

Chapter II

Performance Audit

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Performance Audit

Narmada Valley Development Department

2.1 Construction of canals and creation of irrigation potential of Indira Sagar Project

Executive Summary

Indira Sagar Project (ISP) (in district Khandwa) is a multipurpose project of the State on the Narmada River upstream of Sardar Sarovar Project. The project comprises of a 92 m high and 653 m long concrete gravity dam having 7.90 Million Acre Feet (MAF) live storage, 2.00 MAF dead storage capacity and 248.65 km (revised to 243.89 km) long main canal. The objective of ISP canal is to provide irrigation in 1.23 lakh hectare (ha) net irrigation in Khandwa, Khargone and Badwani districts with a total annual irrigation of 1.69 lakh ha. Initially the project was scheduled for completion in three phases by 2008-09. However, it could not be completed and it was rescheduled for its completion up to March 2017 in a phased manner.

A performance audit of construction of canals and creation of irrigation potential of Indira Sagar Project revealed the following deficiencies:

- Revised Administrative Approval (RAA) of ₹ 4,604.52 crore for Indira Sagar Project canal was accorded against final investment clearance for ₹ 3,182.77 crore without ensuring the source of proportionate central assistance for the remaining work of ₹ 1,421.75 crore.

(Paragraph 2.1.6.1)

- The work of the initial reach of the Indira Sagar Project Canal i.e. Phase I and Phase II to provide irrigation in 62,200 ha, were not completed even after incurring expenditure of ₹ 3,102.89 crore.

(Paragraph 2.1.7)

- Award of works without acquisition of land and forest clearance, resulted in avoidable extra cost of ₹ 2.09 crore on account of escalation and ₹ 5.63 crore as idle charges to contractors.

(Paragraph 2.1.7.1)

- The contractors gave emphasis mainly on execution of main canal instead of simultaneous execution of its distribution network which adversely impacted creation of irrigation potential.

(Paragraph 2.1.7.2)

- The execution of distribution network of Khargone Lift Canal without execution of Balancing Reservoirs was not only indicative of unplanned execution but irrigation facility in 23,753 ha area also could not be provided.

(Paragraph 2.1.7.3)

- The Department did not initiate action for recovery of the remaining amount of ₹ 15.92 crore as an arrear of land revenue from the defaulting contractor.

(Paragraph 2.1.8.1)

- Deviations from the condition mentioned in the standard bidding documents, injudicious revision of orders, adoption of incorrect indices for computation of price escalation and irregular grant of time extension after

stipulated completion period resulted in extra payment of ₹ 93.48 crore on account of escalation.

(Paragraphs 2.1.8.2 and 2.1.8.8)

- Unwarranted execution of the Low Density Polyethylene (LDPE) film below pre cast tiles lining in the canal resulted in extra cost of ₹ 78.91 lakh.

(Paragraph 2.1.8.5)

- Penalty of ₹ 118.78 crore was not levied on the turnkey contractors for delays in completion of milestones of the works.

(Paragraph 2.1.8.7)

- Undue benefit of ₹ 1.37 crore was extended to contractors in the form of saving of premium for insurance as the contractors did not provide insurance cover to the works.

(Paragraph 2.1.8.9)

- Engagement of consultants despite the fact that these activities were also included in the scope of works of turnkey contracts, resulted in avoidable expenditure of ₹ 10.96 crore.

(Paragraph 2.1.8.10)

- Inclusion of unwarranted item of transmission line extended undue benefit of ₹ 75.19 crore to the turnkey contractor.

(Paragraph 2.1.8.11)

- Non-execution of item of joint filling resulted in substandard work as well as excess payment to the contractors of ₹ 1.32 crore.

(Paragraph 2.1.8.12)

- The objective of switching over to turnkey contracts from the item rates contracts was not fulfilled as there were abnormal delays in submission of proposal for acquisition of land by the turnkey contractors, delays in execution of the works and consequential non-creation of irrigation potential.

(Paragraph 2.1.8.14)

2.1.1 Introduction

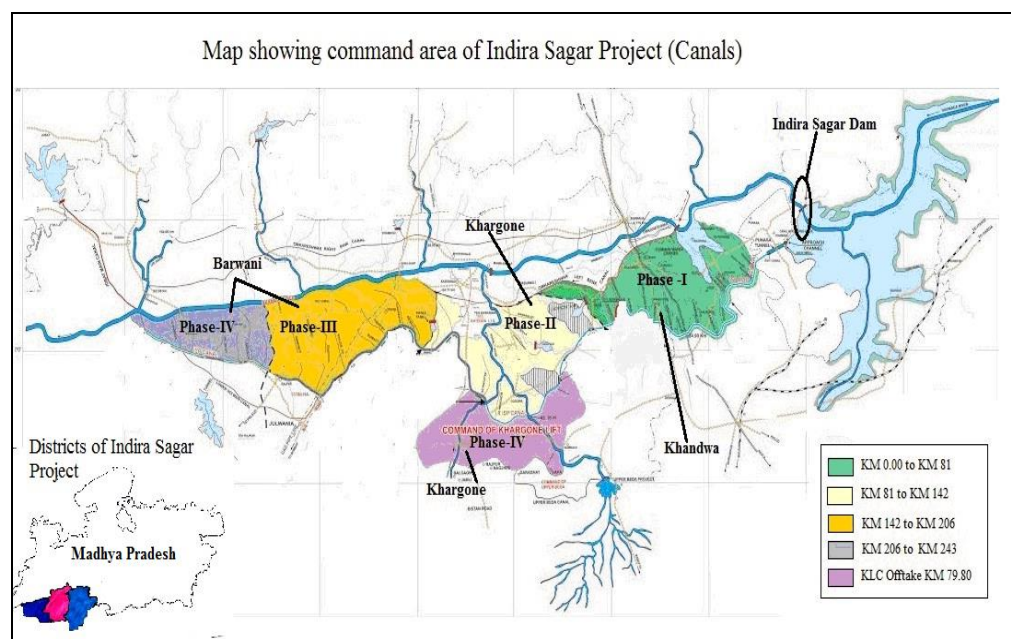
The Narmada river, the fifth largest river in India passes through Madhya Pradesh (MP), Gujarat, Maharashtra with a length 1,312 km of which 1077 km length passes through MP.

To settle down the dispute for Narmada water amongst the state, Narmada Water Disputes Tribunal (NWDT) came into existence in 1969. According to the NWDT award (December 1979) the allotted share of Narmada water for MP was 18.25 MAF out of the total 28 MAF to be tapped before 2024. Thus the State of MP has to ensure that the allocated share of 18.25 MAF water is fully utilised by creation of necessary infrastructure by 2024 to avoid reallocation of unutilised water during review by the NWDT in or after 2024.

The Government of Madhya Pradesh (GoMP) established (1985) Narmada Valley Development Authority (NVDA) for construction of projects to utilise the allotted share of Narmada water. NVDA constructed 13 Major project

across the river Narmada of which the Indira Sagar Project (ISP) is the biggest multipurpose project¹ in terms of the storage capacity.

The project comprises a 92 m high and 653 m long concrete gravity dam, 248.65 km (revised length 243.89 km) long main irrigation canal with its distribution system and Khargone Lift Canal (KLC). The objective of main irrigation canal with its distribution network and KLC was to provide irrigation in 1.23 lakh ha Culturable Command Area (CCA) in Khandwa, Khargone and Badwani districts.



The details of 1.23 lakh ha CCA in Khandwa, Khargone and Badwani districts is given in the **Table 2.1:**

Table 2.1: Command area and proposed annual irrigation of ISP

Sl. No.	District	Culturable command area (ha)	Annual irrigation (ha)	Village benefited (number)
1.	Khandwa	17,800	24,300	74
2.	Khargone	68,400	93,700	388
3.	Badwani	36,800	51,000	134
	Total	1,23,000	1,69,000	596

(Source: Status report of Indira Sagar Project by NVDA)

2.1.2 Organisational set-up

The canal system of ISP including construction of KLC is being implemented by the NVDA. NVDA is headed by the Chairman, who is assisted by Vice Chairman and five full time members (Engineering, Finance, Power, Environment and Forest & Rehabilitation). Project taken up by NVDA is executed through the Chief Engineer (CE) under Member Engineering. The CE, ISP is assisted by three Superintending Engineers (SEs) at Circle level, eight divisions each headed by Executive Engineers (EEs) at the field level.

2.1.3 Audit objectives

Audit objectives for the Performance audit are to examine:

¹ The project comprises generation of power, creation of irrigation facilities and water for industrial use.

- Effectiveness of the financial management and utilisation of funds,
- Adequacy of planning and extent of creation and utilisation of irrigation potential,
- Efficiency, economy and effectiveness in management of contracts for the project and execution of works according to plan and specifications.

2.1.4 Audit criteria

The audit findings are based on the criteria derived from the following:

- Detailed project reports (DPR) and plan documents
- Madhya Pradesh Works Department Manual (MPWD Manual) issued by Government of Madhya Pradesh (GoMP) and Specifications for irrigation works issued by Water Resources Department (WRD) as adopted by NVDA
- Unified Schedule of Rates (USR) for Water Resource Department
- Technical circulars and orders issued by the Departments
- Terms and conditions of item rate agreements as well as turnkey agreements

2.1.5 Scope and methodologies of Audit

The scope of the performance audit was limited to ISP Canal and KLC since the work of dam and power house were already transferred (October 2000) to Narmada Hydroelectric Development Corporation.

For the period up to 2009-10, an expenditure of ₹ 1,485.87 crore had been incurred on implementation of canal works of ISP and from the period 2010-11 to 2014-15, an expenditure of ₹ 1,617.02 crore has been incurred on canal works and KLC. In the performance audit, planning, creation and utilisation of irrigation potential (IP) and fund management for ISP Canal including KLC for the period 2010-11 to 2014-15, have been covered.

The project is being executed in eight divisions² of the NVDA in three districts. Records of offices of the CE, ISP Canal and all the eight divisions engaged in the construction of ISP main canal, distribution network and KLC were reviewed between January 2015 and June 2015 covering the transactions from 2010-11 to 2014-15. Besides, information relating to the project were also collected from NVDA, Bhopal as well as SEs and CE, ISP Canal.

The objectives, criteria, scope and methodologies of audit were discussed with the Principal Secretary, NVDD, GoMP in the entry conference held in February 2015. Draft report containing audit findings was sent to the Government in August 2015 and their reply was received in November 2015. Exit conference was held on 30 November 2015 with the Additional Chief Secretary, NVDD, GoMP and other officials of the Authority to discuss audit findings. Views expressed during the exit conference and reply of the Government have been incorporated suitably in the report.

² ND Dn.11 Badwani, ND Dn. 24, Khargone, ND Dn.18 Khargone, ND Canal Dn. Khargone, ND Dn.28, Punasa, ND Dn. 27 Rajpur, ND Dn.21, Sanawad and ND Dn.14 Thikri.

Audit acknowledges the co-operation extended by the Department during the course of performance audit.

