5.95 \times 1.2 = 7.14$.

Table 3.1: Achievement of Irrigation intensity

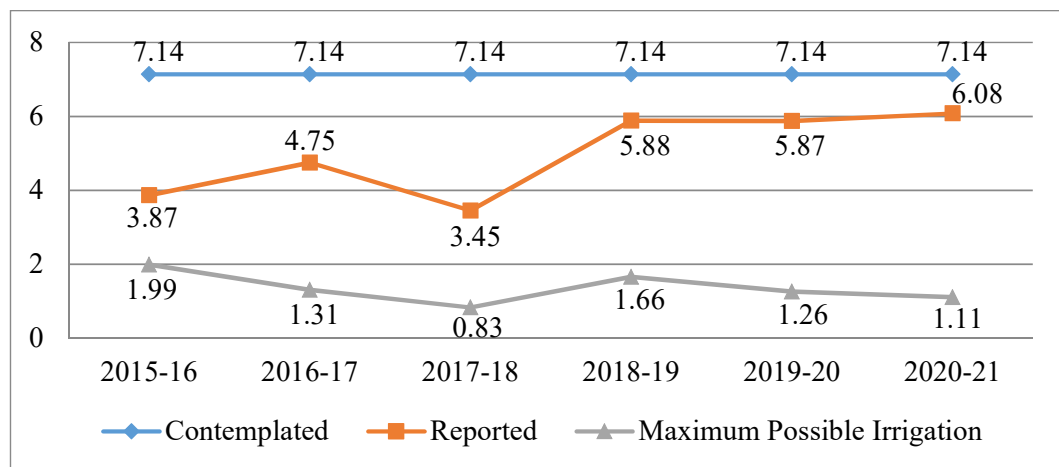
Sl. No.	Year	Contemplated irrigation in CCA of 5,94,730 Ha at the proposed intensity rate				Average net water availability [#] (in Cusec)		Maximum irrigation possible (Ha) based on net water availability @ 40 Ha per Cusec @ (percentage irrigation in comparison to contemplated irrigation)		
		Kharif @ 64 per cent	Rabi @ 32.50 per cent	Others @ 23.50 per cent	Total (c+d+e)	Kharif	Rabi	Kharif (g x 40)	Rabi (h x 40)	Total (i + j)
<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	<i>k</i>
1	2015-16	3,80,627	1,93,287	1,39,762	7,13,676	4,109	872	1,64,360 (43)	34,880 (18)	1,99,240 (28)
2	2016-17	3,80,627	1,93,287	1,39,762	7,13,676	2,624	653	1,04,960 (28)	26,120 (14)	1,31,080 (18)
3	2017-18	3,80,627	1,93,287	1,39,762	7,13,676	1,846	226	73,840 (19)	9,040 (5)	82,880 (12)
4	2018-19	3,80,627	1,93,287	1,39,762	7,13,676	3,267	872	1,30,680 (34)	34,880 (18)	1,65,560 (23)
5	2019-20	3,80,627	1,93,287	1,39,762	7,13,676	2,298	857	91,920 (24)	34,280 (18)	1,26,200 (18)
6	2020-21	3,80,627	1,93,287	1,39,762	7,13,676	1,816	955	72,640 (19)	38,200 (20)	1,10,840 (16)
	Total	22,83,762	11,59,722	8,38,572	42,82,056	15,960	4,435	6,38,400 (28)	1,77,400 (15)	8,15,800 (19)

(Source: Water Resources Department)

Net availability of water has been calculated after taking into account, project irrigation efficiency (Kharif-51 per cent and Rabi-39 per cent) as mentioned in DPR/CWC guidelines.

@ Duty of water is relationship between the volume of water and the area of crop it matures. Duty of water fixed by the Department for Kharif and Rabi irrigation was 40 Ha per Cusec.

A comparison of contemplated, reported and maximum possible irrigation during 2015-21 is shown in **Chart 3.2** below.

Chart 3.2: Comparison of contemplated, reported and maximum possible irrigation during 2015-21 (lakh Ha)

Lower irrigation being provided was also indicated during the beneficiary survey as only 19 per cent farmers stated that they got required water to their farm land. Low water discharge and water availability at the field level was mainly due to non-operational field channels and outlets, siltation, breaches in canals, ineffective

Participatory Irrigation management *etc.* Water indent was sent to the upstream canal division or Headworks Division without proper assessment of crop water requirement for irrigation. The concerned Division intimated that the indent was sent on the basis of farmers' demand, however, no record or document was made available to justify the basis.

Department replied that instruction had been given to Chief Engineer, Irrigation Creation²⁶, Saharsa to provide a report in this regard. However, the Department countered the audit observation on unrealistic reported irrigation achievement and stated that rain water is also an important source of irrigation in this area. That was the reason to show irrigation achieved despite decreasing canal water. Reply of the Department was not accompanied by any documentary evidence and it was contrary to the earlier reply (March 2021) given by Chief Engineer in which low irrigation was attributed to heavy siltation in canal bed, non-development of field channels *etc.*, hence not tenable. The Department had observed (July 2018) that despite water availability in Kosi river, there was less water discharge in canal than its capacity during drought period. Moreover, water indent was sent to the upstream canal division or headworks division without proper assessment of crop water requirement for irrigation.

3.3 Command Area Development

In light of provision discussed in *paragraph 2.3 ante*, Audit observed that an MoU was signed (December 2010) between the Ministry of Water Resources, GoI and GoB for Kosi Command Area Development for the period 2010-16. The MoU set the annual physical and financial targets for 11²⁷ activities (excluding Establishment). Out of the 11 activities, only two (*i.e.* Evaluation study and construction of field channel) were carried out. Funds for remaining activities were not made available by the Department to Kosi Command Area Development Authority. Against the target of 10 evaluation studies for EKCS, only one evaluation study was carried out for 2015-16.

Besides, field channels were also constructed. The details of target and achievement of construction of field channels under EKCS are as shown in **Table 3.2** below.

Table 3.2: Details of Field Channels developed in Command Area of EKCS
(Area in Ha)

Command Area to be developed	Command Area developed out of 5.95 lakh Ha through field channels (March 2015)			Command Area developed out of 5.95 lakh Ha through field channels (March 2021)		
	Kutcha	Pucca	Total	Kutcha	Pucca	Total (percentage against total Command Area)
	(percentage of developed Command Area upto 2014-15 i.e. 4,29,782)			(percentage of developed Command Area upto 2020-21 i.e. 4,41,417)		
5,94,730	3,45,699 (80)	84,083 (20)	4,29,782	3,45,699 (78)	95,718 (22)	4,41,417 (74)

(Source: Water Resources Department)

²⁶ In June 2016, Office of the Chief Engineer, Birpur and the Chief Engineer, Purnea were merged and a new Office of the Chief Engineer, Irrigation Creation, Saharsa was created.

²⁷ (i) Survey, Planning Design; (ii) Field Channel; (iii) Field, Intermediate and link Drains; (iv) Warabandi; (v) Correction of System Deficiency; (vi) Adaptive Trials; (vii) Training; (viii) Demonstration; (ix) Reclamation of Wetland; (x) Evaluation Study; (xi) Farmers' Participation.

Audit observed that during 2015-21, only about two *per cent* of additional command area was developed. 74 *per cent* of Kosi command area was developed (March 2021) through construction of *kutcha* and *pucca* field channels. 78 *per cent* of total developed field channels were *kutcha*. Land acquisition was not required for construction of field channels. Therefore, these were constructed on the farmers' land. As a result, *kutcha* field channels disappeared, as farmers gradually subsumed the drains in the farm. This was also confirmed during joint physical verification (January to March 2021). Further, *pucca* field channels were 22 *per cent* only. However, these *pucca* field channels were functional for only 11,635 Ha (three *per cent* of developed CCA) of Kosi Command Area.

Water User Association (WUA) was not formed. Besides, it was also noted that no funds were provided to the Kosi Command Area Development Authority (KCADA) since 2018-19 for works as CADA Act was abolished (September 2018) and the existing offices were renamed as Kosi Command Area Development Circle and were merged with Water and Land Management Institute (WALMI) under WRD for further activities. No funds as well as work including construction or maintenance of the field channels was allotted to the Kosi Command Area Development Circle/ Division from Central as well as State Plan since last three years.

Further, there was acute shortage (March 2021) of field staff (ranging between 75 and 100 *per cent*) in Kosi Command Area Development Circle. Shortage of manpower led to inadequate functioning and operation and maintenance of irrigation system.

Department replied (April 2022) that some field channels were in working condition while some need proper maintenance.

3.4 Capacity deficiencies of canal system

3.4.1 Non-functional outlets

Joint physical verification of 259 outlets (January to March 2021), which ensures irrigation to fields at the micro level, were carried out and only 50 *per cent* of them were found functional in EKCS. This indicated poor maintenance of irrigation projects leading to lower irrigation intensities.

Department replied that some outlets were choked due to heavy siltation in existing village channels. To carry out the de-siltation work of such field channels, no objection certificate (NOC) had been given to the concerned authorities on their request for de-siltation.

3.4.2 Decrease in water discharge capacity

(i) Audit observed that designed discharge capacity of EKCS was 15,000 Cusec. However, average water discharge during *Kharif* season was 5,215 Cusec (35 *per cent*) only during 2015-21. Lower discharge than designed water discharge capacity was due to siltation and damaged/defunct structures *viz.* cross drainage, head regulator, cross regulator and grasses and bushes in canal bed *etc.* Further, Audit also noted that some parts of canal were non-operational due to heavy siltation, unavailability of CD at all the required places, encroachment, breaches of embankment *etc.* The same was also confirmed during joint physical verification, details are given in [Appendix 2-A and 2-B](#).

Non-operational part of canals affected irrigation capacity as well as project outcomes.



The above facts were accepted (April 2022) by the Department except in case of decrease in water discharge capacity at Irrigation Division, Banmankhi and Katihar and non-operational part of canal at Irrigation Division, Narpatganj. However, the facts were noticed during joint physical verification with concerned field level engineers and found that these parts were not functional.

(ii) It was further observed that CWC advised (September 2009) for selective lining in EKCS, however no lining work could be taken up by the project authorities due to unavailability of fund and proper direction of Department in this regard.

3.5 Maintenance of irrigation project

In light of provision discussed in *paragraph 2.5 ante*, the requirement of funds, allotment and expenditure pertaining to operation and maintenance for 2016-21 are given in **Table 3.3** below.

Table 3.3: Year-wise allotment and expenditure for operation and maintenance

Year	Area of Irrigation Potential (in Ha) as reported by the Department		Rate of maintenance of Irrigation Potential (in ₹/Ha)		Requirement of funds (₹ in lakh)	Allotment (₹ in lakh) (percentage of requirement)	Expenditure (₹ in lakh)
	Utilised	Unutilised	Utilised	Unutilised			
2016-17	4,75,267	2,38,409	982	328	5,449	556.82 (10)	552.84
2017-18	3,44,808	3,68,868	1,032	345	4,831	845.00 (17)	797.03
2018-19	5,87,898	1,25,778	1,083	362	6,822	883.82 (13)	847.14
2019-20	5,86,994	1,26,682	1,137	380	7,156	915.86 (13)	739.11
2020-21	6,08,286	1,05,390	1,194	399	7,683	589.82 (8)	581.56

(Source: Water Resources Department)

Implementing units (*i.e.* Irrigation Divisions) got only eight to 17 per cent of the required funds for operation and maintenance during 2016-21. There was nothing on record to exhibit that action plan for operation and maintenance and commensurate budget requirement was prepared and submitted to controlling officer. Implementing units informed that operation and maintenance plan was being prepared as per the

²⁸ It is used to raise water level in the parent channel to divert water through an off take channel.

availability of funds and priority of maintenance work. This resulted in deficient capacity of irrigation system as discussed in preceding paragraph.

No specific reply was provided by the Department.

3.6 Non-achievement of envisaged agricultural benefits

Audit noted that post-project yield increased in the area covered by the project. However, this was not mainly attributable to surface irrigation. The use of private tubewells was main reason for increase in yield in the project command area. During beneficiary survey, it was found that 81 *per cent* farmers were dependent on other sources of irrigation including use of private tubewells.

Post-project agricultural produce was worked out by the audit for the period 2015-21 on the basis of maximum possible irrigated land based on net water availability and yield envisaged in the respective DPR against contemplated irrigation. Details are given in [Appendix 2-C](#).

Agriculture production attributable to surface irrigation ranged between 11 and 27 *per cent* only during 2015-21.

Department stated that Chief Engineer (CE), Irrigation Creation, Saharsa had been instructed (March 2022) to provide report in this regard. However, the CE, Saharsa had stated (March 2021) that achievement of benefits as envisaged in DPR was not possible due to heavy and regular siltation in canal bed, flood in this area every year, shortage of field staff and not developing of field channel by CADA *etc.*

3.7 Inadequate supply of water to Hydel Project

Kataiya Hydel Power station²⁹ has four units with installed capacity of 4.8 MW each. Each unit needs 3,700 Cusec of water for its optimum production capacity. Thus, for optimum production of power in all the four units, on an average, 14,800 Cusec of water per day was required. Audit observed that during 2015-21, daily water discharge at the Head of canal was mere 3,560 (24 *per cent*) to 8,056 (56 *per cent*) Cusec in *Kharif* season and 580 (four *per cent*) to 2,449 (15 *per cent*) Cusec in *Rabi* season, significantly lower than the optimal requirement. At the given discharge, not more than two units can run in *Kharif* season, that too on selected days when discharge crosses the threshold level and no unit can run in *Rabi* season. The Hydel Power authorities also confirmed that due to short water discharge, intended power could not be generated.

Department stated (April 2022) that instruction has been given (March 2022) to Chief Engineer (CE), Irrigation Creation, Saharsa to provide report in this regard. However, CE, Saharsa had already replied (March 2021) to audit during field visit that due to heavy siltation and non-strengthening of canal bank, discharge of water was not possible as per designed discharge.

3.8 Off-farm development

Command Area Development (CAD) comprises off-farm work such as marketing centres, roads for communication, financial institution, cold storages, supply

²⁹ It is situated at 12 RD of Eastern Kosi Main Canal System.

centres for agricultural inputs like seeds, fertilizers, pesticides, agricultural extension services *etc.* Audit noticed that neither any plan was prepared nor any work was executed regarding off-farm development by the Kosi Command Area Development Authority/Kosi Command Area Development Circle. This indicated that CAD authority failed to provide the facility to the farmers to increase their agriculture produce as well as to provide the facility of agricultural marketing to improve their socio-economic condition.

3.9 Deficient formulation of Benefit-Cost Ratio

According to approval of CWC, the annual additional benefits of the project were of ₹ 771 crore. However, CWC clarified that the benefits computed (₹ 771 crore) were subject to approval of the existing and proposed cropping pattern by the State Agriculture Department. However, no copy of the document was available either at division office or at zonal office on the matter. On being asked for the copy of existing and proposed cropping pattern in the light of CWC approval quoted above, CE, Irrigation Creation, Saharsa stated (December 2021) that reports have been called for from the respective District Agriculture Offices. This indicated that the approval of the State Agriculture Department was not obtained about existing and proposed cropping pattern. Thus, Benefit-Cost ratio of project submitted as 6:1 by GoB to CWC was without necessary approval of State Agriculture Department.

Specific reply was not provided by the Department.

3.10 Project execution

Timely, efficient and economical execution of any project work is a pre-requisite for achievement of intended objectives of the project. During Audit, following discrepancies were observed in the execution of the Project:

3.10.1 Inaccurate survey

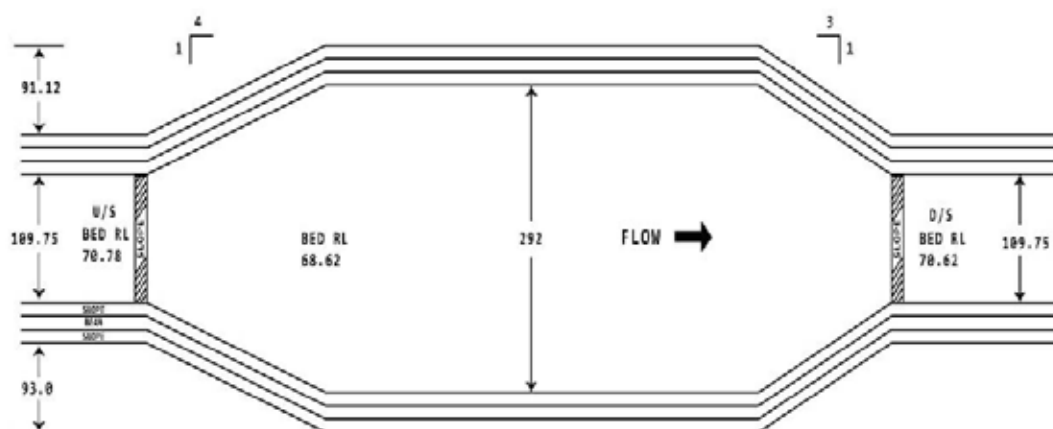
Scrutiny of estimate/BoQ and actual execution (MB) disclosed that the item-wise variation ranged from non-execution of a particular item of work to 12,296 *per cent*. Though, the variations were approved by the competent authority, it indicated that the original estimate was not prepared as per the site condition and after proper survey. Besides, it also contributed to time overrun.