2.1.6 Project cost and financing for the project

2.1.6.1 Project Cost

The Planning Commission (PC) accorded (1989) investment clearance to the proposal of ISP (Multipurpose) on price level of 1988 for ₹ 1,993.67 crore of which ₹ 541.98 crore was allocated for Unit II ISP Canal to provide irrigation facility in CCA of 1.23 lakh ha. The PC accorded (June 2010) revised final investment clearance for Unit II ISP Canal for ₹ 3,182.77 crore at 2009 price level. It subsequently accorded (February 2013) first time extension up to March 2015 and second time extension (September 2014) for the period up to March 2017 and instructed the State Finance Department to restrict the expenditure up to the approved cost of ₹ 3,182.77 crore. The PC further stated that no additional expenditure beyond approved cost would be permitted unless the revised estimate was got approved as per the prescribed procedure.

The GoMP, NVDD accorded (December 2014) revised administrative approval (RAA) of ₹ 4,604.52 crore for ISP Canal without getting investment clearance from PC. An expenditure of ₹ 3,102.89 crore (67.39 per cent of RAA) was incurred on the project up to March 2015. Increase of 44.67 per cent in cost was mainly due to provision of escalation and provision of increase in compensation as per new Land Acquisition Act. In the absence of investment clearance from the PC, the release of proportionate funding assistance from the Central Government was not assured. Thus, the source of proportionate central funding for the remaining work of the projects valued at ₹ 1,421.75 crore was not clear (November 2015).

2.1.6.2 Utilisation of funds

The canal system of ISP including construction of KLC is being implemented by the Narmada Valley Development Authority (NVDA) with the fundings from Accelerated Irrigation Benefit Programme (AIBP), National Bank for Agriculture and Rural Development (NABARD) and State Government. The funds from AIBP and NABARD were routed through the State budget. The total budget provision, allotment and expenditure on implementation of ISP Canal during the last five years are detailed in **Table 2.2**.

Table 2.2: Budget Allotment and Expenditure

Year	Budget provision	Expenditure			Total expenditure	Utilisation of fund (per cent)
		AIBP	NABARD	State share		
2010-11	202.97	111.66	2.96	77.10	191.72	94.46
2011-12	387.67	0.00	49.35	331.77	381.12	98.31
2012-13	401.76	98.22	35.89	266.79	400.90	99.79
2013-14	528.90	139.90	26.96	305.51	472.37	89.31
2014-15	271.76	47.19	5.82	117.90	170.91	62.89
Total	1,793.06	396.97	120.98	1,099.07	1,617.02	90.18

(Source: Information furnished by the NVDA)

The project has been able to absorb substantially the allotted funds except during 2014-15 when expenditure was less in comparison to the preceding years mainly due to the slow progress of work in Phase IV (ISP main canal from RD km 206 to RD km 243.89).

The Government stated (November 2015) that slow progress of work in phase IV was due to the hindrances created by the *Narmada Bachao Andolan* (NBA) in command area of two km strip near Narmada river. The Government further stated that due to non-availability of land for distribution network as NBA not allowing for survey in the command area.

The reply is not acceptable as the contractor had submitted the proposal of land acquisition only for five minors/distributaries/outlets out of 35 minors/distributaries/outlets of Phase IV. Besides, the contractor did not conduct survey even in command area except two km strip of Narmada.

2.1.7 Planning

For every project, detailed survey and investigation are required for proper planning and correct estimation before awarding the work for execution to ensure timely execution of project and avoidance of cost overrun.

The project was scheduled for completion in a phased manner, initially by March 2009 which was subsequently revised for completion by June 2011 and again rescheduled for its completion by March 2017 by PC without according any further investment clearance beyond ₹ 3182.77 crore. The details of rescheduling of execution of the ISP Canal is given in the **Table 2.3**.

Table 2.3: Original and revised schedule of project execution

Canal reaches/Proposed irrigation (ha)	Proposed completion	Canal reaches/Proposed irrigation (ha) (Reschedule programme)	Revised proposed Completion
Main canal from RD km 0 to RD km 71 /36,100 ha (Phase I)	June-2007	Main canal from km 0.00 to km 142.00, (Phase I and Phase II)/62,200 ha	December- 2015
Main canal from RD km 71 to RD km 206 /46,800 ha (Phase II)	June-2009	Main canal from km 142.00 to km 206.00, (Phase III)/20,700 ha	June-2016
Main canal RD km 206 to RD km 248.65 & KLC/40,100 ha (Phase III)	June-2011	Main canal km 206.00 to km 243.89 (Phase IV) and KLC/40,100 ha	March-2017

(Source: Information furnished by the Chief Engineer ISP Canal)

The work of the initial reach of the ISP Canal i.e. Phase I and Phase II to provide irrigation in 62,200 ha, which were earlier scheduled for completion by June 2007 and June 2009 respectively, were not completed even after incurring expenditure of ₹ 3,102.89 crore (March 2015).

We further noticed discrepancy in designed irrigation potential (IP) being reflected in the information furnished by CE, ISP Canal. The phase-wise designed IP for ISP Canal from RD km 206.00 to RD km 243.89 (Phase IV) is 19,600 ha and designed command of KLC is 33,140 ha. Against total 52,740 ha, the Department had shown designed IP of 40,100 ha only.

Deficiencies in the planning have been discussed in succeeding paragraphs.

2.1.7.1 Award of works without acquisition of land and forest clearance

Paragraph 2.104 of MPWD Manual volume I stipulates that when estimate had been sanctioned and funds allotted, an application for acquisition of land shall be sent to the Collector by Department. It further provides that notification³ for the acquisition of land required for any particular work must be submitted before the work is put in hand. The paragraph 2.111 of the MPWD Manual

³ Notification empowers authorities to enter upon, survey, take levels of land to be acquired etc.

further provides that as per Forest Conservation Act, 1980, all proposals for diversion of forest land to any non-forest purpose would require prior approval of the Central Government.

Award of work without forest clearance led to avoidable payment of escalation ₹ 2.09 crore.

- We noticed (January 2015) that two works⁴ were taken up between December 2006 and February 2007 in anticipation of acquisition of land and forest clearance as detailed in **Table 2.4**.

Table 2.4: Details of work execution, delays and time extension for want of forest clearance

Reaches of the canal in km	Date of work order	Schedule date of completion	Percentage of work executed within due date and after due date	Bill paid (₹ in lakh)	Lapse of time	Delay due to forest clearance	Time extension sanctioned By CE
114.07 to 125	15.12.06	14.06.09	41.33/27.67	2600.42 Escalation 378.62	66 months	1.07 km	31.12.14
125 to 130.93	28.02.07	27.02.09	57/9.87	1126.42 Escalation 123.69	70 months	0.25 km	31.12.14

(Source: Information furnished by the CE ISP Canal)

As indicated in table, these two works required forest land of 1,107 metre and 250 metre respectively which could not be obtained up to the scheduled time of completion. Even after obtaining forest clearance (February 2011) and allowing one year from the date of obtaining forest clearance, the works were not completed (January 2015). Thus, due to taking up works before the acquisition of land, NVDA had to pay minimum avoidable escalation of ₹ 2.09 crore for the period February 2012 to January 2015.

Award of work without forest clearance led to avoidable payment of idle charges of ₹ 5.63 crore to contractor.

- Another work of excavation and earth work in RD km 58.856 to RD km 64.50 of ISP main canal⁵ was awarded (May 2002) to a contractor without obtaining forest clearance. Due to not obtaining the clearance from the Forest Department for the forest land of 3.575 km, the work remained stopped for the period July 2003 to May 2005. Subsequently, the forest land of 1.275 km was made available to the contractor (May 2005) and rest of the land was handed over to the contractor during the period September 2008 to April 2010. Against a suit filed by the contractor, Hon'ble High Court of Madhya Pradesh in its order (June 2006) instructed NVDA to pay idle charges to the contractor and to revise rates of certain items of the work. NVDA paid ₹ 5.63 crore⁶ to the contractor. Thus, the award of work without obtaining clearance from the Forest Department resulted in avoidable extra cost of ₹ 5.63 crore.

In the exit conference (November 2015), the Member Engineering stated that delay was mainly due to the hindrances caused by the NBA activist and stay of High Court. It was further stated that award of works after obtaining forest clearance to avoid such payment had been noted for future compliance.

The fact remains that delays occurred due to not obtaining forest clearance prior to award of the works, which resulted in payment of escalation and idle charges to the contractors.

⁴ Being executed under ND Dn 18, Khargone.

⁵ Work was being executed by ND 21, Sanawad.

⁶ Idle charges of ₹ 44.73 lakh, interest thereof due to delayed payment ₹ 37.51 lakh and revision in rates ₹ 480.57 lakh= ₹ 5.63 crore

Contractors gave emphasis mainly on execution of main canal instead of side by side execution of distribution network which adversely affected the creation of targeted IP.

2.1.7.2 Low priority in construction of distribution network

Specific target and milestones were specified in the DPR for execution of work and creation of the specified IP to avoid delay and ensure timely accrual of intended benefits. Besides, the major activity in the execution of the project should also be taken up in a manner so as to complete all the components at the same time and utilise the created IP⁷ in time.

According to clause 36.1 of Volume IV (drawing and design parameter) of turnkey contracts, the construction of canal system including lining and inline structures for main/branch canals along with distributaries and minors shall be executed simultaneously from head to tail to develop block-wise irrigation facilities in the command area. However, no provision was included in the contract for linkage of payment to the contractor with block-wise creation of IP.

We noticed during audit (January 2015 to June 2015) that all the works related to construction of ISP Canal (downstream of 130 km and KLC, offtaking RD km 79.80 of ISP) with its distribution network were awarded on turnkey contract basis from 2008-09 with a view to accelerate the works of canal. However, the contractors gave emphasis mainly on execution of main canal instead of simultaneous execution with its distribution network, as evident from the details given in the **Table 2.5**.

Table 2.5: Construction of main canals/Balancing Reservoir and distribution network

Phase/Reach in km	Designed length (km)	Completed length (km)	Balance length (km)	Designed irrigation (ha)
Phase I Main canal 0 to 81 km	81	81	0	62,200
Length of distributory/Minors	615	565	50	
Phase II Main canal 81 to 142 km	61	61	0	
Length of distributory/Minors	250	245	5	20,700
Phase III Main canal 142 to 205 km	64	62	2	
Length of distributory/Minors	330	85	245	
Phase IV Main canal 206 to 243 km	37	30	7	40,100
Length of distributory/Minors	240	20	220	
Phase IV Balancing reservoir (KLC)	3 no.	1 no.	2 no.	
Rising main (KLC)	11.4	10.2	1.2	
Gravity main (KLC)	75	58	17	

(Source: Information furnished by the Chief Engineer ISP Canal)

Due to non-execution of distribution network simultaneously with main canal, the objective to develop block-wise irrigation facility in command area were not fulfilled. This has also adversely impacted creation of IP as discussed in the succeeding paragraph.