Department stated that instruction had been given (March 2022) to Chief Engineer, Irrigation Creation, Saharsa to provide report in this regard. However, the CE, Saharsa had replied (March 2021) that as per requirement, there were variations in quantities which had been sanctioned by the competent authority. The reply of the CE was in conformity with the audit observation.

3.10.2 Deficient capacity of settling basin led to large quantity of silt deposition in canal system

(A) In Irrigation Division, Birpur, the construction of settling basin in Eastern Kosi Main Canal system (EKMCS) was aimed to trap major chunk of in flowing silt in it, so that the de-silted water released from settling basin can be utilised for irrigation and generation of power.

Chief Engineer, Central Design Organisation (WRD) approved (May 2010) design of settling basin with estimation of 10,000 cubic metre (cum) volume of silt deposit per day (12 lakh cum for *Kharif* period *i.e.* 120 days). Also, Central Water and Power Research Station (CWPRS), Pune reported (November 2010) flow of silt at the rate of 2.2 gm/l during *Kharif* and 0.25 gm/l during *Rabi* season (altogether 29.96 lakh cum annually). Contrary to aforesaid estimation and approval, Audit observed that the settling basin was constructed to accommodate silt to the volume of only 7.7 lakh cum per year.



Plan of settling basin on EKMCS

The settling basin was constructed at the cost of ₹ 68.53 crore in the EKMCS, up to two metre deep below the Canal Bed Level (CBL), to trap the silt coming from Kosi river in the EKMCS to provide silt-free water to the Hydel power project and the irrigable fields. For dredging of silt from the settling basin of the EKMCS, an agreement was executed (September 2015) with a Contractor, having 7.70 lakh cum quantity of work per year (as in approved BoQ and Technical Sanction) for five years. Work was to be completed by 15th June of every year *i.e.* before commencement of *Kharif* season.

Audit observed that before commencement of work, pre-level was recorded (December 2015) and quantity of silt was 18.59 lakh cum which meant that above the CBL, volume of silt was 10.88 lakh cum and 7.70 lakh cum of silt was in the settling basin *i.e.* up to two metre. Thus, as per the pre-level recorded, significant change in the scope of work was required to achieve the objective of the work. But, direction regarding enhanced scope of the work after pre-level was neither issued by the competent authority nor sought by the Contractor and work was started in February 2016. Though the Contractor was to remove silt of 7.70 lakh cum from settling basin, he actually removed only 7.70 lakh cum silt lying above the level of settling basin leaving 10.88 lakh cum of silt in and above settling basin (7.70 lakh cum in settling basin and 3.18 lakh cum above settling basin). The work was foreclosed in April 2017 without assigning any specific reason. As per the last measurement, the final bill was passed (January 2018) making gross payment of ₹ 11.38 crore to the Contractor, without achieving the intended objective.

Further, during post-*Kharif* season 2017 (post October 2017), an estimate was prepared for desiltation through mechanical means and dredging of silt through

dredger from escape channel and settling basin and upstream/downstream canal of settling basin (0-12 RD³⁰) situated in Eastern Kosi Main Canal. Thereafter, Technical Sanction was accorded (August 2017) for ₹ 104.92 crore and another Contractor was engaged (February 2018) for dredging of the silt deposited in the EKMCS from 0 RD to 12 RD including the settling basin. Before commencement of work as per the condition of agreement, pre-level was taken (June 2018) and as per the measurement, the quantity of silt was 22.00 lakh cum. Though the Contractor was to do Capital dredging³¹ in the first year to remove silt of 7.70 lakh cum lying in settling basin, he removed silt of 9.80 lakh cum only lying above and beyond the settling basin through mechanical means only. Thus, the entire silt could not be removed by the Contractor till the beginning of *Kharif* 2018 (June 2018). As a result, expenditure of ₹ 11.01 crore did not serve the intended purpose.

Also, liquidated damages (for delayed/non-execution of work) of three crore leviable was not levied by Irrigation Division, thus extending undue benefit to the Contractor.

Thus, settling basin was not constructed as per required design which led to large quantity of silt accumulation at settling basin in EKMCS which was also confirmed during joint physical verification (January to March 2021) wherein it was found that there was 51.82 lakh cum silt in four³² branch canals.

Audit also observed that the required land for settling basin was not acquired, though its provision was made in DPR. This affected the design capacity of settling basin and division had to compromise 3.45 *per cent* area of original capacity of settling basin.

Department replied (April 2022) that the work was carried out as per the changed drawing as communicated (June 2012) by the Department and Chief Engineer, Central Design & Research, Patna. Reply was not acceptable as settling basin was constructed to accommodate silt to the volume of 7.7 lakh cum only against estimated silt deposition of 29.96 lakh cum annually.

(B) Comparison of the aforesaid two agreements (September 2015 and February 2018) disclosed that during post-*Kharif* season 2018 (post October 2018), for same scope of work (capital dredging of silt of 7.70 lakh cum from settling basin), agreement (February 2018) at higher rate of ₹ 250/cum was executed by closing (April 2017) the first agreement (September 2015), without assigning any specific reason. The first agreement was valid for five years *i.e.* up to 2019-20 and was at the lower rate of ₹ 140/cum. Thus, avoidable expenditure of ₹ 8.37 crore³³ was incurred for execution of dredging work during post-*Kharif* season 2018.

Department did not furnish specific reply.

³⁰ RD is an acronym for reduced distance. It is the reduced distance from the head of any channel. The head of channel is 0 RD and 1 RD is equivalent to distance of 1000 feet downstream from it.

³¹ Capital dredging is excavation of silt through dredger during first year of contract period.

³² Araria branch canal (15.78 lakh cum), Purnea branch canal (11.34 lakh cum), Murliganj branch canal (20.88 lakh cum), Rajpur branch canal (3.81 lakh cum).

³³ Avoidable expenditure = (250-140) × quantity of work executed = (250-140) × 7,61,267.12 = ₹ 8.37 crore.

(C) Audit also observed that as per BoQ, the rate of dredging of silt from settling basin was ₹ 200/m³ including service tax @ 14.50 per cent. Further, the tender was floated on item rate basis and the successful bidder quoted the rate of ₹ 250/m³ including service tax. The work was awarded (February 2018) on the quoted rate and payment was made accordingly for dredging of 7.61 lakh cubic metre silt. Thus, service tax of at least ₹ 25.33/m³ (175×14.5 per cent) was included in the rate of ₹ 250/m³ paid for the dredging work performed during post-Kharif season 2018 (post October 2018). However, service tax was abolished since 1 July 2017 and therefore payment including service tax to Contractor was undue favour of ₹ 1.93 crore to the Contractor, as he/she did not have to pay service tax after its abolition.

Department replied (April 2022) that service tax @ 14.5 per cent had not been mentioned in the NIT/ agreement. The reply of the Department was not tenable as the rate for dredging of silt included service tax and was part of the agreement.

(D) Audit also noticed that a committee was constituted (February 2016) by the Department under the chairmanship of Engineer-in-Chief (North), WRD, Bihar for disposal of silt as a long term management measure. Terms of Reference of the committee was to prepare a report regarding use of silt as agriculture/commercial/ other use, selection of low land or other suitable places for disposal of silt and other points relating to the subject matter. The committee was to submit its report within three months. However, neither the committee submitted its report nor any further action was taken at Department level for long term management of the silt taken out from settling basin/ canal system.

Department stated (April 2022) that instruction had been given (March 2022) to Chief Engineer, Irrigation Creation, Saharsa to provide report in this regard. However, the CE, Saharsa informed (January 2022) that no report had been submitted by the Committee.

Thus, deficient planning for execution of settling basin as well as de-siltation did not serve the intended purpose even after incurring expenditure of ₹ 90.92 crore (construction of settling basin ₹ 68.53 crore and de-siltation work ₹ 22.39 crore).

3.10.3 Execution of work of escape channel without land acquisition

Resolution (July 1986) of Cabinet Secretariat and Co-ordination Department, *inter alia*, stipulated that tender disposal should be processed only after land acquisition, wherever required, to avoid delays and litigation at later stages.

(A) In Irrigation Division, Bathnaha (a part of ERM of Eastern Kosi canal System), end point of escape channel was about half Km away from *Fariyani* river and a proposal to connect the escape channel with river was mooted. It required land acquisition of six acres. The purpose of escape channel was to drain out extra water from canal to river. Audit observed (June 2020) that though the work was completed, escape channel was constructed on private land without acquiring the land. Thus, execution of work without land acquisition rendered the expenditure of ₹ 6.40 crore vulnerable to litigation and may become infructuous.

Department replied that the said work had been completed without land acquisition.

(B) In Eastern Kosi Canal System project, for construction of Escape Channel (Saharsa Sub-branch Canal) and Drainage (Supaul Sub-branch Canal), 24.07 Ha land was to be acquired. An amount of ₹ 9.06 crore (up to September 2014) was provided to Special Land Acquisition Officer (SLAO), Saharsa to acquire the land. However, the land could not be acquired as required information was not provided to SLAO by the Irrigation Division, Saharsa. Subsequently, WRD decided (December 2016) to postpone the construction of escape channel and drainage and ₹ 9.06 crore were refunded (November 2017) by SLAO to the Irrigation Division, Saharsa. However, by then, earth work of ₹ 25.66 lakh was carried out on available land and payment was made to the Contractor. Thus, commencement of work without ensuring the availability of land resulted in unfruitful expenditure of ₹ 25.66 lakh.

Chief Engineer, Saharsa replied (March 2021) that the work was started in anticipation of land acquisition. Later on, it was decided at department level to withdraw the provision of escape channel as land was not acquired due to administrative reason. The reply was not tenable as work should have been executed only after ensuring the availability of land.

3.10.4 Time overrun from 2012 to 2020

The Administrative Approval for the project was accorded by GoB in October 2009 for ₹ 750.75 crore and the project was scheduled to be completed by March 2012. The ERM work of EKCS was executed under two Chief Engineer zones *i.e.* Chief Engineer, Purnea and Chief Engineer, Birpur zone. Agreements were executed for the work relating to both the zones in March 2010 with due date of completion as March 2012 with two different Contractors. The project, however, could not be completed in scheduled time due to enhancement in item of quantities in both the zones. The project was completed in March 2020 with an expenditure of ₹ 763.78 crore *i.e.* approximately eight years after the scheduled date of completion.

Specific reply was not provided by the Department.

3.10.5 Financial irregularities

Financial irregularities relating to project execution are discussed in subsequent paragraphs:

3.10.5.1 Construction of structure on damaged distributary led to unfruitful expenditure

In Araria division, *Mahishakol* distributary was severely damaged³⁴ and became non-functional. Therefore, expenditure of ₹ 5.25 crore on CD work³⁵ and earthwork³⁶ on the damaged portion remained unfruitful.

Department replied that *Mahishakol* distributary was rendered non-functional after 2019. Permanent solution was construction of embankment on the river *Parman* flowing nearby. Reply corroborated audit observation.

3.10.5.2 Payment to Contractor towards price escalation

According to Clause 10 CC of the Model SBD (Standard Bidding Document), price adjustment shall apply for the work done from the start date given in the contract

³⁴ RD 24.00 to RD 65.50.

³⁵ RD 40.00, RD 51.00.

³⁶ RD 26.00 to RD 64.55.

data up to end of the initial intended completion date or extensions granted by the Engineer. Contrary to this provision, in Eastern Kosi Canal System, agreement between the Executive Engineer, Birpur and the IVRCL (Contractor) did not include provision of price adjustment for the extension period (*i.e.* period beyond 31 March 2012) granted by the Engineer.

Further, according to direction of Chief Engineer (October 2013), price escalation was to be calculated as per actual component-wise consumption. Audit observed that component-wise percentage was not mentioned in the Contract data (Schedule-F) and in its absence, the price escalation was actually given according to the example given in the agreement rather than the actual. Departmental tender committee (July 2017) restricted payment of price escalation as per the price index of initial intended completion date (*i.e.* March 2012) only. Also, Chief Engineer approved (April 2018) the actual percentage of all the components of materials and directed to recover the excess payment made to the Contractor on account of price escalation. Against the excess payment of ₹ 20.86 crore, only ₹ 12.06 crore could be recovered and the remaining amount of ₹ 8.8 crore could not be recovered due to premature refund of security deposit of ₹ 17.82 crore (September 2017) to the Contractor. Further, money suit was filed to recover dues from the Contractor as per the final bill. However, Audit noted short inclusion of ₹ 4.41 crore in the final bill as well and money suit.

Department replied that money suit (February 2019) had been filed. However, the reply is silent on pre-mature release of security deposit and short inclusion of ₹ 4.41 crore in the money suit.

3.11 Project monitoring

In light of provision discussed in *paragraph 2.10 ante*, Audit observed that Irrigation Divisions could not ensure complete³⁷ preparation of *sudkar*, the Executive Engineers and Superintending Engineers did not check *sudkar* on sample basis by surprise inspection. Chief Engineers did not inspect each circle office under their respective charge once in every two years, and each divisional office once in every three years. Besides, report stating reasons thereof was also not submitted to the Government. This indicated that effective monitoring was not ensured by the Department.

Also, Audit noticed that Department only monitored discharge and reach of water through canal systems. However, quantum of water discharged up to the field and the irrigation actually achieved was not monitored. Besides, history of maintenance work *viz.* types of work of maintenance, location, starting and finishing date of maintenance work, cost involved *etc.* was not monitored.

Deficient monitoring led to lower than contemplated irrigation intensities, improper assessment of actual irrigation in fields, non-formulation of long term management plan for disposal of silt, financial irregularities such as unfruitful expenditure, non-recovery of interest on mobilisation advance *etc.* as already discussed in preceding paragraphs.

³⁷ 23 per cent *sudkar* of reported irrigated land was prepared during 2016-21.

3.12 Availability of manpower

Audit noticed that in June 2016, restructuring of the Department was done and only 39³⁸ posts of revenue staff were sanctioned only in three Irrigation Divisions out of 10 under the jurisdiction of EKCS. Out of 39 sanctioned posts, no employee was posted. This indicated that insufficient numbers of posts of revenue staff were sanctioned and posted among the 10 divisions of EKCS. *Khatiyani* was prepared partially by the *Amin* deployed on casual basis.

Shortage of revenue staff led to short preparation of *sudkar/khatiyani*, short raising of demand as well as collection of water charges. Audit observed that revenue demand of ₹ 50.11³⁹ crore was to be raised against reported irrigation during 2015-20. However, demand of ₹ 1.22 crore (two *per cent*) only was raised and collection of revenue was only ₹ 0.72 crore (one *per cent*).

Besides revenue staff, 83 *per cent* and 46 *per cent* posts of front line field engineers *i.e.* Assistant Engineer and Junior Engineer were also vacant as given in **Appendix 2-D**.

Shortage of manpower led to inadequate operation and maintenance of the system and this resulted into low achievement of irrigation intensities.

Department replied (April 2022) that 22 Assistant Engineers have recently been posted for this scheme to cater to the manpower requirement.

3.13 Conclusion

Despite project expenditure of ₹ 764 crore, against the contemplated gross irrigation to 42.82 lakh Ha, based on net water availability, irrigation was possible maximum to 8.16 lakh Ha (19 *per cent*) only. Agricultural produce, attributable to surface irrigation, was only 11 to 27 *per cent* of envisaged 25.74 lakh MT. Thus, intended benefits expected from the project were yet to accrue. This was mainly attributable to insufficient infrastructure and ineffective Participatory Irrigation Management. Through functional *pucca* field channels, only 11,635 Ha (three *per cent*) of Kosi command area was catered, whereas *kutcha* field channels disappeared as farmers gradually subsumed them in their farms. Shortage of manpower ranged between 75 and 100 *per cent* in Kosi Command Area. Water User Associations were not formed at all.

3.14 Recommendations

- Department should develop command area with construction of sufficient number of *pucca* field channels duly connected with outlets and other water courses to ensure better irrigation at the field level.
- The implementation of Participatory Irrigation Management should be ensured with formation of sufficient number of Water User Associations and providing them required infrastructure, financial means and imparting training to all stakeholders.

³⁸ One Revenue Inspector; seven *Amin*, 20 *Patrol* and 11 *Mohrir*.

³⁹ As per Departmental Irrigational Reporting, Revenue Demand of ₹ 50.11 crore was to be raised. The rate was ₹ 217 *per Ha* and ₹ 185 *per Ha* for *Kharif* and *Rabi* respectively. As per net water availability, revenue demand of ₹ 14.85 crore should have been raised.

- Department should take necessary steps for de-siltation of canal, repairing of non-functional outlets, lining of canals, proper assessment of demand of water by the farmers and the water supplied to them.
- Department may ensure due diligence while computing Benefit-Cost ratio of projects which should be based on realistic assumptions.
- Existing control mechanism should be further strengthened to avoid excess/irregular payment.
- Existing process of survey and preparation of Detailed Project Report should be further improved to minimize subsequent variation in estimates.
- Department should ensure adequate deployment of manpower for preparation of vital records for raising of demands and efficient collection of revenue as well as operation and maintenance activities.

Chapter-4
Extension, Renovation
and Modernization
(ERM) of Uderasthan
Barrage Scheme

Chapter -4

Extension, Renovation and Modernization (ERM) of Uderasthan Barrage Scheme

Uderasthan barrage has been constructed on *Falgu* river, which is non-perennial and is providing irrigation facility to the parts of three districts (Gaya, Jehanabad and Nalanda) of South Bihar. Audit scope pertained to the period 2017-21.

4.1 Project planning

Uderasthan weir⁴⁰ was constructed in 1967 on *Falgu* river. In 1988-89, a portion of the weir was damaged and against envisaged irrigation to 24,000 Ha *Kharif* and 18,000 Ha *Rabi*, it was providing irrigation to 15,000 Ha of *Kharif* area only. Therefore, WRD proposed (2006) for modernization of the Uderasthan Weir and its canals by replacing the existing weir with a barrage.

Expected discharge capacity of the Main Canal was 1,100 Cusec. Expected outcome of the project was to make water available for irrigation to 41,052 Ha. Irrigation intensity of 100 *per cent* for *Kharif* only was contemplated and agriculture production of 1.73 lakh MT (*Kharif*) was envisaged.

4.1.1 Deficiencies in preparation of DPR

(A) As per CWC Guidelines for preparation of DPR (2010), environmental clearance is required if the project cost is more than ₹ 50 crore.

Audit observed that environmental clearance was not obtained, although estimated cost of the project was more than ₹ 50 crore.

Audit further noted that water was not let out in the downstream of the Barrage during 2017-18 and 2018-19 for 51 and 61 days respectively during *Kharif* season (120 days) which might have impacted the ecology and environment of downstream areas. This is a matter of greater concern in light of the fact that *Falgu* is a non-perennial river. However, this was ignored as environmental clearance was not obtained.

Department stated that forest and environment clearance was obtained for Uderasthan barrage scheme from Divisional Forest Officer (DFO), Gaya (November 2011). During 2017-18 and 2018-19, water was not let out for a few days in the downstream due to shortage of water in the river. The water that let out in the downstream remained stored in *pyne*, *ahar*⁴¹ and the pits of river due to which sufficient water remains for preservation of ecology and environment.

Reply is not tenable since DFO, Gaya has accorded only forest clearance and not environment clearance. Moreover, insufficient discharge of water to the downstream may not be sufficient for ecology and environment.

(B) During scrutiny of records, it was observed that tender was invited and agreement was executed (Between July 2012 and October 2012) with the Contractors for lining work of main/branch canals of Uderasthan Barrage Scheme. After the finalisation

⁴⁰ A weir is a barrier across the river used to control and divert the flow of water for outlets by raising the water level.

⁴¹ Ahars are water reservoirs, whereas *pyne* is a channel that links river or other sources of the water to the farm fields.

of tendering process and award of work, the design and specification of lining work was changed by WRD (December 2013) from tiles lining to cast *in-situ* lining. Mid-course change in design and specification indicated poor planning. As a result, not only the cost of the project increased substantially but it also led to delay in completion of work by three years.

Department replied that in the light of suggestions made by CWC, New Delhi during approval process of the project, provision was made for cast *in-situ* lining work in place of pre-provisioned precast tiles lining work.

(C) Audit observed that there was no provision for restoration and lining of Minors and water courses in the original (February 2007) or revised DPR/estimates approved (March 2013) for ₹ 531 crore. Therefore, another DPR was prepared and Administrative Approval (AA) for ₹ 187.07 crore (December 2017) was given to complete the restoration and lining work of minors and water courses which was incomplete till the date of audit. This indicated poor planning by project authorities.

Department replied that to ensure irrigation to every field, restoration and lining work of minors and water courses were subsequently taken up. However, the reply was silent that why these requirements could not be included in the initial DPR/estimate.

Audit Findings

Audit findings relating to outcomes of surface irrigation project have been discussed under the following categories:

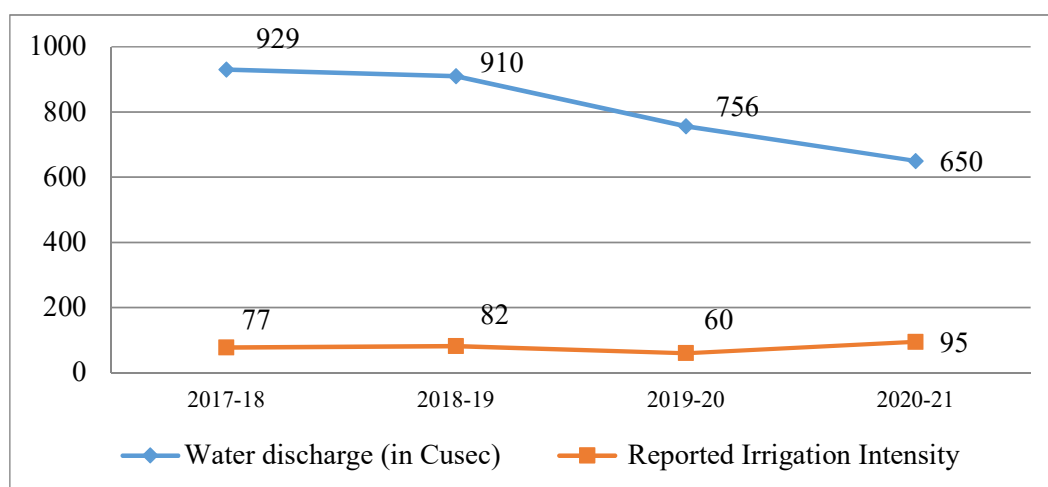
4.2 Irrigation potential utilisation

(A) At the rate of the contemplated irrigation intensity of 100 *per cent*, gross irrigable area was proposed to be 41,052 Ha every year which included *Kharif* crops only. This indicated that WRD did not contemplate for providing irrigation facility to *Rabi* crops, though the earlier weir scheme was contemplated for providing irrigation facility to 18,000 Ha of *Rabi* crops also. No reason for such exclusion was found on record though it was an ERM project of the existing weir scheme.

Department replied that Uderasthan barrage is situated on *Falgu* river and water remains available in this river only in *Kharif* season. Hence, *Rabi* irrigation was not included in the CCA. Reply itself indicated that the requirement for *Rabi* crops was not planned.

(B) Further, even at the proposed level of irrigation intensity (100 *per cent*) and gross irrigable area (41,052 Ha), during evaluation period of 2017-21, 1,64,208 Ha area should have been irrigated. According to Department's reports, during the period 2017-21, gross irrigated area was 1,29,215 Ha (79 *per cent*) only, ranging from 60 to 95 *per cent*.

Discharge of water from headworks was the only source of water in canal system for surface irrigation. Though water discharge during *Kharif* season (2017-21) from headworks decreased, reported irrigation intensity has increased, as shown in the **Chart 4.1** below.

Chart 4.1: Trend of comparison between water discharge and Irrigation intensity reporting for Uderasthan during *Kharif* 2017-21

(Source: Water Resources Department)

Reported irrigation achievement was not in conformity with trend of water discharge during the period 2017-21 which indicated possible incorrect reporting of irrigation achievement.

Further scrutiny disclosed that according to net water availability and duty of water (*i.e.* relationship between the volume of water and the area of crop it matures) fixed by the Department, irrigation was possible maximum in 85,280 Ha of *Kharif* crops during 2017-21. Thus, against the claim of irrigation potential utilisation/achievement of 1,29,215 Ha (79 *per cent* of contemplated irrigation) by the Department, maximum irrigation was possible up to 85,280 Ha (52 *per cent*) only, ranging between 42 and 59 *per cent* of contemplated irrigation for *Kharif* crops during 2017-21 as shown in **Table 4.1** below.

Table 4.1: Achievement of *Kharif* Irrigation intensity

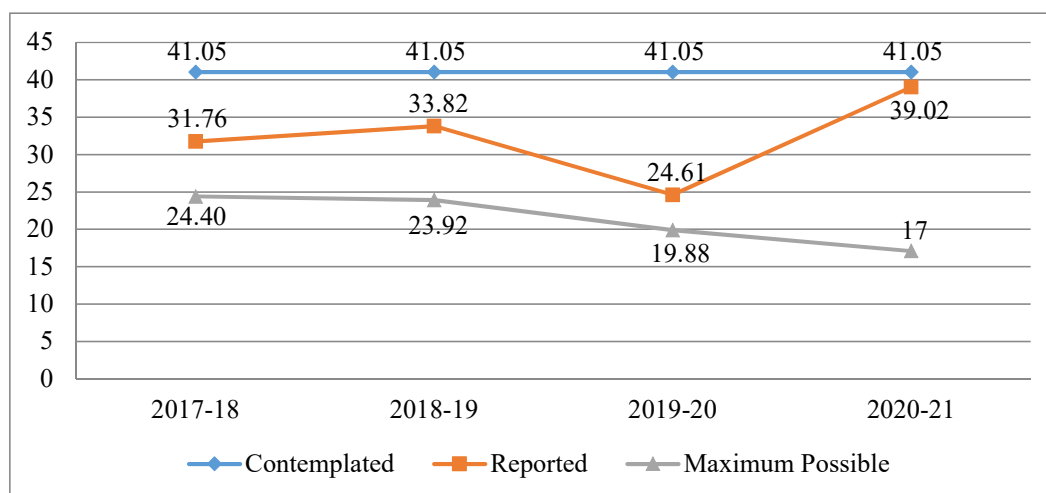
Sl. No.	Year	Contemplated Irrigation @ 100 per cent intensity	Average net water availability [#] (in Cusec)	Maximum irrigation possible (Ha) based on net water availability @ 40 Ha per Cusec duty [@] (percentage irrigation in comparison to contemplated irrigation)
1	2017-18	41,052	610	24,400 (59)
2	2018-19	41,052	598	23,920 (58)
3	2019-20	41,052	497	19,880 (48)
4	2020-21	41,052	427	17,080 (42)
	Total	-	2,132	85,280 (52)

(Source: Water Resources Department)

[#] Net availability of water has been calculated after taking into account, project irrigation efficiency of 65.7 *per cent* as mentioned in DPR.

[@] Duty of water is relationship between the volume of water and the area of crop it matures. Duty of water fixed by the Department for *Kharif* and *Rabi* irrigation was 40 Ha per Cusec.

The comparison of contemplated, reported and maximum possible irrigation during the year 2017-21 is also shown in the **Chart 4.2** below.

Chart 4.2: Comparison of contemplated, reported and maximum possible irrigation during 2017-21 (thousand Ha)

Lower water discharge and water availability at the field level was mainly due to non-discharge of water in left link channel of *Mahmuda* main canal due to heavy siltation in *Jalwar* river, non-completion of work of minors and water courses, insufficiency of outlets and absence of field channels *etc.* It was further observed that water was discharged in the canals without proper assessment of crop water requirement for irrigation, though the concerned Divisions (Uderasthan and Jehanabad) intimated (September 2021) that water was discharged as per farmers' demand, however, no record or document was made available to justify the basis.

Department replied that during 2017-18 to 2019-20, less water was received in the river due to scanty rainfall in the area and therefore target of irrigation could not be achieved. The Department stated the calculation of maximum possible irrigation achievement by the audit as imaginative.

The reply of the Department on the first part of the Para was not supported by any evidence. Latter part of the reply is not correct as the calculation of the maximum possible irrigation achievement by audit was based on the methodology and irrigation efficiencies prescribed in the CWC guidelines/DPR and Duty prescribed by the Department itself.

4.3 Command Area Development

In light of provision discussed in *paragraph 2.3 ante*, Audit observed that Planning Commission while according clearance to Uderasthan Barrage Scheme had directed that the Project Authority must seek the approval of the Command Area Development Plan (CADP) from the Planning Commission. Also, the CAD works will be executed concurrently which will ensure that the outlay on the project is converted into enduring outcomes in the form of assured and sustainable irrigation benefits to the farmers.

Audit observed that this project was not included for CAD work. Moreover, the project authorities also neither planned nor executed any work for implementation of CAD works as directed by the Planning Commission. Thus, the project beneficiaries were deprived of the intended benefits of the CADP.

Department accepted that Command Area Development was not taken in Uderasthan Barrage Scheme.

4.4 Capacity deficiencies of canal system

4.4.1 Non-operational canal

It was observed that left link channel of *Mahmuda* main canal was not in operation till the date of audit due to heavy siltation in dead course of *Jalwar* river and non-inclusion of its de-silting work in the ERM work of this project. As a result, IP for 3,510 Ha of CCA could not be created affecting the intended outcomes of the Project.

In reply, the Department accepted the fact and stated that a DPR had been prepared to link the *Falgu* with *Jalwar* river after which water should be available.

4.4.2 Decrease in water discharge capacity

Audit observed that designed discharge capacity of Left and Right Main Canals was 550 Cusec each. However, average water discharge was 402 Cusec in Right Main canal (73 *per cent*) and 409 Cusec (74 *per cent*) in Left Main canal during 2017-21. Lower water discharge than designed discharge was due to low number of outlets and water courses in the canals and distributaries and non-completion of modernization and lining work in minors and water courses of the canals. The same was also confirmed during joint physical verification.

Department replied that outlets had been adequately provisioned in all the canals keeping in view the agriculture work. The reply of the Department is not tenable as joint physical verification confirmed short number of outlets and non-functional outlets.

4.5 Maintenance of irrigation project

In light of provision discussed in *paragraph 2.5 ante*, the requirement of funds, allotment and expenditure pertaining to operation and maintenance for 2017-21 are given in **Table 4.2** below.

Table 4.2: Year-wise allotment and expenditure for operation and maintenance

Year	Area of Irrigation Potential (in Ha) as reported by the Department		Rate of maintenance of Irrigation Potential (in ₹ /Ha)		Requirement ⁴² of funds (₹ in lakh)	Allotment (₹ in lakh) (<i>percentage of requirement</i>)	Expenditure (₹ in lakh)
	Utilised	Unutilised	Utilised	Unutilised			
2017-18	31,765	9,287	1,032	345	359.86	71 (20)	71
2018-19	33,820	7,232	1,083	362	392.45	26 (7)	26
2019-20	24,610	16,442	1,137	380	342.30	92 (27)	44
2020-21	39,020	2,032	1,194	399	474.01	103 (22)	100

(Source: Water Resources Department)

Irrigation Division got only seven to 27 *per cent* of the required funds for operation and maintenance during 2017-21. There was nothing on record to exhibit that action plan for operation and maintenance and commensurate fund requirement

⁴² Requirement of funds = (Utilised Potential × Rate of maintenance for utilised potential) + (Unutilised Potential × Rate of maintenance for unutilised potential).

was prepared and submitted to controlling officer. The Division informed that operation and maintenance plan was being prepared as per the availability of funds and priority of maintenance work. This resulted in deficient capacity of irrigation system.

Department stated that the restoration and lining work of canals had been done recently and therefore there was less requirement of fund for its maintenance. The reply was not tenable in light of view of the Eleventh Finance Commission which clearly stated requirement of funds for operation and maintenance every year.

4.6 Non-achievement of envisaged agricultural benefits

Post-project agricultural produce was worked out by audit for the period 2017-21 on the basis of maximum possible irrigated land based on net water availability and yield envisaged in the DPR against contemplated Irrigation (*Appendix 3-A*).

Agriculture production attributable to surface irrigation ranged between 42 and 59 *per cent* only during 2017-21.

Department replied that as per actual irrigation reported by the Department, agricultural production was 60 to 95 *per cent* during 2017-18 to 2020-21. The reply is not tenable as calculation made by audit was based on maximum possible irrigation as per net water availability.

4.7 Non-achievement of cropping pattern envisaged in DPR

In light of provision discussed in *paragraph 2.7 ante*, Audit observed that order specifying the cropping pattern to be adopted in the irrigable command area as envisaged in the DPR was not issued by the project authorities. Absence of notified cropping pattern indicated that the Canal Officer regulated the water in the canal system without any realistic basis which affected outcome of irrigation. It also indicated that proposed cropping pattern in DPR was not planned properly in co-ordination with Agriculture Department and provision stipulated in the Bihar Irrigation Act, 1997 was not followed.