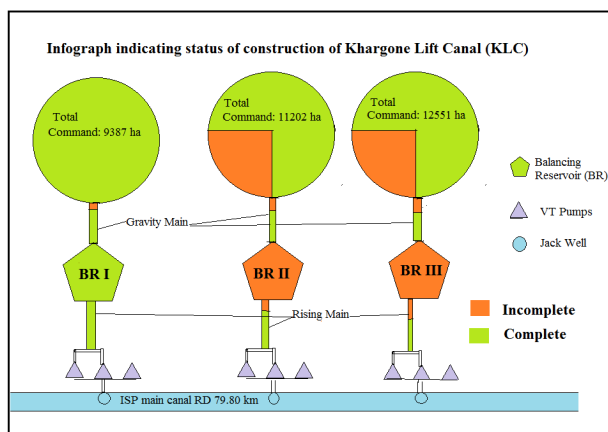
In the exit conference (November 2015) the Member Engineering stated that penalty up to maximum 10 per cent would be imposed on the contractors in the event of non-execution of distribution network and work of Balancing Reservoir (BR) of KLC.

⁷ Irrigation potential is said to have accrued where distribution system has been completed and ready for irrigation.

The fact remains that the distribution network of ISP Canal was not constructed side by side with the main canal. We further noticed that the works of BRs were not executed simultaneously with the distribution system of KLC, which defeated the objective of block wise creation of IP.

Unplanned execution of KLC resulted in non-achievement of irrigation potential in 23,753 ha command area.

2.1.7.3 Unplanned execution of KLC



The construction of KLC at off take from RD km 79.72 of main ISP canal was proposed to provide irrigation facility in 33,140 ha of areas of Khargone district. The work of execution of KLC, including its distribution network up to 40 ha chunk was awarded (March 2011) on turnkey contract to provide irrigation facility in 33,140 ha area at

the cost of ₹ 550.89 crore which was 17.77 *per cent* below the estimates. The work included 38 metre lift and consisted of execution of three Balancing Reservoirs (BRs), laying of 11.4 km rising main, 75 km gravity main (distribution network) and nine numbers of vertical turbine pump. The work was scheduled to be completed in 36 months including rainy seasons (up to March 2014).

In terms of clause 36.1 of Volume IV of the contract agreement, the construction of canal system including structures for main/branch canals along with distributaries and minor shall be executed simultaneously from head to tail to develop block-wise irrigation facilities in the command area of major chunk. Accordingly, the work of rising main, gravity main and BRs of KLC were required to be executed side by side to develop irrigation facility in the command area of major chunk. However, no milestone for block-wise creation of irrigation facility was fixed in the contract.

We noticed (January 2015) that contractor executed BR I with the work of command area of 9,387 ha. We further noted that works related to rising main and gravity main were executed to the extent of 89.47 *per cent* and 77 *per cent* respectively. However, contractor did not execute the works of balancing reservoirs, BR II and BR III. As a result, irrigation facility could not be provided to command of BR II (11,202 ha) and BR III (12,551 ha) despite substantial execution of works of their rising main and gravity main. Thus, faulty planning for execution of KLC and absence of milestones for block-wise creation of IP resulted in non-achievement of objective of KLC.

The Government stated (November 2015) that milestones were fixed for block-wise creation of irrigation facility and 90 *per cent* work of distribution network in stage 2 and 70 *per cent* in stage 3 had been completed from head to tail to provide irrigation in 9,387 and 11,200 ha respectively.

The reply is not acceptable as milestones for block-wise creation of IP was not fixed and also payments to contractors were not restricted according to block-wise creation of IP. The works of BR II and BR III were not started (March

2015) despite substantial execution of works of their rising main and gravity main.

Recommendation

The Government should consider for fixation of milestone for block-wise creation of irrigation potential and linking payment with creation of irrigation potential in the turnkey contracts to avoid time and cost over-run.

2.1.7.4 Creation of Irrigation Potential

As against targeted IP of 1.23 lakh ha, the Department informed creation of IP of 1.10 lakh ha by the end of March 2015 as shown **Table 2.6**.

Table 2.6: Achievement in Irrigation Potential against designed Irrigation Potential

Name of Phase	Designed IP (ha)	Developed IP up to 2009-10 (ha)	Total achievement of IP up to March 2015 (ha)
Phase-I & Phase-II	62,200	37,700	58,000
Phase-III	20,700	0	18,000
Phase-IV	40,100	0	5,000
Phase-IV and KLC		0	28,800
Total	1,23,000	37,700	1,09,800

(Source: Information furnished by the Chief Engineer ISP Canal)

The total achievement of 1.09 lakh ha IP indicated by the Authority is not convincing as distributaries of main canal and two BRs of the KLC were not yet constructed (March 2015) as discussed in paragraph 2.1.7.2 and 2.1.7.3. Since only one BR having command 9,387 ha out of the three BRs of KLC was constructed so far (March 2015), IP of 28,800 ha through KLC was not realistic.

The Government stated (November 2015) that total IP created was based on actual realistic data including feeding of existing tanks of Water Recourses Department (WRD).

The reply is not acceptable as distribution system in Phase IV of ISP Canal was incomplete (85 per cent) and construction of two out of the three BRs of KLC were not taken up (March 2015). Therefore, it is evident that IP of 1.10 lakh ha was not effectively achieved. The command area of ISP would not be covered from the tanks of WRD.

Recommendation

The Government should ensure simultaneous construction of all the components of irrigation system with a view to create and exploit irrigation potential within minimum time.

2.1.8 Contract management and work execution

Contract management is a process of systematically and efficiently managing contract creation, execution and analysis for the purpose of maximising financial and operational performance and minimising risk. Initially, the NVDA awarded contracts on the item rate basis for the works up to km 130 of ISP canals and subsequently switched over to the turnkey contract for the works downstream of km 130 to km 243. The work of KLC, which lift water at RD km 79.80 of ISP Canal, was also taken up through turnkey contract.

During course of field audit, all the 24 main ongoing agreements⁸ valuing ₹ 1,809.54 crore were analysed; of which seven agreements were entered into during the period of 2010-11 to 2014-15 at a cost of ₹ 566.13 crore. Total expenditure incurred on all the 24 ongoing agreements was ₹ 1,606.39 crore including escalation of ₹ 266.83 crore (March 2015). Shortcomings in the management of the contracts leading to excess payment/extra cost/undue benefit/inadmissible payment of ₹ 238.35 crore in respect of 17 contracts have been discussed in the succeeding paragraphs.

Item rate contracts

In item rate contracts, rates are quoted by contractor against each items of a work as mentioned in the tender. During field audit, 17 ongoing item rate agreements valuing ₹ 279.81 crore were examined by us. The shortcomings in contract management and execution have been discussed in the succeeding paragraphs.

2.1.8.1 Non-recovery of excess expenditure from defaulting contractors

Excess expenditure of ₹ 15.92 crore from the defaulting contractors was not recovered.

According to clause 4.3.3.1 of the agreements, when contract is rescinded, the security deposit of the contractor shall stand forfeited. Clause 4.3.3.3 of contract agreement stipulates to measure up the work of the contractor and to take such part thereof as shall be unexecuted out of his hands and to give it to another contractor to complete it. Any excess expenses on the balance work shall be borne and paid by the original contractor. Clause 4.3.38.1 of the agreements provides that the Government shall be entitled to recover amount due from contractor by forfeiting security deposit/performance security of the contractor and in the event of security being insufficient, the balance recoverable amount shall be recovered as an arrear of land revenue.

We noticed (February 2015) in respect of two works⁹ that total time allowed for execution of entire work was 24 months and 18 months respectively. However, after granting time extensions (five times) for the period October 2005 to June 2012 for one work (Sanawad Distributory) and time extensions for the period October 2004 to December 2013 for another work (Excavation & Earth work of main canal of ISP RD km 41.25 to RD km 58.865), the contractors failed to execute the works. Finally, the Department terminated the contracts under clause 4.3.3.3 of the agreements in June 2012 and June 2014 respectively.

The balance quantities of the two works were awarded (December 2013 and March 2015) to other contractors and executed at the extra cost of ₹ 19.50 crore. The Department recovered ₹ 3.58 crore from the security deposit and performance security but did not initiate action for recovery of the remaining amount of ₹ 15.92 crore (**Appendix 2.1**) as an arrear of land revenue from the defaulting contractor.

In the exit conference (November 2015) the Additional Chief Secretary, NVDD agreed (November 2015) to initiate action for recovery of extra cost from contractors through issuance of Revenue Recovery Certificate (RRC).

⁸ Out of 24 agreements, 17 agreements are on item rate, four agreements on turnkey and three agreements are related to consultancy services.

⁹ Sanawad Distributory (Agreement no. 01/2003-04 of ND Dn. 28, Punasa) and Excavation & Earth work of main canal of ISP RD km 41.25 to RD km 58.865 (Agreement no 1/2003-04 of ND 21, Sanawad)

Injudicious revision of order and adoption of incorrect indices of POL led to excess payment of escalation of ₹ 90.47 lakh.

2.1.8.2 *Injudicious revision of order and adoption of incorrect indices of Petrol Oil Lubricant led to excess payment of escalation*

According to the general terms and conditions of item rate contracts, escalation is payable to contractor if construction period is more than 12 months. We noticed unjustified/incorrect payment of escalation in following cases.

- According to the provision of item rate contract, price escalation clause shall be applicable only for the work that is carried out within the stipulated time or extension thereof due to the reasons not attributable to the contractor.

The Department awarded (January 2012) three works of construction of grouted stone pitching in ISP main canal¹⁰ to a contractor on item rate contract basis with allowing completion period of 18 months (including rainy season) from the date of issue of work orders (January 2012).

We noticed (February 2015) that the contractor failed to execute the works within the stipulated time allowed in the agreements. The CE, ISP Canal allowed (September 2013) time extension for all the three works with the condition that the contractor would not be entitled for escalation in the extended time period. However, the successor CE, ISP Canal revised the earlier orders of the time extensions and allowed (June 2014) benefit of escalation to the contractor with freezing the indices on 2 July 2013 (the stipulated completion date) without specifying any reason therein. The revision of orders without any specific justification resulted in avoidable payment of ₹ 41.59 lakh on account of escalation to the contractors (**Appendix 2.2**).

- According to the general terms and conditions of item rate contracts, if the construction period is more than 12 months the amount paid to the contractor for work shall be adjusted quarterly for increase or decrease in the rate of labour, material, Petrol Oil Lubricant (POL), steel and cement. For computation of price escalation on POL, the rate of POL should be considered at prevailing market rate of POL on the date of opening of tender at the area where the work shall be executed.

We noticed (June 2015) that in construction of ISP main canal between RD km 58.856 and RD km 82.395¹¹, the base rate of POL was erroneously taken as ₹ 22.09 per litre instead of ₹ 24.37 per litre prevailing at Sanawad at that time. This resulted in excess payment of ₹ 48.88 lakh (**Appendix 2.3**).

In the exit conference (November 2015) the Additional Chief Secretary, NVDD assured to examine the case of payment of escalation.