Department, in its reply, stated that efforts were made by them regarding cropping pattern to be adopted by the farmers. However, the reply was silent on the issue of cropping pattern not being notified by the WRD as per the Act.

4.8 Non-achievement of Benefit-Cost Ratio

According to CWC Guidelines for preparation of DPR (2010), Project with Benefit-Cost (BC) ratio of more than one, normally 1.5, is justified.

The BC ratio in the approved DPR (May 2012) was taken as 1.63:1. Audit observed that the pre-project benefits were under-stated. The old weir system was providing irrigation to 15,000 Ha of paddy and therefore the yield was to be taken as 40 quintals/Ha, but the same was taken at reduced rate of 20 quintals/Ha. Reduction of approved pre-project yield was unjustified and incorrect. This inflated the BC ratio of the project.

Besides, the post-project benefits taken while calculating the BC ratio in the Revised AA (December 2017) of ₹ 187.07 crore, the *Rabi* output was also taken though this project was not providing irrigation to *Rabi* crops.

As per the calculation shown in *Appendix 3-B*, the actual BC Ratio of the project arrived at 0.50:1 only, which is lower than one and very low in comparison to the contemplated ratio of 1.63:1. This indicated towards lesser than contemplated benefits of the project being accrued.

Department replied that pre-project production of Paddy at the rate of 20 quintals/Ha was based on the figures made available by the District Agriculture Officer, Jehanabad. The water stored in *Ahars* during *Kharif* season was used by the farmers in *Rabi* season, therefore CCA of 838 Ha was taken for *Rabi* Irrigation while preparing the DPR of ₹187.07 crore. After construction of barrage and lining of canals, irrigation in 95 *per cent* of CCA (41,052 Ha) was being achieved. Therefore, the BC Ratio calculated by audit was not correct.

The reply of the Department is not tenable as during preparation of BC Ratio for AA (February 2017) of ₹204 crore, pre-project production of paddy of the areas irrigated by the weir system was taken as 40 quintals/Ha. The inclusion of 838 Ha for *Rabi* was against the CCA approved by the CWC and without any factual supporting evidence of water availability. The calculation of BC Ratio by Audit was well explained and as per the agricultural production derived on the basis of net water availability prescribed in the DPR and Duty prescribed by the Department.

4.9 Project execution

4.9.1 Inaccurate survey

In light of provision discussed in *paragraph 2.9.1 ante*, scrutiny of records disclosed that there was variation of 108 to 136 *per cent* between the items of works executed and their estimate/BoQ. Though these variations were approved, (except as mentioned in *Para 4.9.3.6*) it indicated that the original estimate was not prepared as per the site condition and after proper survey due to which such a huge variation in quantities of items occurred and extension of time was granted time and again.

Department replied that subsequent to physical model study by Central Water and Power Research Station (CWPRS), Pune, variations in many items of work and many new items of work were included in the estimate which resulted in overall enhancement, variation/deviation. Non-conduct of physical model testing by CWPRS, Pune before commencement of work was indicative of inadequate survey and investigation.

4.9.2 Time overrun of eight years and cost overrun of ₹ 548 crore

For construction of Uderasthan Barrage Scheme and its canal system, AA of ₹ 204 crore was accorded by GoB in February 2007 and the work commenced (April 2007) with stipulated completion by March 2010. However, the work was subsequently stopped (October 2007) by WRD. Subsequently, WRD requested (November 2008) CWPRS, Pune to conduct a model study and suggest a suitable project site. Accordingly, a model study by CWPRS, Pune was conducted, in light of which scope and site of the project was changed⁴³ (November 2009). The work resumed (April 2010) and fresh AA of ₹ 531.01 crore was accorded (March 2013)

⁴³ Construction site of the barrage shifted from 590 metre u/s to 200 metre u/s of the old weir.

by GoB. The project proposal was approved by CWC and Planning Commission (May 2012) for CCA of 41,052 Ha, with irrigation intensity of 100 *per cent* for *Kharif* only and BC ratio of 1.63:1. Consequent upon investment clearance by the then Planning Commission (May 2012) on the recommendation of the CWC, estimate was subsequently revised by WRD to ₹ 636.48 crore (February 2015). Again, additional Administrative Approval (December 2017) for ₹ 187.07 crore was accorded to complete the work related to modernization of minors and water courses and other related works which was still (March 2021) ongoing. Expenditure of ₹ 752 crore was incurred on the project (March 2021).

Thus, due to improper planning, the project is still going on and project cost increased from ₹ 204 crore to ₹ 752 crore till now (March 2021).

In reply, Department reiterated the above mentioned circumstances under which project was delayed and project cost increased. It was further stated that due to increase in thickness of the lining work together with price adjustment and in light of the mining policy of GoB, closure of local mines led to increase in project cost. Reply corroborated audit observation.

4.9.3 Financial irregularities

Financial irregularities relating to project execution are discussed in subsequent paragraphs:

4.9.3.1 Loss to the Government

(A) Clause 3 of the SBD stipulates the circumstances when contract can be rescinded by Engineer-in-Charge. Upon such rescission, the Earnest Money Deposit, Security Deposit already recovered and Performance Guarantee under the contract shall be liable to be forfeited. As per Clause 14 of the SBD, in case of cancellation of contract, the Engineer in-charge shall have powers to carry out the incomplete work at the risk and cost of the Contractor.

Scrutiny of execution of four works/agreements pertaining to Uderasthan Barrage Scheme disclosed that all of them were closed (May to July 2017) by Executive Engineer as per orders of Engineer-in-Chief due to slow progress of work. Work was suddenly closed without invoking Clause 3 or Clause 14. Non-invoking of Clause 3 resulted in non-recovery of ₹ 12.03 crore, recoverable from Contractor, as detailed in *Appendix 3-C*. Against the closure order, Contractor moved to arbitration and decision was pending (December 2021).

Scrutiny of recoverable amount of ₹ 12.03 crore disclosed that Performance Guarantee of ₹ 1.66 crore was released to the Contractor (4SBD/2013-14/Uderasthan) despite non-finalisation of the Contractor's bills and pending recovery of advances. In another work (5SBD/2014-15/Uderasthan), Performance Guarantee (PG) of ₹ 1.32 crore was fraudulently liquidated by the Contractor, as discussed in succeeding paragraph captioned "*Fraudulent liquidation of Performance Guarantee*".

(B) In case of three out of four works/agreements, remaining work was awarded to another Contractor on nomination basis instead of re-tendering, violating the provision of Bihar Financial Rules. In one case (4SBD/2013-14/Uderasthan Division), tender was invited and balance work was awarded at higher rate and

therefore Government had to incur extra expenditure of ₹ 3.63 crore⁴⁴ due to non-invoking of risk and cost clause *i.e.* Clause 14 of SBD.

Department assured that the outstanding amount of ₹ 12.03 crore would be recovered after scrutinising the available records. In light of Departmental investigation, action was being taken against the Executive Engineer. However, the reply was silent on the loss of ₹ 3.63 crore to the Government due to non-invoking of risk and cost clause.

4.9.3.2 *Fraudulent liquidation of Performance Guarantee*

Audit noticed that three Fixed Deposit Receipts (FDRs) deposited as Performance Guarantee of ₹ 1.32 crore was fraudulently liquidated (February 2017 and January 2018) by the Contractor in a work (5SBD/2014-15/Uderasthan). After rescinding of work (May 2017), FDRs were sent (May 2018) to the bank for liquidation which could not happen as the bank reported that the two FDRs were already liquidated on 3 February 2017 and one FDR was liquidated on 4 January 2018. A Committee was formed (9 October 2018) by the Chief Engineer, Irrigation Creation, Biharsharif to enquire into the matter but no action was taken (September 2021) against the erring Officers named in the enquiry report submitted (31 October 2018). An FIR was also lodged in the Police station by the Division (October 2018) against the Contractor but still the said amount was not recovered. Audit also noted that three laminated FDRs of ₹ 1.32 crore were still (September 2021) in the custody of the Division. Therefore, the connivance of the custodian cannot be ruled out.

Department replied that an FIR had been lodged and investigation was in progress. However, the reply is silent as to why no departmental action was initiated under relevant conduct Rules.

4.9.3.3 *Excess payment on various items*

Scrutiny of the MBs and other relevant records related to Uderasthan Barrage Scheme disclosed excess payment of ₹ 13.14 crore as detailed in *Appendix 3-D*. Excess payment was on account of payment at higher rate, short deduction towards void⁴⁵ in boulder pitching and payment of inadmissible amount of Royalty and non-deduction of settlement allowance.

4.9.3.4 *Payment of price adjustment*

In light of provision discussed in *paragraph 2.9.4.4 ante*, scrutiny of records/MBs⁴⁶ related to Uderasthan Barrage Scheme disclosed that contrary to the directions of RCD, price adjustment was paid as per estimated original percentage of each component in place of revised percentage of each component at the time of finalisation. This resulted in payment of price adjustment of ₹ 55.84 crore by the Irrigation Division, Uderasthan to Contractor without adhering to the direction of RCD.

⁴⁴ Paid to second Contractor (for the items of work left out by 1st Contractor): ₹ 16.57 crore - (less) Payable to first Contractor: ₹ 12.94 crore = Extra paid to second Contractor: ₹ 3.63 crore.

⁴⁵ Empty space.

⁴⁶ Agreement No. 1 F2/2007-08.

4.9.3.5 Avoidable payment to the Contractor

According to the work agreement, for embankment and borrow area, quoted rate of earth work shall include jungle clearance, removing grass *etc.* Scrutiny of Measurement Books (MBs) and Running Account (RA) bills disclosed that Contractor was separately paid for jungle clearance and grass removing. This resulted in avoidable payment of ₹ 29.35⁴⁷ lakh. This was mainly attributable to incorrect inclusion of jungle clearance *etc.* in BoQ.

4.9.3.6 Payment without approval of the competent authority

(A) Rule 294 of BPWD Code provides that Executive Engineer has no power to sanction any excess over a revised estimate sanctioned by higher authority.

Scrutiny of records in Uderasthan Irrigation Division disclosed that payment for excess quantity of work in 12 items in Agreement No. 1F2/2007-08 (Under SBD) and three items in Agreement No. 4SBD/2014-15 was irregularly made by the Executive Engineer beyond the deviations approved by the WRD. This resulted in irregular/excess payment of ₹ 5.11⁴⁸ crore.

(B) Rule 182 A of the BPWD Code stipulates that supplementary agreement should be executed for extra items sanctioned by the competent authority.

Scrutiny of records in Uderasthan Irrigation Division disclosed that payment of ₹ 1.84 crore for extra items of work was made by Executive Engineer without approval of the WRD who was the competent authority in this case (as the overall cost was 20 *per cent* above the approved cost). Thus, payment of ₹ 1.84 crore was irregular (*Appendix 3-E*).

Regarding audit observations “*Excess payment on various items; Payment of price adjustment; Avoidable payment to the Contractor and Payment without approval of the competent authority*”, the Department assured that follow up action would be taken on the basis of departmental investigation carried out. However, result of departmental investigation was not communicated to Audit.

4.9.3.7 Irregular payment towards carriage

Scrutiny of records of Uderasthan Division disclosed that in a work (1F2/2007-08 under SBD), competent authority (Superintending Engineer) approved the carriage of stone chips from Koderma at the rate of ₹ 2,384/cum. However, against this approval, stone chips were obtained from Daltonganj at a lower rate of ₹ 1,512.38/cum by the order of Executive Engineer (February 2016). Payment of ₹ 10.67 crore was made for carriage of 70,525.61 cum of stone chips from Daltonganj without approval from the competent authority and hence, payment was irregular.

Department replied that some quantity of stone chips was brought from Daltonganj payment for which was made as per agreement/approved rate. The reply of the Department is incorrect as the payment was made for stone chips brought from Daltonganj, which was neither in agreement nor approved, as mentioned in the paragraph.

⁴⁷ Irrigation division, Uderasthan (Agreement No. 4SBD/2014-15)- Amount ₹ 10.22 lakh; Irrigation division, Jehanabad (11SBD/2011-12, 7SBD/2012-13 and 2SBD/2018-19)- Amount ₹ 19.13 lakh.

⁴⁸ Agreement No.- 1F2/2007-08- Amount ₹ 5.06 crore and Agreement No.- 4SBD/2014-15- Amount ₹ 0.05 crore.

4.10 Project monitoring

In light of provision discussed in *paragraph 2.10 ante*, Audit observed that Irrigation Division could not ensure complete⁴⁹ preparation of *sudkar*, the Executive Engineer and Superintending Engineer did not check *sudkar* on sample basis. Chief Engineer did not inspect each circle office under their respective charge once in every two years and each divisional office once in every three years. Besides, report stating reasons thereof was also not submitted to the Government. This indicated that effective monitoring was not ensured which led to lower than contemplated irrigation intensities, improper assessment of actual irrigation in field *etc.* Audit also noticed that quantum of water discharged upto the field and the irrigation actually achieved was not monitored on daily basis. Besides, history of maintenance work *viz.* type of maintenance work, location, starting and finishing date of maintenance work, cost involved *etc.* was not monitored.

Besides, deficient monitoring also led to financial irregularities such as excess and avoidable payment to Contractors *etc.* as discussed in the preceding paragraphs.

Department replied that due to shortage of staff, *sudkar* and *khatiyani* preparation were delayed. The prepared *sudkar* was checked by concerned officers. Field visit was done by the Superintending Engineer and Chief Engineer from time to time. Monitoring of the irrigation work was also done at the level of Chief Engineer as well as Department. Department's reply was not supported by any evidence of inspection and monitoring. The reply was silent on checking of *sudkar* by the Superintending Engineer and the Executive Engineer. The large scale financial irregularities were indicative of absence of monitoring or poor monitoring.

4.11 Availability of manpower

Audit noticed that despite vesting of important work, permanent post of *Amin* and Patrol was abolished (May 2005) and permanent *Amin* and Patrol was not posted in the Division. *Khatiyani* was prepared partially by the *Amin* deployed on casual basis. 60 per cent and 50 per cent posts of front line field engineers *i.e.* Assistant Engineer and Junior Engineer respectively were vacant as shown in *Appendix 3-F*.

Shortage of manpower led to short preparation of *sudkar/khatiyani*, short raising of demand as well as collection of water charges. Audit further observed that revenue demand of ₹ 1.41⁵⁰ crore was to be raised against reported irrigation during 2017-21. However, demand of ₹ 9.06 lakh (six per cent) only was raised. Against that, no revenue collection was made during 2017-21.

Also, shortage of manpower led to inadequate operation and maintenance of the system and this resulted in short achievement of irrigation intensity.

Department accepted the shortage of Patrol and *Amin*, and stated that *sudkar* and *khatiyani* is being prepared by hiring. Assistant Engineers have been posted in the division by the department and requisition for Junior Engineers has been sent to the Bihar Technical Commission.

⁴⁹ 56 per cent *sudkar* of reported irrigated land was prepared during 2017-21.

⁵⁰ As per Departmental Irrigational Reporting, Revenue Demand of ₹ 1.41 crore was to be raised. The rate was ₹ 109 per Ha for Kharif. As per net water availability, revenue demand of ₹ 0.93 crore should have been raised.

4.12 Conclusion

The project was scheduled to be completed by March 2010, but it is still ongoing and project expenditure has been ₹ 752 crore (March 2021). Despite project expenditure of ₹ 752 crore, against the contemplated gross irrigation to 1.64 lakh Ha, water was made available to irrigate maximum 0.85 lakh Ha (52 *per cent*) only during 2017-21. During this period, agricultural production, attributable to surface irrigation, was only 42 to 59 *per cent* of envisaged 1.73 lakh MT. Thus, intended benefits expected from the project were yet to accrue. This was mainly due to insufficient infrastructure and ineffective Participatory Irrigation Management. Due to low number of outlets and water courses in the canals and distributaries and non-completion of modernization and lining work in minors and water courses of the canals, actual discharge was lower than the designed discharge. Project authorities neither planned nor executed Command Area Development works, thus depriving the beneficiaries of the intended benefits of Command Area Development.

4.13 Recommendations

- Department should develop command area with construction of sufficient number of outlets and water courses to ensure intended irrigation at the field level.
- The project should be included in the CAD programme to get its intended benefits by implementation of Participatory Irrigation Management with formation of sufficient number of Water User Associations.
- Department should take necessary steps for proper assessment of crop water requirements of entire CCA considering the irrigation intensity as well as project efficiency and ensuring discharge of water according to assessment.
- Department should ensure preparation of DPR including all the components of the project and computation of BC ratio as per the prescribed guidelines and based on authentic inputs.
- Control mechanism prescribed under codal provisions should be strengthened to avoid excess/irregular payment, prevent fraud and safeguarding of Government interests while closing/rescinding of works.
- Department should ensure detailed survey/investigation and preparation of proper/adequate estimates to minimise subsequent variation in estimates.
- Department should ensure adequate deployment of manpower for preparation of *sudkar/khatian*, proper raising of demands and collection of revenue as well as operation and maintenance activities.

Chapter-5
Jamania Pump
Canal Scheme
(JPCS)

Chapter -5

Jamania Pump Canal Scheme (JPCS)

Jamania Pump Canal Scheme (JPCS) was conceived by GoB in the year 1965 as an inter-state (involving then Bihar and Uttar Pradesh (UP)) irrigation project to provide irrigation facilities to the drought prone area of Durgawati and Ramgarh blocks of Kaimur district (the then Rohtas district of Bihar). Audit scope pertained to the period 2015-21.

5.1 Project planning

A DPR for execution of JPCS was sent to CWC in 1975 for their approval and since then the scheme was revised/modified several times up to 1990 in light of suggestions received from CWC. Another DPR was prepared in 1990, with project cost of ₹ 94.87 crore (₹ 65.17 crore for Bihar portion and ₹ 29.70 crore for UP portion), to cater the need of irrigation to CCA of 19,150 Ha. CWC did not approve the project for want of concurrence of UP Government. However, on the basis of this DPR, Administrative Approval (August 1992) of ₹ 94.87 crore (₹ 65.17 crore for Bihar portion and ₹ 29.70 crore for UP portion) was accorded by Government of Bihar and accordingly work was started in 1992 in Bihar portion without the approval of the CWC and investment clearance by the then Planning Commission. In 2003, WRD decided to limit the scope of the project to Bihar only and the same was approved by GoB in August 2011. By then, ₹ 94.39 crore were already spent on the project against the AA of ₹ 65.17 crore (Bihar portion). Administrative Approval (August 2011) was revised to ₹ 118.95 crore, on the basis of another DPR prepared in 2010. CCA of the project was revised (August 2011) from 19,150 Ha to 9,000 Ha. Expected water discharge capacity of the project was 350 Cusec. Expected outcome of the project was to make water available for irrigation to 9,000 Ha. Irrigation intensity of 157.1 *per cent* (89 *per cent* Kharif and 68.1 *per cent* Rabi) was contemplated. This would actually provide irrigation to 14,139 Ha. Besides, annual agriculture produce of 70,695 MT was envisaged.

5.1.1 Non-preparation of DPR after change of scope

Being a project on inter-state river, techno-economic appraisal by CWC and investment clearance by planning Commission was required.

Audit observed that the scope of the JPCS irrigation project was substantially changed by lifting the water from *Karmanasha* river (which passes through Bihar and Uttar Pradesh) in place of Ganga and altering the CCA and length of Main canal and its capacity. The name of the project was also changed (June 2011) from “Jamania Pump Canal Scheme” to “Karmnasha Pump Canal Scheme” but no DPR was prepared as per the changed scope. Thus, the project authorities executed the work without obtaining aforesaid approvals of CWC and Planning Commission.

Department replied that after change in scope, the project became a state level project and therefore, approval of the CWC and Planning Commission was not necessary. Therefore, DPR remained unchanged after change in scope of work.

The reply of the Department is not correct in view of the provision *ibid* as *Karmanasha* is an inter-state river.

Audit findings

Audit findings relating to outcomes of surface irrigation project have been discussed under the following categories:

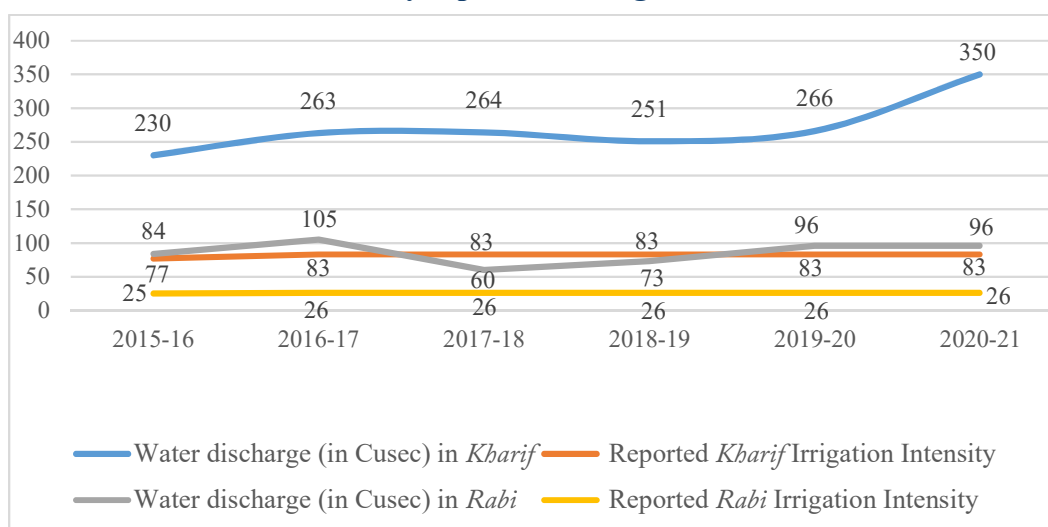
5.2 Irrigation potential utilisation

(A) At the rate of the contemplated irrigation intensity of 157.1 *per cent* to CCA of 9,000 Ha, gross irrigated area was proposed to be 14,139⁵¹ Ha every year which included irrigation for *Kharif* in 8,009 Ha (89 *per cent* of CCA) and *Rabi* in 6,130 Ha (68.1 *per cent* of CCA). This indicated that GoB planned for providing lesser irrigation facility to *Rabi vis-à-vis Kharif* crops. In Bihar, generally rainwater remains available in *Kharif* season due to south-west monsoon, whereas there is lesser rainfall in *Rabi* season indicating higher requirement of irrigation facility to *Rabi* crops. However, no reason for such exclusion for *Rabi* crops was found on record.

(B) Further, even at the proposed level of irrigation intensity (*i.e.* 157.1 *per cent*) and gross irrigated area (*i.e.* 14,139 Ha per year), during evaluation period of 2015-21, 0.85 lakh Ha area should have been irrigated. According to Department's reports, during this period, gross irrigated area was 0.58 lakh Ha (69 *per cent*) only ranging from 65 to 70 *per cent*.

Discharge of water from headworks was the only source of water in canal system for surface irrigation. During 2015-21, though water discharge from headworks in *Kharif* season increased, reported *Kharif* irrigation intensity remained constant. Similarly, during 2015-21 water discharge from Headworks in *Rabi* season varied, but reported *Rabi* irrigation intensity remained constant. Thus, reported irrigation achievement was not in conformity with trend of actual water discharge into the canal system during the period 2015-21, as shown in the **Chart 5.1** below.

Chart 5.1: Trend of comparison between water discharge and Irrigation intensity reported during 2015-21



(Source: Water Resources Department)

⁵¹ $9,000 \times 1.571 = 14,139$.

Further scrutiny disclosed that according to net availability and duty of water (*i.e.* Relationship between the volume of water and the area of crop it matures) fixed by the Department, irrigation was possible maximum in 0.41 lakh Ha and 0.10 lakh Ha for *Kharif* and *Rabi* respectively. Thus, against the claim of irrigation potential utilisation of 0.58 lakh Ha (69 *per cent*) by the Department, maximum irrigation possible was 0.51 lakh Ha (61 *per cent*) only, ranging from 73 to 100 *per cent* and 19 to 33 *per cent* of contemplated irrigation for *Kharif* and *Rabi* seasons respectively during 2015-21 as shown in **Table 5.1** below.

Table 5.1: Achievement of Irrigation intensity

Sl. No.	Year	Contemplated irrigation in CCA of 9,000 Ha at the proposed intensity rate			Average net water availability [#] (in Cusec)		Maximum irrigation possible (Ha) based on net water availability @ 40 Ha per Cusec [@] (percentage irrigation in comparison to contemplated irrigation)		
		<i>Kharif</i> @ 89 <i>per cent</i>	<i>Rabi</i> @ 68.1 <i>per cent</i>	Total (c+d)	<i>Kharif</i>	<i>Rabi</i>	<i>Kharif</i> (f x 40)	<i>Rabi</i> (g x 40)	Total (h+ i)
<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>
1	2015-16	8,009	6,130	14,139	147	41	5,880 (73)	1,640 (27)	7,520 (53)
2	2016-17	8,009	6,130	14,139	168	51	6,720 (84)	2,040 (33)	8,760 (62)
3	2017-18	8,009	6,130	14,139	168	29	6,720 (84)	1,160 (19)	7,880 (56)
4	2018-19	8,009	6,130	14,139	160	36	6,400 (80)	1,440 (23)	7,840 (55)
5	2019-20	8,009	6,130	14,139	170	47	6,800 (85)	1,880 (31)	8,680 (61)
6	2020-21	8,009	6,130	14,139	223	47	8,920 (100)	1,880 (31)	10,800 (76)
	Total	48,054	36,780	84,834	1,036	251	41,440 (86)	10,040 (27)	51,480 (61)

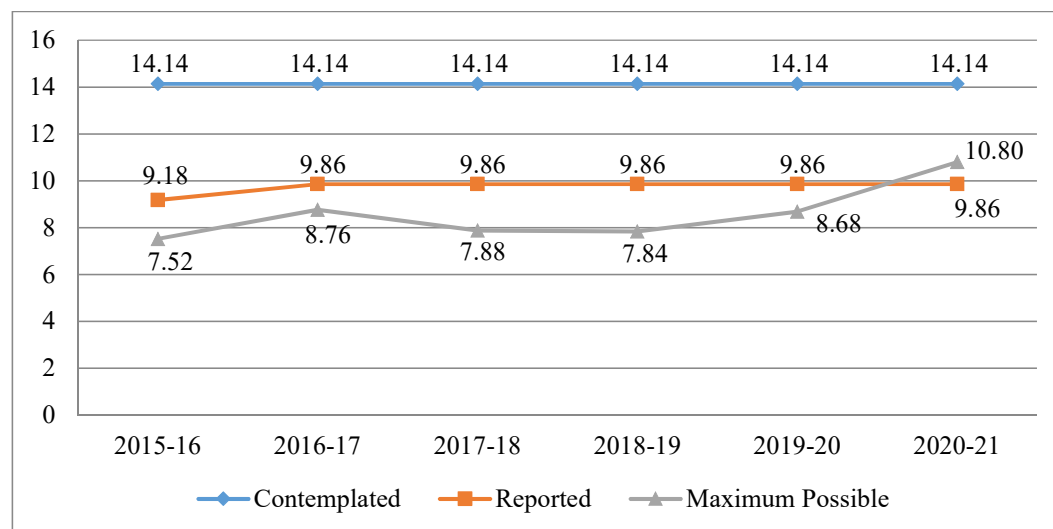
(Source: Water Resources Department)

[#] Net availability of water has been calculated after taking into account, project irrigation efficiency (*Kharif*-63.75 *per cent* and *Rabi*-48.75 *per cent*) as mentioned in CWC guidelines.

[@] Duty of water is relationship between the volume of water and the area of crop it matures. Duty of water fixed by the Department for *Kharif* and *Rabi* irrigation was 40 Ha per Cusec.

The comparison of contemplated, reported and maximum possible irrigation during the year 2015-21 are also shown in the **Chart 5.2** below.

Chart 5.2: Comparison of contemplated, reported and maximum possible irrigation during 2015-21 (thousand Ha)



As depicted above, the contemplated irrigation intensity could not be achieved which indicated that intended objective of the project to maximise the farm produce through creation of irrigation facilities could not be achieved.

The above under-achievement of irrigation intensity may have led to WRD revising (August 2020) the Irrigation Potential of the project to 10,800 Ha *i.e.* at 120 *per cent* intensity of the CCA of 9,000 Ha. This indicated that the originally contemplated intensity of 157.1 *per cent* was not based on realistic data of water availability particularly during *Rabi* season.

Non-creation of contemplated IP and low water discharge and water availability at the field level were mainly due to construction of shorter number of outlets, water courses and structures than planned, incomplete work in distributary number eight and absence of field channels, lower water discharge than contemplated during *Rabi* season *etc.* It was also observed that water was discharged in the canals without proper assessment of crop water requirement for irrigation, though the concerned Division intimated that water was discharged on the basis of farmers' demand, however, no record or document was made available to justify the basis.

Department replied that out of the CCA of 9,000 Ha, paddy was being produced in 7,450 Ha and wheat was being produced in 2,460 Ha. The work of strengthening and lining of various water courses had been proposed. After its completion, there was a possibility of increase in production of wheat. Similarly, irrigation facilities would also be enhanced after this scheme getting covered by Command Area Development programme. Reply corroborated audit observation.

5.3 Command Area Development

Audit observed that JPCS was not covered by Command Area Development Programme. As a result, the project beneficiaries were deprived of the intended benefits receivable from construction of field channels, Water User Associations *etc.*

Department assured that the Project would be covered under Command Area Development Programme.

5.4 Capacity deficiencies of canal system

5.4.1 Incomplete outlets and structures

Only 65⁵² *per cent* of outlets and 85⁵³ *per cent* of structures were completed in the main canal. Out of 37.01 km of intended lining work in distributaries, 2.71 km (seven *per cent*) was incomplete (December 2021) (*Appendix 4-A*).

According to WRD, GoB Guidelines (2005) for preparation of cost estimates, water courses should be constructed to irrigate five to eight Ha of land. However, it was observed that to cater CCA of 9,000 Ha, only 47 water courses were constructed in the distributaries and 15 direct outlets were constructed in the main canal, which could irrigate only 1,581 Ha⁵⁴ (18 *per cent*), as per the aforesaid guidelines. Moreover, out of proposed 750 outlets and 100 syphons in the water courses, no

⁵² $(15/23) \times 100 = 65.$

⁵³ $(50/59) \times 100 = 85.$

⁵⁴ $\text{Area Irrigated by 47 water courses} + \text{area irrigated by 15 direct outlets} = 47 \times 8 + 1205 = 1581.$

such structure was constructed. Resultantly, during physical verification (*Kharif* 2021, 8/8/2021), Audit observed that numerous pipes were illegally put into the canals to draw the water for irrigation by the farmers.



Unauthorised withdrawal of water from Main Canal of JPCS



Unauthorised withdrawal of water from the D-5 distributary of JPCS

Department replied that water courses could not be completed due to local reasons. Strengthening and lining work of constructed water courses was under consideration which might increase the irrigation capacity of the scheme.

5.4.2 Decrease in water discharge capacity

Audit observed that designed discharge capacity of Jamania Main Canal was 350 Cusec. However, average water discharge was 271 Cusec in *Kharif* (77 per cent) and 86 Cusec (25 per cent) in *Rabi* seasons during 2015-21. Lower discharge than designed water discharge capacity was due to low number of outlets and water courses in the main canal as well as six distributaries and absence of outlets and water courses in two distributaries (D-2 and D-8). Audit also noted that most part of D-8 was non-operational due to incomplete canal/lining work which was also confirmed during joint physical verification. These shortcomings affected irrigation capacity as well as project outcomes.

Department replied that irrigation was provided to the farmers as per requirement. The construction of distributary number eight had been completed after resolving land acquisition issues. Lining work was still to be done but distributary was fully functional and irrigation was being provided to farmers.

However, the reply was silent on short discharge of water than designed discharge capacity in the main canal during evaluation period.

5.5 Maintenance of irrigation project

In light of provision discussed in *paragraph 2.5 ante*, the requirement of funds, allotment and expenditure pertaining to operation and maintenance for 2016-21 are given in **Table 5.2** below.

Table 5.2: Year-wise allotment and expenditure for operation and maintenance

Year	Area of irrigation potential (in Ha) as reported by the Department		Rate of maintenance of irrigation potential (in ₹/Ha)		Requirement of funds (₹ in lakh)	Allotment (₹ in lakh) (percentage of requirement)	Expenditure (₹ in lakh)
	Utilised	Unutilised	Utilised	Unutilised			
1	2	3	4	5	6 = (2*4) + (3*5)	7	8
2016-17	9,855	4,284	982	328	110.83	50 (45)	48.94
2017-18	9,855	4,284	1,032	345	116.48	72 (62)	72.00
2018-19	9,855	4,284	1,083	362	122.24	70 (57)	70.00
2019-20	9,855	4,284	1,137	380	128.33	90 (70)	89.69
2020-21	9,855	4,284	1,194	399	134.76	97 (72)	93.69

(Source: Water Resources Department)

Irrigation Division (Jamania Pump Canal Division, Ramgarh) got 45 to 72 per cent of the required funds for operation and maintenance during 2016-21. There was nothing on record to exhibit that action plan for operation and maintenance and commensurate funds requirement was prepared and submitted to controlling officer. The Division informed that operation and maintenance plan was being prepared as per the availability of funds. This resulted in deficient capacity of irrigation system.