2.1.8.3 *Short deduction of additional security deposit from contractors*

According to clause 3.46 of the item rate contracts, in case the approving authority considers that the tenderer has quoted rate for some items disproportionately high and the tender is unbalanced¹², he will have the power to limit the payment to the estimated rate of that item *plus* or *minus* overall percentage above/below as the case may be, of the estimated cost. The

Undue benefit was given to the contractor due to short deduction of ASD of ₹ 1.78 crore.

¹⁰ ND Dn. 28, Punasa is the executing division for three works of grouted stone pitching from RD km 0 to RD km 4.36, RD km 4.36 to RD km 10 and RD km 10 to RD km 17.

¹¹ Work was being executed by ND Dn. 21, Sanawad.

¹² The tender is considered unbalanced, if quoted rates of different items of a work are disproportionately high or low compared to estimated rates of those items.

balance payment of such items shall be retained by Engineer-in-Charge as additional security deposit (ASD). This shall be released only after completion of entire work.

We noticed (January 2015 to March 2015) in respect of three contracts that the divisional officers recovered ₹ 2.19 crore on account of ASD though the recoverable amount of ASD is worked out to ₹ 3.97 crore. Thus, there was shortfall of ₹ 1.78 crore in retention of amount of ASD in respect of the three ongoing works (**Appendix 2.4**). As the NVDA failed to deduct the total amount of ASD in respect of items for which disproportionately higher rates were quoted and those items were mostly paid for, the contractor for three works were not taking interest in execution of cement concrete (CC) lining work for which the contractor had quoted very low rates of ₹ 2,000 per cu m in comparison to the prevailing rate of ₹ 3,256 per cu m (UCSR of 2009). The work of CC lining in 12 km length out of total 24 km remained incomplete even after lapse of more than five years from the scheduled completion period.

The Government stated (November 2015) that out of three contracts, the main items where rates were disproportionately higher were earth work, concrete structure and concrete lining and out of this only lining in about 12 km of main canal was remaining to be executed.

The fact remains that there was shortfall in retention of ASD by 44.84 per cent (March 2015) as a result even after lapse of more than five year from stipulated date of completion, cement concrete lining work in 50 per cent canal length is still incomplete.

2.1.8.4 *Non-recovery of penalty for delay*

Penalty of ₹ 1.63 crore was not recovered from contractor for delay.

As per clause 4.3.2 of item rate contract, the contractor shall pay compensation of an amount equal to one per cent or such smaller amount every day as may be decided on the amount of estimated cost of the work which remains incomplete after the scheduled date, provided that the entire amount shall not exceed 8 per cent of the estimated cost.

The work of ISP main canal from RD km 31.28 to RD km 41.25¹³ was awarded (July 2003) to a contractor at the cost of ₹ 18.22 crore against the estimated cost of ₹ 20.32 crore. Despite seven time extensions with the condition of freezing the price indices prevailing in June 2008, the work valued at ₹ 1.30 crore still remained incomplete (March 2015).

We noticed (February 2015) that the entire land for the work had been acquired and handed over to the contractor by October 2010 but the contractor could not complete the work so far (March 2015). We worked out penalty of ₹ 1.63 crore¹⁴ leviable on the contractor for delays for the period July 2011 to March 2015 (after allowing eight months from the date of handing over the land for execution of balance work of ₹ 1.30 crore).

The Government stated (November 2015) that though the entire land was made available to the contractor up to October 2010, he could not complete the work due to continuous release of water during rabi and kharif season.

¹³ Being executed by ND 28, Punasa

¹⁴ Penalty for 50 months (1,500 days) = 8 per cent of estimated cost = (20.32 crore* 8 per cent)= ₹ 1.63 crore

In the exit conference (November 2015) the Member Engineering stated that notice for levy of penalty had been issued to the contractor and action will be taken after giving opportunity of hearing.

2.1.8.5 Extra cost due to use of LDPE film below pre cast tiles lining

Extra cost of ₹ 78.91 lakh was incurred due to unwarranted execution of LDPE film in precast tiles lining.

According to clause 25.5.1 of technical specifications for irrigation works, a plastic membrane of LDPE of suitable thickness may be used below the concrete lining in sides and in beds, where the sub-grade is of pervious materials like morrum etc., so as to prevent absorption of water from concrete slurry in prepared sub-grade during placement. Further, clause 25.6.4.3.3 of the specifications provides that the sub-grade should be uniformly soaked with water so that soil does not absorb moisture from the mortar laid on the sub-grade for pre cast tiles lining. Hence, there is no need to execute LDPE film below the pre cast tiles lining.

We noticed (March 2015 and June 2015) during the scrutiny of two works¹⁵ that LDPE films were executed below pre cast tiles lining in 2,27,068.14 sq m area at the rate of ₹ 27 per sq m in one work and in 2,51,410.62 sq m area at the rate of ₹ 7 per sq m in other work, which were not required because of pre cast tiles lining. Execution of the LDPE film in the work thus resulted in extra cost of ₹ 78.91 lakh¹⁶. We further noticed during field visit that in execution of Junapani Distributory under turnkey contract, pre cast tiles lining was executed without LDPE film.

The Government stated (November 2015) that Engineer-in-Charge was empowered to decide whether the polythene film should be used or not in terms of the provision of clause 25.5. In the exit conference (November 2015), the Member Engineering, NVDA assured to furnish reply after examination with reference to the specifications.

The reply of the Department is not acceptable in view of the provision of the technical specifications for irrigation works.

2.1.8.6 Non-recovery of item of stacking in excavation of hard rock

Excess payment of ₹ 57.51 lakh was made to the contractor due to non-deduction of rate of stacking in excavation of hard rock.

According to the provision of USR enforced from 2007 issued by WRD, the rate of excavation of hard rock includes the rate of stacking. The item of excavation of hard rock was included in the work¹⁷ of ISP main canal km 80 to km 107. We noticed (February 2015) that the excavated hard rock was not stacked as per the measurements book but full rate was paid, resulting in excess payment of ₹ 57.51 lakh¹⁸ to the contractor for the work not done.

The Government stated (November 2015) that excavated hard rock was accounted for in the MAS (Material at Site) account of Assistant Engineer (AE) field. It was also stated that the useful hard rock was in huge quantity for which separate stacks were not possible, hence stacked along side of the canal. However, in the exit conference (November 2015) the Additional Chief

¹⁵ Agreement no. 01/2008-09 of ND Dn. 24, Khargone and agreement no. 01/2003-04 of ND Dn. 21, Sanawad

¹⁶ $(2,51,410.62 * ₹ 7) + (2,27,068.14 * ₹ 27) = ₹ 78,90,714.12$

¹⁷ Agreement no. 01/2008-09 being executed by ND Dn. 24, Khargone

¹⁸ The total hard rock excavated was 3,81,391.72 cu m. $3,81,391.72 \text{ cu m} * 1.3 = 4,95,809.24 \text{ cu m}$ issued 52,485.10 cu m. $4,95,809.24 \text{ cu m} - 52,485.10 \text{ cu m} = 4,43,324.14 \text{ cu m}$. $4,43,324.14 \text{ cu m} * ₹ 9.20 \text{ per cu m plus } 41.01 \text{ per cent tender premium} = ₹ 57.51 \text{ lakh}$.

Secretary, NVDD stated that the amount would be recovered from the contractor after scrutiny.

Turnkey contracts

A turnkey contract is a type of contract where contractor undertakes the single point responsibility from survey, planning, design, drawing, estimation, preparation of land acquisition proposals along with completion and commissioning of the work, on a firm contract price.

During field audit, four ongoing turnkey contracts for civil works and three turnkey contracts of consultancy valuing ₹ 1,529.73 crore were examined by us. The deficiencies in management of turnkey contracts and execution of works have been discussed in the succeeding paragraphs.

2.1.8.7 Non-levy of penalty for delays

Penalty of ₹ 118.78 crore was not recovered from the turnkey contractors for not achieving the milestone.

According to the clause 115 of special conditions of contract, contractor shall submit a work programme for completing the works. The progress of work shall be monitored by NVDA in every six months period. In the event of any shortfall in progress by more than 20 per cent (10 per cent in turnkey contract for KLC), the penalty shall be imposed on the contractor at the rate of 0.1 per cent per day of the shortfall value (0.2 per cent of initial value of contract in turnkey contract for KLC) till the shortfall is made up and shall be deducted from intermediate payments. The cumulative penalty shall however be limited to 10 per cent of the contract value. This penalty will be imposed notwithstanding the review and rescheduling of the programme or updating of programme and cash flow stated in the tender document.

We noticed (January 2015 to May 2015) in three turnkey contracts¹⁹ awarded during February 2008 to March 2011 at the total cost of ₹ 1,272.37 crore that there were shortfall ranging from 16.65 per cent to 96.45 per cent in achievement of progress against the scheduled programme.

The reasons for delays were attributable to the contractors as there were delays in finalisation of alignment of canal, abnormal delay in submission of proposal for acquisition of land despite the fact that the acquisition of land was the responsibility of contractor and late submission of drawings and designs of structure by the contractors. Therefore, because of substantial shortfall, penalty of ₹ 127.24 crore i.e. 10 per cent of the total contract value was required to be imposed and deducted from the intermediate payments of the contractors. Against this, NVDA recovered ₹ 8.46 crore only in respect of one work²⁰. This resulted in short imposition and recovery of penalty of ₹ 118.78 crore from the contractors (**Appendix 2.5**). We further noticed that the six monthly reviews were not carried out by the CE, ISP Canal after expiry of the stipulated completion period.

The Government stated (November 2015) that notices had been issued to the contractors for levy of 10 per cent penalty. It was further stated that in response to the notice the contractor of KLC had written to the Engineer-in-Charge for non-levy of penalty and after hearing, the same was rejected by the Engineer-in-Charge. The contractor further moved the next higher authority

¹⁹ Agreement no. 02/2009-10 in ND Dn. 11, Badwani, Agreement no. 01/2010-11 in ND Dn. 18, Khargone for KLC, Agreement no. 01/2007-08 in ND Dn. 14, Thikri

²⁰ Agreement no. 02/2009-10 in ND Dn.14, Thikri

(CE, ISP) where hearing was under progress. With respect to the work of RD km 155 to RD km 206 the contractor moved to the court after recovery of penalty of ₹ 8.46 crore and further recovery has been stopped till further order. The Engineer-in-charge revised the construction programme and waived off the penalty with respect to the work of RD km 206 to RD km 243.89.

The reply is not acceptable as penalty was required to be assessed and imposed by the CE, ISP and therefore it should have been recovered from the intermediate payments of the contractors. Further, penalty clause of the contract did not stipulate for waiver of the penalty leviable on account of the delays attributable to the contractor in case of approval of revised construction programme.

2.1.8.8 Payment of escalation

According to the general terms and conditions of turnkey contracts, if the construction period is more than 12 months the amount paid to the contractor for work shall be adjusted quarterly for increase or decrease in the rate of labour, material, POL, steel and cement. It is further provided in the agreements that the price escalation clause shall be applicable only for the work that is carried out within the stipulated time or extension thereof due to the reasons not attributable to the contractor.

Shortcomings noticed in the payment of price escalation have been discussed in the succeeding paragraph.

- **Extra payment due to adoption of incorrect index for payment of escalation in the agreement**

Extra payment of ₹ 11.37 crore made to contractor due to adoption of incorrect index for payment of escalation.

As per the standard bidding documents (SBD) for turnkey contracts, for payment of escalation on material, cement and steel, index numbers of wholesale prices in India shall be adopted as published by the Government of India (GoI), Ministry of Industry, office of the Economic Advisor or as published in Reserve Bank of India (RBI) bulletin.

We noticed (May 2015) that in respect of the turnkey contract of ISP Canal RD km 206 to RD km 243.89²¹ for payment of escalation on cement and steel, the rate of cement per metric tonne at nearest factory including all taxes and duties and rate of twisted deformed bar and structural steel of Steel Authority of India Limited (SAIL) were considered instead of the indices as published in the bulletin of the RBI. Deviations from the condition mentioned in the standard bidding documents resulted in avoidable extra cost of ₹ 11.37 crore²² on account of escalation on cement and steel (**Appendix 2.6**).

The Government stated (November 2015) that escalation was paid to the contractors in terms of the provision of the agreement.

In the exit conference (November 2015), the Additional Chief Secretary, NVDD assured to examine the cases of payment of escalation.

The facts remains that deviation from the condition mentioned in SBD without its approval from the Narmada Control Board resulted in extra payment to the contractor.

²¹ Being executed by ND Dn. 11, Badwani

²² ₹ 2.42 crore on price escalation on steel and ₹ 8.95 crore on price escalation on cement.

Excess payment of ₹ 81.20 crore was made to the contractors due to payment of price escalation after stipulated completion period.

- **Payment of price escalation after stipulated completion period**

The NVDA awarded (February/March 2008) two works²³ of construction of main canal on turnkey basis. Against the value of work done up to February 2015 the contractors were paid ₹ 733.11 crore including ₹ 130.75 crore on account of escalation for the period February 2008 to February 2015.

We noticed (February 2015 and March 2015) that the contractors could execute only 36.75 per cent and 41 per cent of the works up to the stipulated date of completion (February 2012 and March 2011) provided in the contracts. Due to the continued shortfall, the Department imposed (September 2014) a penalty of ₹ 8.01 crore in respect of one work²⁴ after being pointed out²⁵ by audit and ₹ 21.16 crore in respect of other work²⁶. The contractors applied for time extensions on the grounds of stay order of Hon'ble High Court, delay in clearance of forest land and land acquisition of distribution network, hindrances created by the cultivators, change in drawing and design and release of water in canal. CE, ISP Canal sanctioned time extensions for the period March 2011 to September 2015 and paid escalation of ₹ 117.76 crore.

We further observed that in respect of the said two works, first time extension was granted up to December 2011 and November 2012 respectively on the ground of stay order of Hon'ble High Court. The subsequent grant of time extensions granted up to December 2014 in respect of both the works were attributable to the contractors since all clearance of forest land was obtained by February 2011 by NVDA. NVDA itself observed that there were delays in finalisation of the alignment of main canal followed by delayed submission (14 months to 61 months from the date of award of works) of proposals for land acquisition by the contractors. As the acquisition of land was the responsibility of the contractor in terms of clause 25 section IV of turnkey agreement, the grant of subsequent time extension resulted in undue payment of ₹ 81.20 crore on account of escalation for the extended period (**Appendix 2.7**).

In the exit conference (November 2015), the Additional Chief Secretary, NVDD assured to examine the cases of payment of escalation.

Recommendation

The Government should strengthen management of contracts to conform to the terms and conditions of the SBD to avoid extra payment to the contractors.

2.1.8.9 Non-insurance of works

Undue benefit was extended to the contractor due to non-obtaining insurance cover of ₹ 1.37 crore.

The clause 7 of the turnkey contract agreements provide that the contractor shall obtain and maintain in force during the period of construction and maintenance, contractor's all risk insurance for the project providing for full coverage on replacement value basis. Covered peril shall include fire, flood and allied perils. Insurance for workers against injury and death according to Workmen's Compensation Act, shall also be obtained by the contractor.

²³ ISP canal RD km 130.935 to RD km 155 (ND Canal division, Khargone and ISP Canal RD km 155 to RD km 206 (ND Dn. 14, Thikri)

²⁴ ISP canal km 130.935 to km 155

²⁵ Paragraph 3.4.2 of Audit Report for the year 2010-11

²⁶ ISP canal RD km 155 to RD km 206

We noticed (March 2015 and April 2015) in two²⁷ turnkey contracts costing ₹ 721.48 crore that insurance cover for the events mentioned in the contract agreements were not renewed by the contractors after expiry of the period of insurance from March 2012 and March 2014. Thus, the NVDA extended undue benefit of ₹ 1.37 crore, in the form of saving of premium payable by the contractors.

The Government accepted the facts and stated (November 2015) that necessary action for renewal of insurance had been taken by the Engineer-in-Charge and contractor of Phase IV (RD km 206 to RD km 243 of ISP Canals) had deposited the premium of ₹ 27.46 lakh.

Recommendation

The Government should strengthen internal control system for ensuring recovery of extra cost, penalty for delays, deduction of ASD and insurance coverage of the works from defaulting contractors in order to safe guard its interest.

2.1.8.10 Avoidable expenditure on consultancy contracts

Engagement of consultants for the same nature of the work as included in the scope of turnkey contractors, resulted in avoidable expenditure of ₹ 10.96 crore.

NVDA engaged (March 2008 to April 2009) three consultants²⁸ at the total cost of ₹ 14.82 crore to assist it for implementation of the work of the three turnkey contracts of ISP Canal. The scope of the work of the consultants included finalisation of all plans, drawings, designs and specifications, submission of Programme Evaluation and Reviewing Technique (PERT) charts of various activities of civil, electrical and mechanical works alongwith overall supervision and quality control during execution as well as after its completion. The consultants were paid amount of ₹ 10.96 crore for the period (between March 2008 and May 2015) they were engaged.

In respect of two²⁹ out of the three consultancy contracts, the period of the consultancy was not extended beyond the period specified (April 2014 and September 2014) in the contracts though the civil works of ISP Canal for the RD km 130 to RD km 155 and RD km 206 to RD km 243.89 were completed 97 per cent and 31.23 per cent respectively by that time, which indicated that separate consultancy services were not required.

We noticed that the scope of the turnkey contracts of the ISP Canal project also comprised the work of survey, planning, designs, drawings, quality control, preparation of estimates, and preparation of land acquisition cases along with overall operation and maintenance of complete commissioned scheme for one year. Thus, the engagement of the consultants for almost the same work as entrusted to the turnkey contractors was not required. Therefore, the payment of ₹ 10.96 crore made to the consultants was avoidable.

In the exit conference (November 2015), the Additional Chief Secretary, NVDD agreed with the fact stated above.

²⁷ Agreement no. 02/2009-10 for canal work from RD km 206 to RD km 243.89 at ND-11, Badwani and Agreement no. 01/2007-08 for canal work from RD km 155 to RD km 206 at ND-14 Thikri

²⁸ For the work of ISP main canal (i) RD km 130 to RD km 155 (ii) RD km 206 to RD km 243.89 (iii) RD km 155 to RD km 206.

²⁹ For RD km130 to RD km 155 and RD km 206 to RD km 243.89 of ISP canal.

The Department extended undue benefit of ₹ 75.19 crore due to inclusion of unwarranted item in the scope of turnkey contractor.

2.1.8.11 *Undue financial aid to the contractor due to inclusion of unwarranted item of transmission line*

In terms of the clause 101.1 of turnkey contracts, the contractor is bound to complete the entire work under the contract on a firm lump sum price quoted and on a single source responsibility basis. Besides, in terms of clause 101.2 of the contract, supplement works which are found essential, incidental and inevitable during execution shall also be borne by the contractor.

The work of KLC was awarded (March 2011) on turnkey basis at the cost of ₹ 550.89 crore. The work also comprised of installation of 132/11 KVA transmission line (83 km) from ISP, Canal Head Power House (CHPH) to RD km 79.80 of ISP main canal. The civil work of the KLC was in progress but the work of transmission line was not started yet (November 2015) even after expiry of the scheduled completion (March 2014).

We further noticed (January 2015) that three Vertical Turbine Pumps were operated to feed the BR I by providing electricity from nearby power grid of Madhya Pradesh Electricity Board. However, in the RAA for the ISP (Canal), a provision of ₹ 75.19 crore was made for transmission line though the item of work was already included in the scope of work of KLC. Thus inclusion of unwarranted item of transmission line extended undue benefit of ₹ 75.19 crore to the contractor.

In the exit conference (November 2015), the Additional Chief Secretary, NVDD stated that though a provision had been made in the RAA for transmission line but no additional payment would be made to the turnkey contractor since turnkey offer covered everything and if contractor failed to execute the work of transmission line, deduction would be made from the contractor's payment. It was further stated that scheme can be run even without this transmission line and there is no need to construct this line at additional cost by the Department even if the contractor fails to execute it.

The reply is not acceptable as the requirement of transmission line was not assessed properly at the time of preparation of estimates of KLC. Moreover, the cost of construction of transmission line, which was included in the scope of work was also not reduced from the turnkey contract price (November 2015).

Recommendation

The Government should strengthen mechanism for avoiding inclusion of unwarranted items before entering into turnkey contracts to avoid undue benefit to the contractor.

2.1.8.12 *Non-execution of joint filling in expansion and longitudinal joints*

Excess payment of ₹ 1.32 crore was made to the contractor as joints fillings was not done by contractors.

According to the provision of technical specifications appended with the turnkey agreement and detailed payment schedule, the expansion and longitudinal joints in CC lining were required to be filled in with filling compounds. The filling compound comprises bitumen and sand.

We noticed (March 2015 and May 2015) during the visit of two sites³⁰ of the work of main canal RD km 155 to RD km 206 and RD km 206 to RD km 243.89 that the expansion and longitudinal joints was not filled in with filling

³⁰ ND Dn. 14, Thikri and ND Dn.11, Badwani

compound. Since the item of filling the joints was the part of the lining work, the non-execution of item of joint filling resulted in substandard work as well as excess payment to the contractors by ₹ 1.32 crore (**Appendix 2.8**).

In the exit conference (November 2015), the Chief Engineer accepted the facts and stated that the canal was to operate, hence joint filling was not done and work of joint filling would be completed.

The reply is not acceptable as the joints filling was not done simultaneously with the lining work as provided in the agreement and payment was not reduced for not doing the work of joint filling.

2.1.8.13 Irregular modification in the drawings of aqueduct

According to clause 106.9 of condition of turnkey contract, the payment shall be released to contractor only as per work done and respective component of work has been completed and/or levels are achieved.

We noticed (May 2015) during scrutiny of the records for the work of ISP main canal RD km 206 to RD km 243.89³¹ that three aqueducts³² were planned to be constructed in the canal. The CE, on the proposal of the contractor, approved (October 2010) the change of design from construction of aqueducts to open through assigning the reason of site condition but did not specify detailed site conditions necessitating change of design. As a result of change in design, top slab and parapet railing of both the sides of aqueducts were deleted from the scope of the works.