Department replied that funds were made available to various divisions despite many limitations for operation and maintenance of canal.

5.6 Non-achievement of envisaged agricultural benefits

Post-project agricultural produce was worked out by Audit for the period 2015-21 on the basis of maximum possible irrigated land based on net water availability and yield envisaged in the respective DPR against contemplated irrigation.

Agriculture production attributable to surface irrigation ranged between 53 and 76 per cent only during 2015-21 (*Appendix 4-B*).

Department replied that gradual increase in production of crops was evident from the table, after restoration of water courses, intended growth in productivity was possible.

5.7 Non-achievement of cropping pattern envisaged in DPR

In light of provision discussed in *paragraph 2.7 ante*, Audit observed that no order specifying the cropping pattern to be adopted in the irrigable command area as envisaged in the DPR was issued by the WRD officials of the project. Absence of notified cropping pattern indicated that the Canal Officer regulated the water in the canal system without any realistic basis which affected the outcomes of irrigation. According to the Report of the Directorate of Economics and Statistics (2019-20), pertaining to Kaimur district falling under JPCS, actual post-project cropping pattern varied from proposed post-project cropping pattern in DPR. The variation ranged between (-)94 and 40 per cent.

Coverage of Maize, Potato, Oilseeds and Pulses decreased by 94, 86, 76 and 55 per cent respectively whereas coverage of Wheat increased by 40 per cent. Coverage of Paddy did not change much (*Appendix 4-C*).

Thus, cropping pattern as envisaged in DPR was not achieved which indicated that proposed cropping pattern in DPR was not planned properly in co-ordination with Agriculture Department and directions stipulated in Bihar Irrigation Act, 1997 were not followed.

Department replied that cropping pattern in DPR was incorporated on the advice of Agriculture Department. Department accepted the fact of change in cropping pattern with the passage of time by farmers due to various reasons.

5.8 Non-achievement of BC ratio

BC ratio in revised DPR (2010) was 2.63:1. Scrutiny of BC ratio calculation disclosed that the expenses were incorrectly calculated on the basis of input cost instead of gross value of farm produce. As a result, expenses were under-cast by ₹ 16.24 crore which ultimately overstated net annual post-project benefits and BC ratio. Further, the basis of calculation of pre-project benefits of ₹ 37.76 lakh was also not mentioned in the DPR. The pre-project benefits mentioned in the DPR prepared in 1990 was ₹ 5.79 crore (CCA 19,150 Ha). Calculated on pro-rata basis, the pre-project benefit should be at least ₹ 2.72 crore for CCA of 9,000 Ha.

Audit calculated the BC ratio as per the actual benefit worked out on the basis of actual utilisation of irrigation potential and up-to-date expenditure of the project and observed that actual value of annual agriculture production as per achieved irrigation potential as reported by the division was ₹ 53.99 crore only and the up-to-date expenditure of the project was ₹ 134.56 crore. Further, the pre-project benefit was ₹ 2.72 crore. By taking these inputs in the calculation methodology adopted by the Division, the BC Ratio of the project arrives at 0.97:1, which is lower than one and very low in comparison to the contemplated ratio of 2.63:1, as detailed in [Appendix 4-D](#). This indicated towards lesser than contemplated benefits of the project being accrued.

Besides, lack of coordination of the WRD with the Agriculture Department was noticed as the pre and post-project benefits taken while calculating the BC Ratio in the revised DPR 2010 was not based on the inputs authenticated or certified by the Agriculture Department.

Department accepted that actual BC ratio was less at present due to various limitations.

5.9 Project execution

5.9.1 Incurring of expenditure without approval of the Competent Authority

As per resolution (January 2008 and March 2008) of the Finance Department, GoB, if the project cost exceeds more than 20 *per cent* of the original estimates, then approval of the Cabinet was to be taken.

It was observed that the original estimate of ₹ 94.87 crore of JPCS was approved by GoB in 1992. The revised estimate of ₹ 118.95 crore was also approved by the Cabinet in August 2011. However, the actual expenditure of ₹ 134.56 crore exceeded the original estimate of ₹ 94.87 crore by 42 *per cent* and approval of the Cabinet was not taken.

Department replied that against the AA of ₹ 118.95 crore, ₹ 134.56 crore had been spent till 2017-18 thus only 13.12 *per cent* excess expenditure above the Administrative Approval was incurred.

The reply of the Department is not acceptable as original approved AA/estimates were for ₹ 94.87 crore and ₹ 118.95 crore was revised estimate and as per the provision *ibid* comparison was to be made with the original estimate.

5.9.2 Time overrun of 22 years and cost overrun from ₹ 65.17 crore to ₹ 134.56 crore

According to DPR prepared in 1990, on the basis of which AA (August 1992) of ₹ 65.17 crore was accorded for Bihar portion, the project was scheduled to be completed by 1995-96. Due to procedural delays and change in scope of the work as narrated in the paragraph captioned “**Project Planning**”, the project was reportedly completed (except lining work in one distributary and other structures as detailed in **Appendix 4-A**) in 2017-18 with the expenditure of ₹ 134.56 crore. Thus, the project could be completed approximately 22 years after the scheduled completion and project cost increased by ₹ 69.39 crore (106 *per cent*), from ₹ 65.17 crore to ₹ 134.56 crore.

Audit noted that the project cost may rise further, as the lining work in distributary number eight was incomplete for which a proposal for ₹ 3.18 crore was sent (March 2019) by CE, Dehri to WRD, however, approval of the Department was still awaited (December 2021).

Department replied that the project was to be completed by 1995-96 but due to procedural delays, the project cost increased.

5.9.3 Invitation of tender and award of work without resolving the land acquisition issues

Scrutiny of records related to construction and lining work of distributary number eight (D-8) disclosed that the work was awarded⁵⁵ to Contractors without land acquisition. Imprudent decision of the project authorities of awarding the work without resolving the land acquisition issues led to non-completion of work despite expenditure of ₹ 54.37 lakh and the intended irrigation potential of the distributary could not be utilized till date, thus affecting the intended outcomes.

Department replied that the tender was invited in anticipation that the required land would be acquired on time but due to unavoidable reasons, land could not be acquired on time and construction work was hampered.

5.9.4 Financial irregularities

Financial irregularities relating to project execution are discussed in subsequent paragraphs:

5.9.4.1 Excess payment due to non-deduction of settlement allowance

Contrary to work agreement provision of deduction towards settlement at the rate of 1/9th from the gross value of earth work, in Jamania Pump Canal Division,

⁵⁵ Agreement No. 9F2/2006-07 (February 2007), and Agreement No. 15F2/2011-12 (December 2011).

payment for earth work in filling of canal bank and embankment was made to four Contractors without making deduction towards required settlement which resulted in excess payment of ₹ 9.07 lakh as given in *Appendix 4-E*.

Department accepted the audit observation and stated that deduction towards settlement was not done while making payment.

5.9.4.2 Avoidable payment to the Contractor

According to the work agreement, if the earths brought from borrow area to the placement site is watered to maintain uniform moisture content, no extra payment would be made for this.

Scrutiny of Measurement Books and Running Account bills in Jamania Pump Canal Division disclosed that four Contractors who were engaged in lining work of distributaries were separately paid for watering the earth. This resulted in avoidable payment of ₹ 20.34 lakh as given in *Appendix 4-F*. This was mainly attributable to incorrect inclusion of watering component in the BoQ.

Department replied that the payment for watering in compaction was justified as per rate analysis. The reply of the Department is not acceptable in view of the provision of the agreement.

5.10 Project monitoring

In light of provision discussed in *paragraph 2.10 ante*, Audit observed that Irrigation Division prepared *sudkar* of irrigated land, however the Executive Engineer and Superintending Engineer did not check *sudkar* on sample basis. Chief Engineer did not inspect each circle office under their respective charge once in every two years and each divisional office once in every three years. Besides, report stating reasons thereof was also not submitted to the Government. This indicated that effective monitoring was not ensured by the Department.

Quantum of water discharged up to the fields and the irrigation actually achieved was not monitored on daily basis. Besides, history of maintenance work *viz.* types of work of maintenance, location, starting and finishing date of maintenance work, cost involved *etc.* were not monitored.

Deficient monitoring led to lower than contemplated irrigation intensities, financial irregularities such as excess and avoidable payment to Contractors *etc.* as discussed in the preceding paragraphs.

Department did not furnish any reply to this observation.

5.11 Availability of manpower

Audit noticed that permanent post of *Amin* and Patrol was abolished (May 2005) and permanent *Amin* and Patrol was not posted in the Division, *khatiyani* was prepared partially by the *Amin* deployed on casual basis. 80 per cent and 76 per cent posts of front line field engineers *i.e.* Assistant Engineer and Junior Engineer were vacant respectively as shown in *Appendix 4-G*.

Shortage of manpower led to short preparation of *khatiyān*, short raising of demand as well as collection of water charges. Audit further observed that revenue demand of ₹ 1.22⁵⁶ crore was to be raised against reported irrigation during 2015-21. However, demand of ₹ 53.46 lakh (44 *per cent*) only was raised. Against that, no revenue collection was made during 2015-21.

Also, shortage of manpower led to inadequate operation and maintenance of the system and this resulted in short achievement of irrigation intensity.

Department accepted the audit observation and stated that the work of preparation of *khatiyān* was being done phase-wise. Efforts were being made to sort out the deficiency of technical manpower. The recruitment of Assistant Engineers and Junior Engineers was going on.

5.12 Conclusion

Due to procedural delays and change in the scope of work, the project could be completed (except lining work in one distributary) with delay of 22 years and increase in project cost by ₹ 69.39 crore. Despite project expenditure of ₹ 134.56 crore, against the contemplated gross irrigation to 84,834 Ha, based on net water availability, irrigation was possible maximum to 51,480 Ha (61 *per cent*) only during 2015-21. Agricultural produce, attributable to surface irrigation, was only 53 to 76 *per cent* of envisaged 70,695 MT. Thus, intended benefits expected from the project were yet to accrue. This was mainly due to insufficient infrastructure and ineffective Participatory Irrigation Management. To cater CCA of 9,000 Ha, only 47 water courses were constructed in the distributaries and 15 direct outlets were constructed in the main canal, but according to WRD Guidelines for preparation of cost estimate, these water courses and outlets could irrigate only 1,581 Ha (18 *per cent*). Moreover, out of proposed 750 outlets and 100 syphons in the water courses, no such structure was constructed. The project was not covered by Command Area Development Programme. As a result, beneficiaries were deprived of the intended benefits receivable from construction of field channels, formation of Water User Associations *etc.* Also, maximum possible irrigation was lower than contemplated irrigation, ranging from 19 to 33 *per cent*, during *Rabi* season.

5.13 Recommendations

- Department should develop command area with construction of sufficient number of outlets and water courses to ensure intended irrigation at the field level.
- The project should be included in the CAD programme to get its intended benefits by implementation of Participatory Irrigation Management with formation of sufficient number of Water User Associations.
- Department should take necessary steps for proper assessment of crop water requirements of entire CCA considering the irrigation intensity as well as project efficiency and ensuring discharge of water according to assessment.

⁵⁶ As per Departmental Irrigational Reporting, Revenue Demand of ₹ 1.22 crore was to be raised. The rate was ₹ 217 per Ha and ₹ 185 per Ha for Kharif and Rabi respectively. As per net water availability, revenue demand of ₹ 1.08 crore should have been raised. Kharif- 44,395 Ha @ ₹ 217.45 and Rabi- 14,060 Ha @ ₹ 185.32.

- Department should ensure preparation of DPR including all the components of the project and computation of Benefit-Cost ratio as per the prescribed guidelines and based on authentic inputs.
- Control mechanism prescribed under codal provisions should be strengthened to avoid excess/irregular payment and timely acquisition of required land before the award of work.
- Department should ensure adequate deployment of manpower for preparation of *sudkar/khatiyar*, proper raising of demands and collection of revenue as well as operation and maintenance activities.

Chapter-6
Chanken Irrigation
Project

Chapter -6

Chanken Irrigation Project

Chanken Irrigation Project (CIP) is one of the major irrigation projects of Bihar. It covers parts of Munger district. Audit scope pertained to the period 2018-21. About 159 years ago, the then *Darbhangra Maharaj* constructed an earthen dam and distributary system on river *Chanken* to irrigate a large area. This dam completely collapsed by 2013 and therefore was not in operation. Therefore, the irrigation project, Chanken Irrigation Project was floated (December 2013) to cater CCA of 10,251 Ha (with irrigation intensity of 100 *per cent*), spread across 57 villages of six blocks in Munger district, for irrigation during *Kharif* season only.

Audit findings

6.1 Unfruitful expenditure

Post-project annual agriculture produce was contemplated to be 30,753 MT. Project components and expected outcome were (i) construction of gated weir on river *Chanken* at *Mureri* to provide irrigation to CCA of 7,278 Ha, (ii) construction of *Ratni* gated check dam on river *Gangri* to provide irrigation to CCA of 423 Ha, (iii) construction of *Jhagrahawa* check dam on river *Belharni* to provide irrigation to CCA of 2,550 Ha and (iv) construction/renovation of main canal, distributaries, head regulator, cross regulator, falls, bridges, village channels, outlets *etc.* The envisaged project life was 50 years. WRD approved DPR (December 2013) with an estimated cost of ₹ 34.96 crore. The project was scheduled to be completed by May 2015.

Project started in September 2015, midway stopped in January 2018 after expenditure of ₹ 35.78 crore and no benefit accrued to intended beneficiaries from the project. Midway stoppage may be attributed to unavailability of funds and short acquisition of land as detailed in succeeding sub-paragraphs.

6.1.1 Unavailability of funds

After lapse of more than one year since Administrative Approval (January 2014), NIT was issued (June 2015) only for construction of three weir/check dam at *Mureri*, *Ratani*, and *Jhagrahawa*. Against their estimated cost of ₹ 24.13 crore and agreement (September 2015) value of ₹ 24.01 crore, actual expenditure increased (48 *per cent*) (January 2018) to ₹ 35.78 crore due to change in site condition and increase in quantity of work and the tendered work was completed (January 2018). Increase in cost of work was duly approved by WRD, however, no additional funds were sanctioned for execution of the remaining works which could make actual irrigation possible. Therefore, tender was not invited (December 2021) for the remaining works *viz.* construction/renovation of main canal, distributaries, head regulator, cross regulator, falls, bridges, village channels, outlets *etc.* As a result, the project remained abandoned since 2018 and the concerned Executive Engineer, Irrigation Division, Tarapur did not specifically apprise higher authorities about the requirement of funds to make the project functional. However, the Irrigation Division apprised (September 2020 and May 2021) higher authorities about the nil irrigation. No corrective action was taken by them (December 2021).

6.1.2 Short acquisition of land

According to the approved DPR, 14.8 acres of land was to be acquired for construction of Chanken Headworks, Afflux *Bundh*, left distributary system and linked canal near *Jhagrahawa Bundh*. Audit observed that in place of 14.8 acres, only 2.18 acres of land was acquired (May 2018). As a result, distributary system *et al* were not executed. Water cannot reach at the tail end without construction of distributary system.

6.1.3 Project outcome

As per the approved DPR and BC ratio, the net forecast annual benefits of the project in terms of agriculture produce was worth ₹ 16.03 crore annually. However, even after lapse of more than six years, since commencement of the project, irrigation potential utilized was nil. Thus, the benefits envisaged in DPR could not be achieved.

6.1.4 Physical status of the project

With the passage of time and without use, the irrigation structure created was of not much use and was subject to gradual deterioration. The same was confirmed during joint physical verification (August 2021).

A small sample of 21 beneficiaries were surveyed who stated that water was not being provided to them through Chanken Irrigation Project as distributaries, sub distributaries, minors, water channels and outlets were not in place. They used personal pump sets for irrigation.

Department replied that irrigation potential utilisation was partially achieved through existing old *pyne* system. Intended irrigation would be achieved after project completion. Work could not be completed due to unavailability of funds. Reply of the Department that irrigation potential utilisation was partially achieved was not tenable as the earlier dam and distributary system on *Chanken* river completely collapsed by 2013 and the current project provided nil irrigation only.

6.2 Deficiencies in project formulation/planning, execution

6.2.1 Approval of project despite short availability of water

As per CWC guidelines, after adding conveyance and field application loss @ 49 per cent⁵⁷, gross water requirement comes to 1,11,771 acre feet. As per DPR, available gross water was only 64,372 acre feet, which was 42 per cent less than the requirement to irrigate 10,251 Ha. Despite short availability of water, DPR was approved by WRD.

Department stated that available gross water *i.e.* 64,372 acre feet is sufficient to irrigate 10,251 Ha after conveyance loss. Reply is not tenable as the Department did not consider the conveyance loss prescribed by CWC while formulation of project.