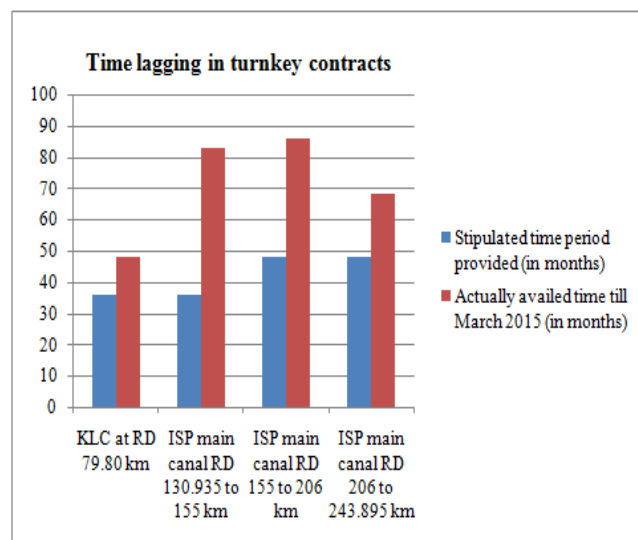
Due to deletion of top slab of aqueducts and parapet walls on either side of aqueducts, the Department passed the benefit to the extent of cost of top slab and parapet wall of ₹ 97.51 lakh to the contractor (**Appendix 2.9**).

In the exit conference (November 2015), the Additional Chief Secretary, NVDD assured to reduce the cost from the contract price.

2.1.8.14 Non-fulfillment of objectives of turnkey contracts

Undue benefit of ₹ 97.51 lakh was extended to the contractor due to irregular modification in drawing of aqueducts.

Objective of switching over to turnkey contract was not fulfilled.



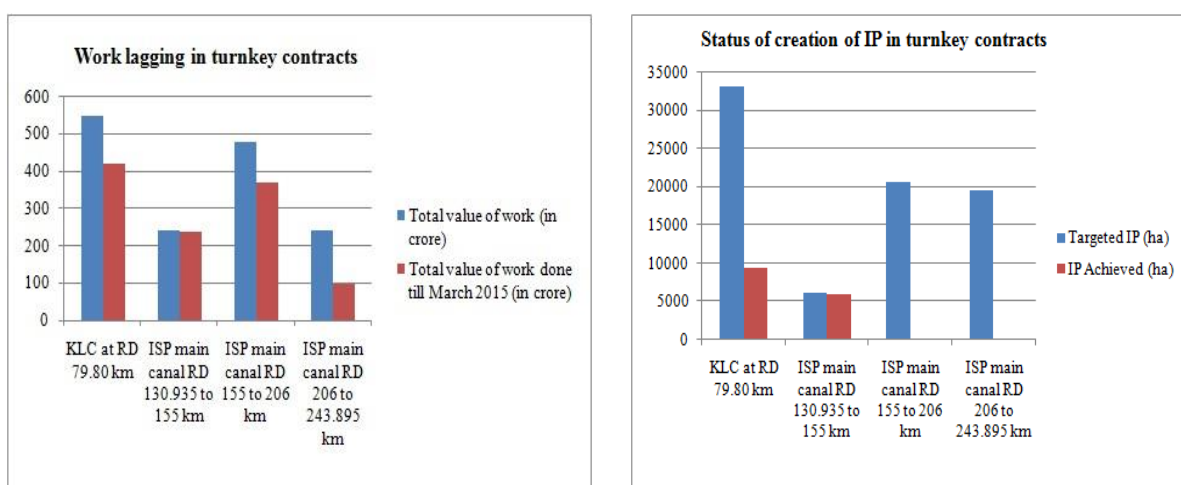
In turnkey contracts, the contractor is bound to complete the entire work under the contract on a firm lump sum price quoted and on a single source responsibility basis. The contractor is also responsible for timely acquisition of land. The turnkey contracts also include milestones for completion of project and creation of block-wise

irrigation potential. In the turnkey contracts, however there are certain risks also.

³¹ Being executed by ND Dn. 11, Badwani
³² At RD km 207.185 Mandir aqueduct length 66.750 metre, RD km 288.250 Sajwani aqueduct length 525 metre and RD km 230.377 Paramount aqueduct length 325 m

In view of experiencing slow progress of work by item rate contractors and to avoid delay in land acquisition and execution of work in the phased manner, NVDA switched over from item rates contracts to the turnkey contracts. Accordingly, NVDA entered into three turnkey contracts for execution of ISP Canal, downstream RD 130 km and one for KLC. The clause 36 of Volume IV of the turnkey contracts provide for fixation of milestones for block-wise creation of irrigation potential.

We noticed that there were abnormal delays of 14 months to 61 months in submission of proposal for acquisition of land for the project by the turnkey contractors, delays of 12 months to 47 months in execution of the works beyond the stipulated period provided in the agreements, the works were remaining incomplete ranging between 2.50 per cent and 59.50 per cent and creation of irrigation potential ranged from zero per cent to 99 per cent in different reaches of canal and KLC. Thus, the objective of switching over to turnkey contract was not fulfilled.



We further noticed that specific milestones for block-wise creation of irrigation potential was not fixed as discussed in paragraph 2.1.7.2. The status of actual time vis-a-vis scheduled time for completion of work, progress of work and creation of irrigation potential are given in the bar charts above. Besides, instances of deviation in design and deletion of items from the scope of work, execution of below specification work and unwarranted inclusion of item in the scope of work were also noticed as discussed in paragraphs 2.1.8.11, 2.1.8.12 and 2.1.8.13.

The Government agreed (November 2015) with the facts and stated that the suggestion given by the audit for linking block-wise creation of IP and linking of payment, creation of IP should be accepted and incorporated in future tenders.

In exit conference (November 2015), the Additional Chief Secretary, NVDD stated that earlier turnkey contracts were more like an item rate contracts and in the revised Standard Bidding Documents (SBD) of turnkey, the contractors had been made solely responsible for every activity required for the execution of the work.

Recommendation

The Government should consider for fixation of milestone for block-wise creation of irrigation potential and linking payment with creation of irrigation potential in the turnkey contracts to avoid time and cost over-run.

2.1.9 Conclusion and recommendations

- The planning for the ISP Canal was deficient to the extent that works of the project were started without acquisition of land and clearance from the Forest Department, which resulted in avoidable payment of escalation and extra cost.
- Due to non-execution of distribution network simultaneously with main canal, the objective to develop block-wise irrigation facility in command area was not fulfilled. Works of rising main and gravity main of the Khargone Lift Canal were executed without execution of BRs, indicating inappropriate planning.

The Government should ensure simultaneous construction of all the components of irrigation system with a view to create and exploit irrigation potential within minimum time.

- Bids were invited deviating from the condition laid down in the standard bidding documents resulting in excess payment. Further, there were instances of irregular grant of time extensions resulting in avoidable payment of escalation.

The Government should strengthen management of contracts to conform to the terms and conditions of the standard bidding documents to avoid extra payment to the contractor.

- The Department did not initiate action for recovery of extra cost incurred on re-award of works after failure of original contractor to complete works and imposed penalty of lesser amount on contractors for delays, besides instances of non-deduction of ASD and non-insurance of works were also noticed.

The Government should strengthen internal control system for ensuring recovery of extra cost, penalty for delays, deduction of ASD and insurance coverage of the works from defaulting contractors in order to safe guard its interest.

- Inclusion of unwarranted item in the scope of work of turnkey contract resulted in undue benefit to the contractor.

The Government should strengthen mechanism for avoiding inclusion of unwarranted items before entering into turnkey contracts to avoid undue benefit to the contractor.

- The objective of switching over to turnkey contracts was not fulfilled as there were significant delays in submission of proposal for acquisition of land and execution of works by the turnkey contractors. Specific milestones for block-wise creation of irrigation potential were not specified in the contracts.

The Government should consider for fixation of milestone for block-wise creation of irrigation potential and linking payment with creation of irrigation potential in the turnkey contracts to avoid time and cost over-run.

All the recommendations given in the report were accepted by the Government.

Panchayat and Rural Development Department

2.2 Construction of roads under Pradhan Mantri Gram Sadak Yojana

Executive Summary

The Pradhan Mantri Gram Sadak Yojana (PMGSY) was launched by the Government of India in December 2000 with the objective of providing connectivity by way of all weather roads to unconnected habitations in the rural areas with a population of 500 persons and above (Census 2001) in plain areas and habitations with a population of 250 and above in case of selected tribal and backward district. In Madhya Pradesh the scheme is being implemented by Madhya Pradesh Rural Road Development Authority (MPRRDA).

Out of 20,210 eligible unconnected habitations as on April 2000 in Madhya Pradesh, connectivity was provided to 12,496 habitations up to March 2010 by constructing 8,258 roads (37,355 km) under PMGSY at a cost of ₹ 8,795.73 crore. During the period of audit coverage i.e. between April 2010 and March 2015, the MPRRDA provided connectivity to 3,323 habitations by incurring expenditure of ₹ 6,328.61 crore on construction of 5,190 roads (23,030 km). As of March 2015, 3,388 eligible habitations were unconnected. The significant audit findings of the performance audit are as under:

- Government of India sanctioned ₹ 19,146.92 crore for works under PMGSY for the period since start of the scheme up to March 2015, against which ₹ 13,204.13 crore was released. We noticed that release of fund to MPRRDA was lesser during 2012-13 to 2014-15 as compared to previous years, such short release would affect the pace of execution of Pradhan Mantri Gram Sadak Yojana in providing connectivity to remaining 3,388 habitations.

(Paragraphs 2.2.6 and 2.2.7.1)

- The planning was deficient as transect walks were not held, approval of roads on yearly basis was not obtained from the *Zila Panchayat*. Even after a lapse of 14 years of the commencement of the scheme, 17 per cent of the eligible habitations were yet to be provided connectivity by all weather roads. Detailed Project Reports were not realistic as there were huge variations in the estimated length of bituminous and concrete pavements as well as number of cross drainage structures when compared with actual execution.

(Paragraphs 2.2.7.1 to 2.2.7.4)

- There were delays in execution of works as only six per cent packages were completed within scheduled time, whereas 79 per cent packages were completed with delay ranging from six months to more than two years. The slow execution of works was due to lack of forest clearance, land disputes, non-coordination with other departments etc.

(Paragraph 2.2.8.1(iii))

- The liquidated damages were not levied in terms of the contract, which resulted in short imposition of liquidated damages of ₹ 34.42 crore in 107 packages.

(Paragraph 2.2.8.1(v))

- In 27 cases, roads were constructed with width of 7.5 meter as against the specification of 6.0 metre width for link routes with motorised vehicle less

than 100 per day. This resulted in avoidable expenditure of ₹ 4.98 crore.

(Paragraph 2.2.8.2(i))

- Instances of incorrect payments of ₹ 11.21 crore for hume pipes, payment of ₹ 29.19 crore without substantiating measurements, excess payments of ₹ 69.41 lakh, short/non-recovery of ₹ 47.34 crore recoverable from contractors and undue financial aid of ₹ 2.60 crore due to non-insurance of works etc. were noticed.

(Paragraphs 2.2.8.1(vi and vii), 2.2.8.3)

- There was delay in award of post five year maintenance work after defect liability period of work, in case of 103 packages of road works and instances of non-maintenance of roads during defect liability period were noticed.

(Paragraph 2.2.8.4)

- The quality monitoring through State Quality Monitors (SQMs) were not being held as per prescribed norms for assessing quality of work. There was delay in rectification of defects pointed out by SQMs.

(Paragraph 2.2.9.2)

2.2.1. Introduction

Government of India (GoI), acknowledging the expected socio-economic benefits to the rural population from rural roads and with a view to impart greater thrust to the ongoing efforts, launched a Programme called Pradhan Mantri Gram Sadak Yojana (PMGSY) on 25 December, 2000. PMGSY is a 100 per cent centrally funded Programme.

The objective of the PMGSY is to provide connectivity, by way of an 'all-weather road' (AWR) (with necessary culverts and cross-drainage structures, which is operable throughout the year), to the eligible unconnected habitations in the rural areas with a population of 500 persons and above (Census 2001) in plain areas. In the tribal areas and selected tribal and backward districts³³ the objective would be to connect eligible unconnected habitations with a population of 250 persons and above (Census 2001). PMGSY permits upgradation (to prescribed standards) of the existing roads but is not central to the Programme.

PMGSY is an ongoing scheme under which, out of 20,210 eligible unconnected habitations as on April 2000 in Madhya Pradesh, connectivity was provided to 12,496 habitations up to March 2010 by constructing 8,258 roads (37,355 km) at a cost of ₹ 8,795.73 crore. During the period of audit coverage i.e. between April 2010 and March 2015, the MPRRDA provided connectivity to 3,323 habitations³⁴ by incurring expenditure of ₹ 6,328.61 crore on construction of 5,190 roads (23,030 km). As of March 2015, 3,388 eligible habitations were unconnected.

For the purpose of implementation of the scheme in the State, the Madhya Pradesh Rural Road Development Authority (MPRRDA) was established (23 December 2000) as nodal agency by the Government of Madhya Pradesh

³³ As identified by the Ministry of Home Affairs and Planning Commission

³⁴ 2010-11:686, 2011-12:560, 2012-13:467, 2013-14:580 and 2014-15:1,030; total 3,323

(GoMP) under MP Society Registration Act, 1973.

A web based portal named as Online Monitoring, Management & Accounting System (OMMAS) has been developed by the National Rural Roads Development Agency (NRRDA) for enabling online monitoring of PMGSY.

2.2.2 Organisational set-up

The Additional Chief Secretary, Panchayat and Rural Development Department is the administrative head at Government level. The MPRRDA is headed by Chief Executive Officer (CEO) and assisted by an Engineer-in-Chief (E-in-C). The E-in-C is assisted by six Chief General Managers (CGMs) who are assisted by General Managers at Programme Implementation Unit (PIU) levels, as depicted in organogram in **Appendix-2.10**.

2.2.3 Audit objectives

The objectives of the Performance audit were to ascertain whether:

- The allocation and release of funds under PMGSY were made in an adequate and timely manner to ensure optimum utilisation of funds;
- The systems and procedures in place for identification/preparation of Core Network as well as District Rural Road Plan were adequate and conform to the Programme provisions;
- The road works were executed economically, efficiently and effectively;
- The existing monitoring system and quality control mechanism was adequate and effective for achieving the desired objective.

2.2.4 Audit criteria

The audit findings are based on the criteria derived from the following:

- Guidelines and orders for the scheme issued by the Ministry of Rural Development (MoRD),
- Provisions of Operational Manual and Accounts Manual of PMGSY,
- Rural Road Manual and Specifications for Rural road issued by Indian Road Congress (IRC),
- Provisions of approved DPRs and orders issued by MPRRDA from time to time for execution of works,
- Terms and conditions of contracts for the works,
- Provisions for MP Financial Code and
- Standard Schedule of rates (SSR) for the works.

2.2.5 Scope and methodology

For the performance audit, records of selected 13 districts³⁵ relating to the period from April 2010 to March 2015 were test checked besides collection of information/records from Headquarters office of MPRRDA.

For test check of records, out of 51 districts of the State, 13 districts (25 per cent) were selected using the sampling technique of Probability Proportional

³⁵ 1) Ashok Nagar 2) Balaghat 3) Betul 4) Chhindwara 5) Datia 6) Jhabua 7) Khargone 8) Ratlam 9) Rewa 10) Sagar 11) Shajapur 12) Umaria and 13) Vidisha

to Size Without Replacement (PPSWOR) after stratification of data under seven regions. In each of the selected districts, 25 *per cent* packages³⁶ selected by using random sampling method, have been test checked during the period March 2015 to July 2015. Accordingly, 316 packages (920 roads) were selected out of 1,145 packages in the selected districts.

The audit commenced with an entry conference on 27 January 2015 and concluded with an exit conference on 15 October 2015 at the Government level with the Additional Chief Secretary, Panchayat and Rural Development Department, GoMP, Chief Executive Officer, MPRRDA, Engineer-in-Chief, MPRRDA and other officers. The reply to the draft report issued in the month of September 2015, was received from the GoMP in October 2015.

The recommendations included in the report were also communicated to the GoMP, however, no further comment was offered. The views expressed by the Government/department on the audit findings including exit conference have been suitably incorporated in the report.

Audit findings

2.2.6 Fund Management

The DPRs of the projects were submitted by MPRRDA for the approval of NRRDA. MoRD releases funds for approved projects to MPRRDA/GoMP in two instalments. The first instalment of 50 *per cent* of the cleared value of projects (or annual allocation whichever is lower) is released. The second instalment (equal to the balance due on the cost of the awarded works) is released subject to utilisation of 60 *per cent* of the available funds and completion of at least 80 *per cent* of the road works awarded in the year previous to the preceding year and 100 *per cent* of the awarded works of all the years preceding that year. Besides the funds provided by GoI, the State Government provides funds against tender premium and cost overrun in execution of works against the sanctioned cost of the works.

GoI sanctioned ₹ 19,146.92 crore for works under PMGSY for the period since start of the scheme up to March 2015 and released ₹ 13,204.13 crore during that period. The details of fund received by MPRRDA from GoI, State Government, interest/incidental income accrued on the unutilised balance fund and expenditure on works by MPRRDA during the period 2010-11 to 2014-15 are given in the **Table 2.7** below:

³⁶ As per Operational Manual, a package includes several roads in a block or in adjacent blocks combined for tendering and is identified by a unique number given to it.

Table 2.7: Year-wise details of fund received and expenditure on works**(₹ in crore)**

Year	Fund received during the year from GoI	Funds received from GoMP	Interest and Incidental income	Total fund available during the year	Expenditure on works	Balance fund at the end of the year
2010-11	1966.11	201.53	68.91	2935.36*	1421.75	1513.61
2011-12	1138.05	169.62	76.93	2898.21	880.99	2017.22
2012-13	237.88	1.97	273.43	2530.5	735.46	1795.04
2013-14	600.00	2.00	157.32	2554.36	1402.89	1151.47
2014-15	708.00	324.93	157.24	2341.64	1887.52	454.12
Total	4650.04	700.05	733.83		6328.61	

* Including cash and bank balance of ₹ 698.81 crore as on 31 March 2010

(Source: Annual accounts of MPRRDA as per OMMAS)

It can be seen from the table that balance fund decreased from ₹ 1,513.61 crore as on 31 March 2011 to ₹ 454.12 crore as on 31 March 2015. Decrease in the fund was mainly due to lesser release of funds by GoI during 2012-13 to 2014-15 compared to funds released during 2010-11 and 2011-12. As discussed in para 2.2.8, road works in progress was 9,257 km as on 31 March 2015. Keeping in view, the present per km average cost (₹ 45 lakh per km) for road works, if funds are not augmented by the GoI and State Government the pace of execution of the works under PMGSY will suffer.

The Government stated (October 2015) that the GoI had been requested to increase the allotment of funds under PMGSY.

- As per the PMGSY guidelines, all cost due to time overrun shall be borne by the State Government. In case the value of tenders received is above the estimates approved by the Ministry, the difference (tender premium) pooled for the entire State for works cleared in phases/batches will be borne by the State Government. In case of change in scope of work the difference is absorbed with net saving at State level within the phase/batch.

The MPRRDA claimed the total net payable amount of ₹ 119.85 crore by the State Government to MPRRDA on account of cost overrun and tender premium. We did not find details of calculation for arriving at this amount at PIU and headquarters level. Based on the package-wise data provided by the MPRRDA, we however worked out that an amount of ₹ 334.24 crore (**Appendix-2.11**) is payable (after taking into account the tender premium/cost overrun already paid) by the State Government in respect of works of all the phases taken up so far and substantially completed. The amount will vary on completion of these works. Thus, MPRRDA could not claim and receive funds to that extent from the State Government for augmenting the road works.

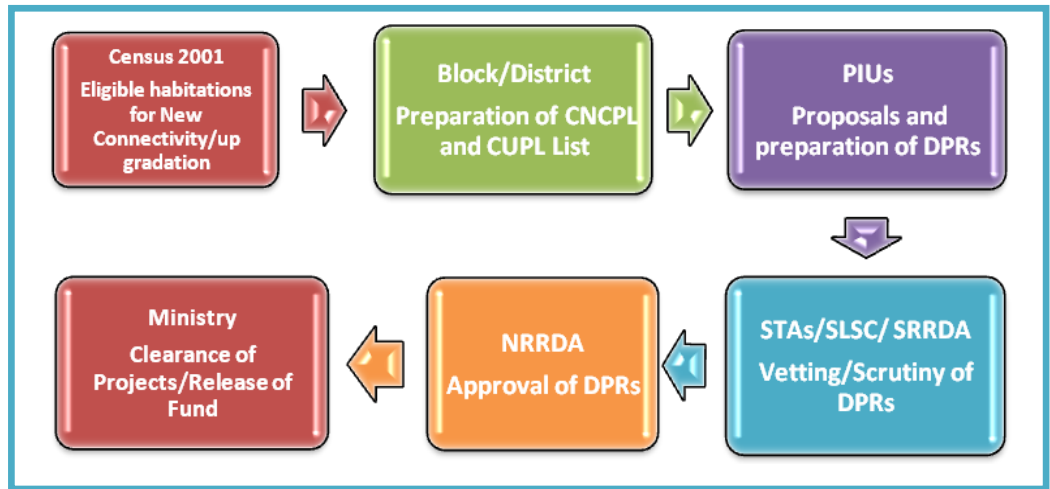
Recommendation

The Government should take steps for providing funds of its share in timely manner after assessing cost over-run/savings and tender premium in respect of substantially completed packages.