6.2.2 Non-execution of work as per DPR/site condition

As per inspection report (June 2018) of Superintending Engineer, *Bundh* and Gate Design Circle-3, Patna, under-sluice of *Jhagrahawa* check dam was constructed in

⁵⁷ $100 \times 0.4 + 60 \times 0.15 = 0.49$.

right side of structure, while the *pyne* in which discharge of water is to be given was in left side of structure. To operate the sluice, there was a need of bridge which was not provided. The aforesaid comment of Superintending Engineer indicated lack of due diligence while designing the structures.

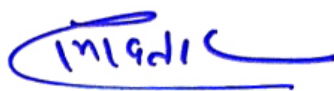
6.3 Conclusion

Despite expenditure of ₹ 35.78 crore on Chanken Irrigation Project, irrigation potential utilisation was nil and no benefits accrued to intended beneficiaries as the work related to distributary system *viz.* distributaries, head regulator, village channels, outlets *etc.* were not carried out due to unavailability of funds and short acquisition of land.

6.4 Recommendation

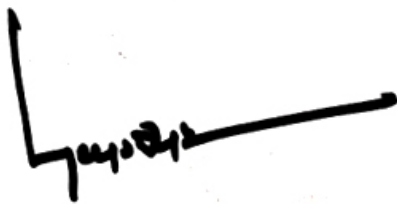
Department should contemplate all the measures to make the project operational so that intended benefit is accrued to the beneficiaries.

Patna
The 01 August 2022


(RAMAWATAR SHARMA)
Accountant General (Audit), Bihar

Countersigned

New Delhi
The 03 August 2022


(GIRISH CHANDRA MURMU)
Comptroller and Auditor General of India

Appendices

Appendix-1

1-A: Details of decrease in water discharge capacity of canal during physical verification

(Reference: Paragraph no. 2.4.2)

(a) Water discharge capacity of canal during physical verification

Eastern Gandak Canal System	Name of Canal visited (Reach)	Reason for decrease in water discharge capacity of canal
Bettiah-I	TMC (RD 155 to 273)	Heavy siltation, shrubs and encroachment.
Bettiah-II	Baswariya SD (RD 1.5 to 19.10)	Heavy siltation, shrubs and bushes.
	Mangalpur Distributary (RD 8)	Broken embankment.
Raxaul	Triveni Branch Canal (RD 424 to 430) and (RD 403 to 404)	Canal was covered with shrubs and bushes and encroachment at canal bank (RD 427, RD 429.55).
Valmikinagar	TMC (RD 0 to 3)	Lining was badly damaged.
Chakia	Kesariya D/S (RD 0 to 73)	Full of weeds and bushes.
Ghorasahan	GBC (RD 110 to 160) Rampur Minor	Full of weeds and bushes.
	Hira Chapra minor (RD 137.80)	Mouth blocked by bushes and weeds.
	Katkenwa Sub-Minor (RD 125.50)	Full of weeds and bushes.
Dhaka	232-272 RD GBC, Goabari Weir Scheme	Head Regulator of Dhaka Main Canal on Goabari Weir heavily silted and hardly operative.
Hajipur	Mallikpur Branch Canal	Maximum agricultural land of the command area was flooded. Shrubs/bushes were found in lined part of the canal also.
Ratwara	TMC (RD 734.35 to 790)	Maximum agricultural land of the command area was flooded/water-logged and the main canal was found with shrubs/bushes.
Saraiya	Vaishali Branch Canal (VBC) (RD 138 to 155) and Habibpur S/D (RD 0 to 15)	CD was found damaged at RD 143 of VBC. Maximum agricultural land of the command area was flooded.
Muzaffarpur	Jaitpur Branch Canal (JBC)	CD was found damaged at RD 18, 42 and 68 of JBC due to leakage.
	Birpur D/S	Shrubs/bushes were found in JBC and Birpur D/S. Rain cut and other type of damage was found on canal embankment of the system owing to weak embankment to carry the designed discharge of water.

(b) Non-functional part of canal found during physical verification

EGCS	Name of Canal visited	RDs of Canal	Reason of non-functional part of canal
Chakia	Lala Chhapra Sub D/S	RD 3.50 to 26	Syphon was broken and jammed.
Ghorasahan	Chikni Minor	RD 0 to 16	Encroachment
Bettiah-II	Nandangarh Minor	RD 0 to 12	Full of siltation and shrubs.
Narkatiyaganj	Triveni Branch Canal	RD 176 to 190	Collapsed/filled with shrubs and bushes.

1-B: Achievement of agriculture produce*(Reference: Paragraph no. 2.6)*

Year	Contemplated		Maximum possible		Percentage of achievement against expected agriculture produce
	Area to be irrigated as per BC ratio in DPR (in Ha)	Expected Agriculture produce as per DPR (in lakh MT)	Area irrigated as per net availability of water	Agriculture Produce (in lakh MT)	
2015-16	6,62,400	45.576	2,01,320	13.851	30
2016-17	6,62,400	45.576	2,24,520	15.447	34
2017-18	6,62,400	45.576	1,61,480	11.110	24
2018-19	6,62,400	45.576	2,25,040	15.483	34
2019-20	6,62,400	45.576	2,08,680	14.358	31
2020-21	6,62,400	45.576	1,64,240	11.300	25

1-C: Comparison of pre and post-cropping pattern of EGCS*(Reference: Paragraph no. 2.7)**(Cropping pattern in per cent of CCA)*

Sl. No.	Season	Crop	Pre-project cropping pattern during 2001-02	Proposed post-project cropping pattern in DPR	Post-project cropping pattern during 2019-20	Variation (in per cent)
1.	Kharif	Paddy	21	71	52.60	-26
2.		Maize	3	15	12.58	-16
3.	Rabi	Wheat	11	18	38.97	117
4.		Oilseeds	1	6	1.47	-76
5.		Pulses	1	6	5.89	-2
6.		Vegetables	2	6	8.26	38
7.	Hot weather	Green Gram	5	11	0.10	-99
8.	Perennial	Sugarcane	2	5	18.11	262

(Source: DPR of project and Directorate of Economics and Statistics)

1-D: Statement showing excess payment on account of different types of irregularities

(Reference: Paragraph no. 2.9.4.2)

Division	Package/Work	Amount (₹ in lakh)	Reasons/remarks
TCD, Motihari	24	5.00	Payment till 12 th RA bill was ₹ 9.46 crore, whereas in the 13 th RA-cum-final bill, the previous payment of ₹ 9.41 crore was deducted. Actually, recovery of ₹ 5.00 lakh towards Mobilization Advance in 11 th RA bill was not considered as payment.
	27	3.00	Payment till 9 th RA bill was ₹ 2.65 crore, whereas in the 10 th RA-cum-final bill, the previous payment of ₹ 2.62 crore was deducted. Actually, recovery of ₹ 3.00 lakh towards Mobilization Advance in 5 th RA bill was not considered as payment.
TCD, Hajipur	42	1.25	Excess payment of ₹ 1.25 lakh was made to the Contractor towards price escalation in first (composite) and second RA bill due to application of higher WPI.
TCD, Muzaffarpur	37	10.11	Price escalation for 16 th RA bill, was calculated on ₹ 44.51 lakh instead of actual net bill value of ₹ 24.51 lakh which resulted in excess payment of ₹ 10.11 lakh to the Contractor.
	36	4.17	As per the agreement (Bill of Quantity), rate of carriage of 150 mm dia NP2 Hp was ₹ 1,101.35 per 100 metre. However, it was observed that the said rate was taken as ₹ 1,101.35 per metre in the final bill which resulted in excess payment of ₹ 4.17 lakh.
TCD, Saraiya	30	1.00	₹ 13.36 lakh was paid to Contractor but ₹ 12.36 lakh only was shown as paid in final bill. Resultantly, excess payment of ₹ 1.00 lakh was made to the Contractor.
Triveni Canal Division, Narkatiyaganj	1SBD/2014-15 2SBD/2014-15 3SBD/2014-15	76.30	It was observed that 11 items of work which were already included in primary agreement were included in supplementary agreement also. But, rate of those items in the supplementary agreement were higher than the rate of primary agreement in violation of Rule 182A of the BPWD code and therefore payment for these items were made at higher rate which resulted in excess payment of ₹ 76.30 lakh to the Contractor.
Triveni Canal Division, Narkatiyaganj	3SBD/2014-15	14.36	The Contractor was paid carriage charge for 4,101.742 M ³ of Stone Chips against execution of work. However, only 3,527.245 M ³ of Stone Chips were required. So, the Contractor was paid carriage for extra 574.497 M ³ Stone Chips in excess which led to excess payment of ₹ 14.36 lakh.
Triveni Canal Division, Narkatiyaganj	5	1.69	Contrary to work agreement provision of deduction of settlement allowance of 12.50 per cent from the gross value of earth, in four Divisions under EGCS, payment for earth work in filling of canal bank and embankment was done without deducting the required settlement allowance which resulted in excess payment of ₹ 18.60 ⁵⁸ lakh.
GCD, Raxaul	6	12.47	
WMCD, Valmiki Nagar	1SBD/2012-13	0.45	
TCD, Dhaka	2	3.99	
	Total	133.79	

⁵⁸ TCD, Narkatiyaganj (Package/Agreement No. 5)- ₹ 1.69 lakh; GCD, Raxaul WMCD (Package/Agreement No. 6)-₹12.47 lakh; WMCD Valmikinagar (Package/Agreement No. 1)- ₹ 0.45 lakh; TCD Dhaka (Package/Agreement No. 2)- ₹ 3.99 lakh.

1-E: Statement showing payment on account of variations/extra items without sanction of competent authority

(Reference: Paragraph no. 2.9.4.3)

Division	Package	Amount (₹ in lakh)	Reason
TCD, Dhaka	3	1.12	It was observed that an amount of ₹ 65,853.87 was paid to the Contractor for “Brickbat filling supply and laying jhawakhowa” and ₹ 11,923.63 was paid for “carriage of brickbat”, though these items were not in the BoQ of package-3 and any further approval of these extra items or supplementary BoQ approved by the Competent Authority was also not found on record.
GCD, Raxaul	7	7.81	It was noticed that extra work worth ₹ 5,40,323.40 was executed by the Contractor under 8 number of items, however approval of the same by the Competent Authority was not found on the record. This resulted in irregular payment of ₹ 7,80,929.41.
TCD, Saraiya	29 to 33	205.95	Scrutiny revealed that in 33 numbers of items, work executed exceeded the BoQ by 11 to 355 per cent. But, the sanction of the competent authority was not obtained leading to irregular payment of ₹ 2,05,94,579.
	Total	214.88	

1-F: Statement showing details of payment of price escalation

(Reference: Paragraph no. 2.9.4.4)

Division	Package No.	Price escalation paid (₹ in lakh)
TCD, Chakia	26	321.65
TCD, Dhaka	3	226.21
TCD, Hajipur	39	773.44
	40	20.28
	41	28.17
	42	349.98
	42	349.98
TCD, Muzaffarpur	28	80.79
	34	432.05
	36	76.25
	37	398.95
	38	1,324.13
TCD, Ratwara	43	426.68
	44	682.28
	45	566.74
TCD, Saraiya	30	228.73
	31	167.97
	33	596.98
HWD, Valmikinagar	46	580.51
TCD, Narkatiyaganj	4&5	578.01
TCD, Bettiah-I	1	263.70
	12	109.25
	16&19	102.09
	17	73.87
	18	80.36
	20	97.35
	21	112.45
TCD, Bettiah-II	13&14	193.64
	15	139.86
	16(p)	4.00
	Total	9,036.37

1-G: Details of payment for jungle clearance and grass removing*(Reference: Paragraph no. 2.9.4.5)*

Division	Package No./ Agreement No.	Quantity executed (m ²)	Rate (₹)	Amount paid (₹ in lakh)
GCD, Raxaul	6	2,58,015.60	0.65	1.68
	6	5,85,680.50	1.15	6.74
	7	3,16,401.20	0.65	2.06
	7	1,54,668	1.15	1.78
	8	78,203.80	0.65	0.51
TCD, Chakia	25	41,16,136	0.65	26.75
TCD, Dhaka	2	1,72,887.28	0.65	1.12
	2	1,77,192.55	1.15	2.04
	3	4,87,983.21	0.65	3.17
TCD, Muzaffarpur	28	3,48,677	1.15	4.01
	34	5,00,535	1.15	5.76
	35	13,75,550	1.15	15.82
	36	5,40,645	1.15	6.22
	37	1,06,842	1.15	1.23
	38	2,65,380	1.15	3.05
TCD, Saraiya	29	6,99,991.6	1.15	8.05
	30	3,39,676.15	1.15	3.91
	31	4,84,872.88	1.15	5.58
	32	4,10,879.70	1.15	4.73
	33	2,31,289.82	1.15	2.66
TCD, Raxaul	9	4,17,634	1.15	4.80
	9	2,29,103.39	0.65	1.49
	10	3,75,400	0.65	2.44
	11	6,05,389.25	1.15	6.96
	11	5,38,244	0.65	3.50
TCD, Motihari	22	4,77,028.23	0.65	3.10
	22	14,31,254.71	1.15	16.46
	23	11,87,148.97	0.65	7.72
	23	2,76,311.50	1.15	3.18
	27	1,57,845.55	0.65	1.03
TCD, Hajipur	39	41,585.55	1.15	0.48
	40	2,84,545.86	1.15	3.27
	41	52,322.58	1.15	0.60
	42	13,38,105.93	1.15	15.39
TCD, Bettiah-I	1	3,58,634.79	1.15	4.12
	27	67,380	0.65	0.44
Total				181.85
Add 44.53 per cent above BoQ				80.97
Grand Total				262.82

1-H: Sanctioned strength and person-in-position*(Reference: Paragraph no. 2.11)**(As on March 2021)*

Name of Project	Sanctioned Strength			Men-in-position			Vacancy Percentage		
	EE	AE	JE	EE	AE	JE (Regular + Contract)	EE	AE	JE
EGCS	18	108	303	6	27	31+58	67	75	71

(Source: - CE, Irrigation creation, Motihari)

Appendix-2

2-A: Details of decrease in water discharge capacity of canal

(Reference: Paragraph no. 3.4.2)

Name of Irrigation Division	Name of Canal	Reason for decrease in water discharge capacity of canal
Araria	Araria Branch Canal	Heavy siltation
Banmankhi	Dhamdaha D/S (RD 0 to 9.10)	Broken Aquaduct and structure
Birpur	Main Canal	Siltation
Katihar	Bajinathpur SD (RD 30 to 32)	Engulfed with garbage
Murliganj	Gangapur D/S (RD 48.20)	Engulfed with garbage
Triveniganj	Murliganj Branch Canal (MBC)	Maximum area of MBC and upper reach of Triveniganj Sub-distributary was engulfed with silt

2-B: Non-functional part of canal

(Reference: Paragraph no. 3.4.2)

Name of Irrigation Division	Name of Canal visited	Non-functional part of canal	Reason of non-functional part of canal
Birpur	Fulkaha distributary	RD 47 to 85	Non-construction of CD at 47 RD during ERM of the project
Raghopur	Rajpur Branch Canal	RD 0 to 32.80	Heavy siltation
Saharsa	Bangaon SD	RD 34 to 38	Encroachment, heavy siltation and plants growing on the canal banks
Triveniganj	Triveniganj Sub D/S	RD 28 to 79	Heavy siltation
Narpatganj	Simarbani D/S	RD 20.60 to 45.70	Breaches of embankment since 2008 and non-construction of CD at RD 22
Araria	Mahishakol D/S	RD 24 to 65	Non-construction of CD at RD 40
	Sapa Sub D/S	RD 4 to 52.50	Breaches of embankment since 2019

2-C: Achievement of agriculture produce

Reference: Paragraph no. 3.6

Year	Contemplated		Maximum possible		Percentage of achievement against expected agriculture produce
	Area to be irrigated as per DPR (in Ha)	Expected Agriculture produce as per DPR (in lakh MT)	Area irrigated as per net availability of water	Agriculture Produce (in lakh MT)	
2015-16	7,35,500	25.739	1,99,240	6.972	27
2016-17	7,35,500	25.739	1,31,080	4.587	18
2017-18	7,35,500	25.739	82,880	2.900	11
2018-19	7,35,500	25.739	1,65,560	5.794	23
2019-20	7,35,500	25.739	1,26,200	4.416	17
2020-21	7,35,500	25.739	1,10,840	3.879	15

2-D: Sanctioned strength and men-in-position

(Reference: Paragraph no. 3.12)

(As on March 2021)

Name of Project	Sanctioned Strength			Men-in-position			Vacancy Percentage		
	EE	AE	JE	EE	AE	JE (Regular + Contract)	EE	AE	JE
EKCS	14	66	166	7	11	89 (33+56)	50	83	46

Appendix-3

3-A: Achievement of agriculture produce

(Reference: Paragraph no. 4.6)

Year	Contemplated		Maximum possible		Percentage of achievement against expected agriculture production
	Area to be irrigated as per DPR (in Ha)	Expected Agriculture produce as per DPR (in MT)	Area irrigated as per net availability of water (in Ha)	Agriculture Produce (in MT)	
1	2	3	4	5	6
2017-18	41,052	1,73,005	24,400	1,02,829	59
2018-19	41,052	1,73,005	23,920	1,00,806	58
2019-20	41,052	1,73,005	19,880	83,780	48
2020-21	41,052	1,73,005	17,080	71,980	42

3-B: Calculation of BC Ratio

(Reference: Paragraph no. 4.8)

Particulars	As per DPR		Audit Calculation as per CWC guidelines	
	Pre-project (₹ in lakh)	Post-project (₹ in lakh)	Pre-project (₹ in lakh)	Post-project (₹ in lakh)
A. Gross receipts				
1. Gross value of farm produce	7,365.14	22,856.72	9,915.14 (WN 2)	16,760.58 (WN 1 & 3)
2. Add dung receipts	331.43	685.70	446.18	502.82
3. Total	7,696.57	23,542.42	10,361.32	17,263.40
B. Expenses				
1. Expenditure on seeds, manure and hired labour	5,870.79	6,384.03	5,870.79	6,384.03
2. Fodder expenses @ gross value of produce 15 per cent before and 10 per cent after project	1,104.77	2,285.67	1,487.27	1,676.06
3. Depreciation on implements @ 2.7 per cent of farm produce before and after project	198.86	617.13	267.71	452.54
4. Share & Cash rent @ 5 per cent before and 3 per cent after project of farm produce	368.26	685.70	495.76	502.82
5. Land Revenue @ 2 per cent of farm produce before and after project	147.30	457.13	198.30	335.21
Total (B) expenses	7,689.98	10,429.66	8,319.83	9,350.66
C. Net value of produce				
Total gross receipts (A3)	7,696.57	23,542.42	10,361.32	17,263.40
1. Total expenses (B6)	7,689.98	10,429.66	8,319.83	9,350.66
2. Net value of produce (C1-C2)	6.59	13,112.76	2,041.49	7,912.74
D. Annual benefits (For stage 1 and 2)				
1. Net value post-project		13,112.76		7,912.74
2. Net value pre-project	6.59		2,041.49	
Net Annual benefits (D1-D2)		13,106.17		5,871.25

Particulars	As per DPR		Audit Calculation as per CWC guidelines	
	Pre-project (₹ in lakh)	Post-project (₹ in lakh)	Pre-project (₹ in lakh)	Post-project (₹ in lakh)
E. Costs				
1. Capital cost of project		53,101.00		82,397.00
2. Cost of land development @ ₹ 20,000/Ha		8,210.40		8,210.40
Total cost of project (E1+E2)		61,311.40		90,607.40
F. Annual costs (For stage 1 and 2)				
1. Interest on capital @ 10 per cent of the estimated cost of the project.		6,131.14		9,060.74
2. Depreciation of the project @ 2 per cent of the cost of the project.		1,062.02		1,812.14
3. Annual operation and maintenance charge @ ₹ 1,175/Ha of CCA		482.36		482.36
4. Maintenance of headworks @ 1 per cent of its cost (₹ 234.14 crore as per DPR and ₹ 258.50 crore as calculated by Audit)		234.14		258.50
5. Cost towards incurring the expenses in irrigating the command through ground water during shortfall in canal water		145.73		145.73
Total Annual costs (F1 to F5)		8,055.39		11,759.47
Benefit-Cost ratio = Annual benefits/ Annual costs		1.63		0.50

Working Note 1: Possible Irrigation achievement as per net water availability

Year	Average discharge	Loss @ 34.3 per cent	Net availability of water	Irrigation	Average irrigation
2017-18	930	318.99	611.01	24,440.40	
2018-19	910	312.13	597.87	23,914.80	
2019-20	756	259.308	496.692	19,867.68	
2020-21	650	222.95	427.05	17,082	
Total				85,304.88	21,326.22

Working Note 2: Pre-project gross value of farm produce

Crop	Area (in Ha)	Production per Ha	Total production (quintal)	Rate per quintal	Value of production (₹ in lakh)
Paddy (I)	15,000	40	6,00,000	850	5,100.00
Paddy(U)	1,421	20	28,420	850	241.57
Maize	22,587	15	3,38,805	1,000	3,388.05
Black Gram	2,044	10	20,440	5,800	1,185.52
Total	41,052		9,87,665		9,915.14

Working Note 3: Post-project gross value of farm produce

Crop	Contemplated irrigation (in Ha)	Actual Irrigation (in Ha)	Rainfed-irrigated (in Ha)	Irrigated area yield rate/Ha	Rainfed irrigated area yield rate/Ha	Total production irrigated (in Ha)	Total production rainfed irrigated (in Ha)	Gross production (in quintal)	Rate per quintal (in ₹)	Value of production (₹ in lakh)
Paddy (M)	10,472	5,440	5,032	50	20	2,72,000	1,00,640	3,72,640	850	3,167.44
Paddy (S)	27,229	14,145	13,084	40	20	5,65,800	2,61,680	8,27,480	1,250	10,343.50
Maize	838	436	402	50	15	21,800	6,030	27,830	1,000	278.30
Black Gram	2,513	1,305	1,208	30	10	39,150	12,080	51,230	5,800	2,971.34
Total	41,052	21,326	19,726			8,98,750	3,80,430	12,79,180		16,760.58

3-C: Loss to the Department*(Reference: Paragraph no. 4.9.3.1)**(Amount in ₹ crore)*

Agreement no. (Project/Division)	Agreement value (Agreement / completion)	Value of work done	Amount not recovered from Contractor
7SBD/2015-16 (Uderasthan /Jehanabad)	26.98 (July 2012/ March 2017)	10.42 (June 2017)	₹ 2.82 crore (excess payment ₹ 1.22 crore, P & M advance and interest ₹ 0.94 crore, Liquidated damage ₹ 0.49 crore, Performance Guarantee (PG) ₹ 0.17 crore)
1SBD/ 2014-15 (Uderasthan / Uderasthan)	10.45 (December 2014/December 2016)	9.09 (June 2017)	₹ 1.35 crore (non-forfeiture of Security Deposit (SD) of ₹ 0.73 crore and PG of ₹ 0.62 crore)
5SBD/2014-15 (Uderasthan/ Uderasthan)	13.86 (March 2015/ March 2017)	4.70 (May 2017)	₹ 3.67 crore (secured advance ₹ 1.21 crore, non-forfeiture of SD ₹ 0.38 crore and PG ₹ 1.32 crore, Liquidated damage ₹ 0.76 crore)
4 SBD/2013-14 (Uderasthan /Uderasthan)	22.78 (August 2013/August 2015)	8.94 (May 2017)	₹ 4.19 crore (SD of ₹ 0.71 crore, PG ₹ 1.66 crore, Liquidated damage ₹ 0.88 crore, Secured advance ₹ 0.94 crore).
Total			₹ 12.03 crore

3-D: Statement showing excess payment on account of different types of irregularities*(Reference: Paragraph no. 4.9.3.3)*

Division/Agreement	Amount (₹ in lakh)	Reasons/remarks
Irrigation Division Uderasthan/ 1F2/2007-08	101.14	An amount of ₹ 1.01 crore was incorrectly paid to the Contractor towards payment of differential amount of royalty by applying inapplicable rates of royalty, without evidence of actual payment and that too without approval the competent authority.
	953.42	The payment was made to Contractor for supply of boulder, their pitching and carriage after making deduction of five <i>per cent</i> only towards voids. However, relevant clauses of the agreement provide for deduction at the rate of 20 <i>per cent</i> towards voids. Thus, short deduction towards voids resulted in excess payment of ₹ 9.53 crore.
	169.75	It was observed that supplementary agreement for an extra item in afflux <i>bundh</i> was done @ ₹ 588.70/cum for 44,771.33 cum. However, the rate of the same work in Barrage portion under the original agreement was ₹ 209.55/ cum only. Thus, payment at the rate of ₹ 588.70/cum instead of ₹ 209.55/cum in violation of Rule 182A of the BPWD code resulted in excess payment of ₹ 1.70 crore.

Division/Agreement	Amount (₹ in lakh)	Reasons/remarks
Irrigation Division Uderasthan/ 4SBD/2014-15	36.74	According to the work agreement, if earth brought from borrow area to the placement site is watered to maintain uniform moisture content, no extra payment will be done for this. Scrutiny of records disclosed that a Contractor was separately paid for watering the earth. This resulted in avoidable payment of ₹ 36.74 lakh. This was mainly attributable to incorrect inclusion of watering component in the BoQ.
Irrigation Division Jehanabad/ 2SBD/2018-19	3.91	Settlement was deducted @12.50 per cent on net filling quantity (17115.40 cum) in place of gross earth work filling quantity (21839.10 cum) against the provision of technical specification of SBD agreement. This resulted in excess payment of ₹ 3,90,813 to the Contractor on 4024.85 cum of earthwork @97.10/cum.
Irrigation Division, Uderasthan 4SBD/ 2014-15	7.94	Contrary to work agreement containing provision of deduction of settlement allowance of 12.50 per cent from the gross value of earth, in two Divisions of Uderasthan Barrage Scheme, payment for earth work in filling of canal bank and embankment was done without deducting the required settlement allowance which resulted in excess payment of ₹ 49.21 lakh (₹ 7.94 lakh+₹ 6.04 lakh+₹ 35.23 lakh).
Irrigation Division, Jehanabad 11SBD/2011-12	6.04	
Irrigation Division, Jehanabad 7SBD/2012-13	35.23	
Total	1,314.17	

3-E: Payment on account of extra items without sanction of competent authority

(Reference: Paragraph no. 4.9.3.6)

Name of Division/Agreement	Name of item	Expenditure incurred (in ₹ lakh)
Irrigation Division, Uderasthan/ 1F2/2007-08	Construction of haul road	45.99
	Rehandling of boulders	68.06
	Painting work of Barrage	20.11
	Construction of additional outlet	31.46
	Dismantling of old HR and undersluices	18.82
	Total	184.44

3-F: Sanctioned strength and person-in-position

(Reference: Paragraph no. 4.11)

(As on March 2021)

Name of Project	Sanctioned Strength			Men-in-position			Vacancy Percentage		
	EE	AE	JE	EE	AE	JE	EE	AE	JE
Uderasthan Barrage Scheme	2	10	34	2	4	17	-	60	50

Appendix-4

4-A: Structures contemplated in DPR and actual execution

(Reference: Paragraph no. 5.4.1 & 5.9.2)

Items	As Contemplated in the DPR for main canal	Work executed in the main canal	As Contemplated in the DPR for distributary	Work executed in the distributary	As Contemplated in the DPR for water courses	Work executed in the water courses
Head Regulators	8	8	111	8	-	-
Cross Regulators	5	4	10	0	-	-
Escape	2	0	6	0	-	-
Cross Drainage work	18	12	49	11	-	-
Single Lane Road bridge	26	26	41	20	-	-
Double Lane Road bridge				4	-	-
Outlet	23	15	0	0	750	-
Water courses	0	0	111	47	-	-
Fall	-	-	1	0	-	-
Syphon	-	-	-	-	100	0
Lining (Km)	18.20	18.20	37.01	34.30	-	-

(Source: Water Resources Department)

4-B: Achievement of agriculture produce

(Reference: Paragraph no. 5.6)

Year	Contemplated		Maximum possible		Percentage of achievement against expected agriculture production
	Area to be irrigated as per DPR (in Ha)	Expected Agriculture produce as per DPR (in MT)	Area irrigated as per net availability of water (in Ha)	Corresponding Agriculture produce (in MT)	
1	2	3	4	5	6
2015-16	14,139	70,695	7,520	37,600	53
2016-17	14,139	70,695	8,760	43,800	62
2017-18	14,139	70,695	7,880	39,400	56
2018-19	14,139	70,695	7,840	39,200	55
2019-20	14,139	70,695	8,680	43,400	61
2020-21	14,139	70,695	10,800	54,000	76

4-C: Comparison of pre and post-cropping pattern of JPCS

(Reference: Paragraph no. 5.7)

(Cropping pattern in per cent of CCA)

Sl. No.	Season	Crop	Pre-project cropping pattern during 1990-91	Proposed post-project Cropping pattern	Post-project cropping pattern during 2019-20	Variation (in per cent)
1.	Kharif	Paddy	48.00	85.00	86.07	1
2.		Maize	0.76	4.00	0.24	-94
3.	Rabi	Wheat	35.86	44.80	62.93	40
4.		Oilseeds	2.57	10.00	2.42	-76
5.		Pulses	12.57	11.20	5.06	-55
6.		Potato	0.96	2.00	0.28	-86
	Total		100.72	157.00	157.00	

(Source: DPR of project and Directorate of Economics and Statistics)

4-D: Calculation of BC Ratio (Reference: Paragraph no. 5.8)

(Amount ₹ in lakh)

Sl.No.	Particulars	Description of Audit calculation	Audit Calculation	As per DPR
A	Gross Receipts			
1.	Gross Value of farm produce	Working Note 1	5,398.95	9,402.90
2.	Dung Receipts	@ 30 per cent of fodder expenses i.e ₹ 539.90 lakh	161.97	423.12
3.	Total Receipt		5,560.92	9,826.02
B.	Expenses			
1 (a)	Total value of input	8,580 Ha (6,907 Ha + 1,673 Ha) × ₹ 20,000	1,716.00	2,827.80
(b)	Fodder expenses	10 per cent of ₹ 5,398.95 lakh	539.90	424.17
(c)	Depreciation on implements	2.7 per cent of ₹ 5,398.95 lakh	145.77	76.35
(d)	Share and cash rent	3 per cent of ₹ 5,398.95 lakh	161.97	141.39
(e)	Land Revenue	2 per cent of ₹ 5,398.95 lakh	107.98	56.55
4.	Total expenses 1(a) to 1(e)		2,671.62	3,526.26
5.	Net post-project benefit (3-4)	₹ 5,560.92 lakh - ₹ 2,671.62 lakh	2,889.30	6,299.76
6.	Net pre-project benefit	₹ 578.71 × 9,000/19,150 (Calculated on pro-rata basis)	271.98	37.76
7.	Annual Benefit (5-6)	₹ 2,889.30 lakh – ₹ 271.98 lakh	2,617.32	6,262.00
8.	Annual expenditure	20 per cent of capital expenditure of ₹ 13,456.11 lakh (as per Department)	2,691.22	2,379.09
9.	BC Ratio (7/8)	2,617.32/2,691.22	0.97:1	2.63:1

Working Note 1

Crop	Average Irrigation Achieved (Ha)	Yield @ 5 MT/Ha	Rate (in ₹)	Total Value (₹ lakh)
Kharif	6,907	34,535	12,000/MT	4,144.20
Rabi	1,673	8,365	15,000/MT	1,254.75
Total	8,580	42,900		5,398.95

4-E: Excess payment due to non-deduction of settlement allowance (Reference: Paragraph no. 5.9.4.1)

Agreement no.	Earth-filling Quantity (in M ³)	Amount paid @ ₹ 94.40	Settlement quantity @ 1/9 th of total quantity	Excess payment (in lakh)
11SBD/2015-16	15,472	14,60,556.80	1,719.11	1.62
7SBD/2015-16	37,864	35,74,361.60	4,207.11	3.97
8SBD/2015-16	20,110.75	18,98,454.80	2,234.53	2.11
10SBD/2015-16	13,070.90	19,33,899.96	1,452.32	1.37
Total	86,517.65	88,67,273.16	9,613.07	9.07

4-F: Avoidable payment for watering of earth

(Reference: Paragraph no. 5.9.4.2)

Agreement no.	Watering and consolidation Quantity (in M ³)	Total Amount paid @ ₹ 46.10	Amount paid for watering component @ ₹ 23.50/M ³ as per rate analysis (₹ in lakh)
11SBD/2015-16	15,472	7,13,259.20	3.64
7SBD/2015-16	37,864	17,45,530	8.90
8SBD/2015-16	20,110.75	9,27,105.57	4.73
10SBD/2015-16	13,070.90	6,02,568.49	3.07
Total	86,517.65	39,88,463.26	20.34

4-G: Sanctioned strength and men-in-position

(Reference: Paragraph no. 5.11)

(As on March 2021)

Name of Project	Sanctioned Strength			Men-in-position			Vacancy Percentage		
	EE	AE	JE	EE	AE	JE (Regular + Contract)	EE	AE	JE
JPCS	1	5	17	1	1	2+2	-	80	76

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