2.2.7 Planning

Under the PMGSY the core network³⁷ (CN) would constitute the basis for all planning. Each road work that is taken up under the PMGSY is part of the core network. Under the guidelines of the scheme, all the districts had to prepare block level and district level Comprehensive New-Connectivity Priority Lists (CNCPL) on the basis of population size³⁸ of habitations being connected and a Comprehensive Up gradation Priority List (CUPL) for up gradation of existing roads. The CNCPL/CUPL lists are finalised by district Panchayat in consultation with lower level Panchayati institutions and elected representatives and forwarded to the PIU. The process of preparation and clearance of project is depicted below in the flowchart:

Chart 1: Project preparation and clearance



As per the Operational Manual issued by NRRDA, in all the proposals the PIUs shall ascertain availability of land and prepare all necessary papers to obtain land, forest clearance etc. It is the responsibility of State Government/District Panchayat to oversee that land is available for taking up the proposed road works.

2.2.7.1 Connectivity to habitations

The position of the habitations connected and unconnected in the State, for the period from the date of commencement of the Scheme to March 2015 are detailed in **Table 2.8** below:

³⁷ Core network is the rural road network required for providing the basic access (by all weather road) to all villages/habitations with nearby market or Rural Business hub through at least a single all-weather road connectivity.

³⁸ Population size as per census 2001 are - 1000 and above (priority I), 999 to 500 (priority II), 499 to 250 (priority III)

Table 2.8: Details of eligible habitations connected and unconnected in the state

Particulars	Population			
	1000+	999-500	499-250	Total
No. of eligible habitations as on 01-04-2000	14471	16404	4544	35419
Unconnected habitation as on 01-04-2000	6123	10855	3232	20210
Habitations covered in the proposals from 01-04-2000 to 31-3-2015	5954	7989	2015	15958
Habitations covered during 2010-15	392	2555	376	3323
Balance unconnected habitations eligible under PMGSY as on March 2015 (including deletion and addition of roads)	28	2960	400	3388
Percentage of habitations unconnected	0.46	27.27	12.37	16.76

(Source: First two rows- OMMAS and other rows as per MPRRDA fact sheet)

From the table, it can be seen that 17 per cent habitations out of total eligible habitations were left to be connected by all weather road even after a period of 14 years.

2.2.7.2 *Transect walk*

DPRs were prepared without transect walk.

During preparation of DPRs, a simple non-formal “transect walk” to ensure availability of land and to fix alignment to avoid subsequent dispute, was to be organised by Assistant Engineer involving Panchayat Pradhan, local Patwari, forest official etc. We, however, noticed that, in 114 packages (258 roads) transect walk was not held and in case of 52 such roads, there was delay in completion of work due to land dispute/non-availability of land, forest clearance and finalisation of alignment. We further noticed that up to March 2015, 326 roads (1,776 km) were dropped after approval for the reasons such as, non-availability of land, forest clearance, execution of work by other agencies, submergence etc indicating that the transect walk was not carried out in respect of these roads.

The Government stated (October 2015) that prior to 2010 the specific provision of recording of the transect walk was not there.

The reply is not acceptable as para 6.13 of the guidelines (2004) provided for holding of such transect walk and hence it was required to be recorded for ensuring that roads planned for construction are not dropped subsequently for reasons of non-availability of land, forest clearance, submergence etc.

2.2.7.3 *Annual approval by District Panchayat*

The list of roads taken up under the scheme was not being finalised yearly by involving ZP/Gram Panchayat.

As per the guidelines, the list of road works to be taken up under PMGSY would be finalised each year by District Panchayat (ZP) in accordance with the allocation of funds and in consultation with lower level Panchayat institutions.

We noticed that, the list of all the roads included under the Scheme were prepared in consultation with the ZP/Gram Panchayat at the time of finalisation of Core Network (CN). However, during the period 2010-2015 in all the 13 districts selected for audit we observed that finalisation of list of road works on yearly basis was not done by involving ZP/Gram Panchayat.

Thus, planning for roads to be taken under the scheme was not based on latest input, as local panchayat was not taken into confidence about the proposed alignment before finalisation of road works under PMGSY each year. This

resulted in demand of changes in alignment/change in alignment at the time of execution of road work.

We noticed that changes in alignment of 48 roads in the state were approved (February 2014) by NRRDA. Instances for demand in change in alignment by the Panchayat and public during execution in respect of three road works are detailed in **Appendix-2.12**.

The Government stated that the list of all the roads included in the programme was finalised in consultation with ZP/Gram Panchayat at the time of finalisation of CN, and whenever, any change in alignment was required.

The reply is not acceptable as the list of road works to be taken up under PMGSY was not finalised each year by District Panchayat (ZP) in accordance with the allocation of funds as directed in the guidelines so as to avoid changes in selection of roads in ad hoc manner.

2.2.7.4 Deficiencies in Detailed Project Reports (DPRs)

The DPRs were deficient as there was variation in total length (10 per cent to 96 per cent), length of BT roads (10 per cent to 74 per cent) and length of CC roads (10 per cent to 390 per cent). The type and number of CDs were also not estimated realistically.

Consultants are engaged for preparation of DPRs for road works under PMGSY. DPRs are required to be prepared after detailed survey and subsequent on-site checking by the General Manager (GM) and Assistant Manager (AM) on the basis of available data. The accuracy of DPR is essential not only for estimation but also for maintaining financial discipline. The average approved cost of the roads for the State ranged from ₹ 28 lakh per km (2008) to ₹ 45 lakh per km (2014). During test check of records of the completed road works with reference to approved DPRs, we noticed following:

i) Significant variation in length of roads

In 499 roads completed at the cost of ₹ 590.45 crore under 13 districts, there was wide variation in total length {including black top (BT) and cement concrete (CC) road} as executed and that proposed in the DPRs. The variations in length exceeding 10 per cent were noticed in 134 road works, which ranged up to 96 per cent. This indicated inadequate survey by the DPR consultants and its verification by PIU officials during preparation of the DPRs.

In case of execution of 162 roads costing ₹ 193.26 crore, the variation (increase/decrease) over 10 per cent in length of CC roads alone compared to that shown in approved DPRs, ranged up to 390 per cent (20 m to 4700 m). This included five roads with variation exceeding 200 per cent and two CC roads which were constructed without provision in the DPRs. Similarly, in case of 90 roads costing ₹ 87.65 crore, the variation above 10 per cent in length of BT roads varied up to 74 per cent (100 m to 8310 m).

ii) Variation in number of cross drainages

In respect of 292 roads costing ₹ 355.76 crore, number of cross drainages (CDs) constructed varied from that provided in the DPRs. In case of 199 roads, where variation in constructed CD exceeded more than one, 1,762 CDs were constructed against the provision of 2,485 CDs. Further, the location and type of CDs on the roads were also found different during execution. This indicated inflated provision for CDs and inadequate survey for CD works during estimation.

Some instances on incorrect estimation such as over estimation on number of CDs required and incorrect estimation as to the type of the CDs actually required are discussed in **Appendix-2.13**.

The Government stated that deviations from approved DPRs were necessitated due to reasons such as, DPRs were prepared three to four years prior to start of work, roads taken up by other agencies, lack of provisions for acquisition of land, length increased as per local demand etc. It was also stated that at the time of preparation of DPRs there were only cart tracks surrounded by cultivated fields; therefore exact assessment of CDs was sometimes not possible.

The reply confirms that DPRs were not prepared after taking into accounts these constraints resulting in significant variations in length of constructed roads/execution of cross drainages. The variation could have been minimised by resorting to requirement of transect walks as discussed in paragraph 2.2.7.2 above.

iii) Execution of items not provided in DPRs

Expenditure of ₹ 12.10 crore was incurred on items not provided in DPRs.

Out of the savings of ₹ 18.29 crore in cost arising due to reduction/deletion/substitution in quantities/items given in DPRs in respect of 23 packages (cost ₹ 61.36 crore), expenditure of ₹ 12.10 crore was incurred on the works of items such as, retaining wall, protection wall, items of concrete³⁹, back filling, M-30 wearing coat etc. which were either not provided in the DPRs or were executed in quantities beyond the DPRs (**Appendix-2.14**).

The Government stated that deviation/changes was as per site condition and was for safety of the roads and its users, besides it was approved by the competent authority after due verification.

The reply is not acceptable as in these cases savings in certain items of road works were utilised in execution of other items or quantities not provided in the DPRs of these works.

Deficiencies in planning, not holding of transect walk and inappropriate preparation of DPRs led to delays in execution of the works as well as non-providing of connectivity as envisaged in the scheme. Some of the significant instances are given in **Appendix- 2.15**.

Recommendation

The Government should ensure the conduct and recording of the 'Transect Walk' and detailed survey/investigation for preparing realistic detailed project for desired road connectivity.

2.2.8 Execution

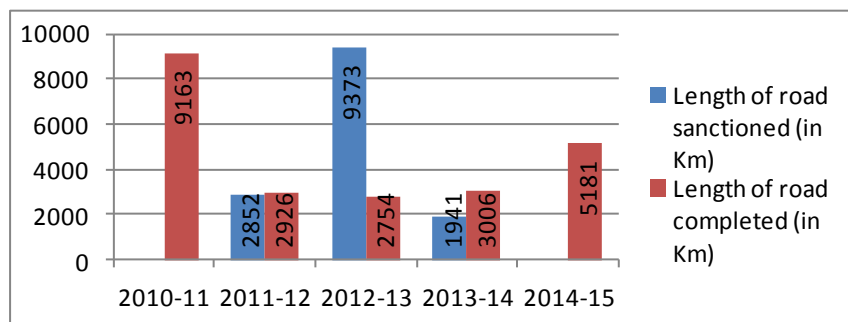
Against the overall sanction of 69,642 km of road length since commencement of the scheme, the MPRRDA completed construction of 37,355 km (8258 roads) at average progress of 4,151 km⁴⁰ per year up to 2009-10. As at the end of financial year 2009-10, the work of 4,000 roads having 18,121 km length was in-progress. During the period 2010-15, 23,030 km of 5,190 roads were completed. As on March 2015, the work of 2,898 roads (9,256 km length) was

³⁹ Plain Cement Concrete (PCC) M-10, PCC M-15, PCC M-25

⁴⁰ From 2001-02 to 2009-10, 9 years; 37,355 km/9 years = 4,151 km

in-progress. The DPRs for 2,037 roads were in the pipe line. During 2010-11 and 2014-15 no sanction of road works was received from GoI. The year-wise details of the status of roads sanctioned and completed are shown in **Chart-2** below:

Chart 2: Showing comparison of length of road sanctioned and completed



We noticed from the progress of the works as provided by the MPRRDA that during the year 2010-11, 9,163 km roads were constructed but after 2011-12 the progress of work was slow and the average length of road constructed per year during the period 2011-15 reduced to 3,467⁴¹ km.

Although the Operational Manual provides for execution of work within a period of 9 months to 18 months, the construction of road of the work in-progress of 9,257⁴² km as at the end of March 2015 could be completed only by 2017-18, at the average pace of construction actually achieved during last four years period.

The shortcomings in execution of works have been discussed in following paragraphs.

2.2.8.1 Tendering and implementation of contractual conditions

(i) Invitation for tenders with incorrect data

The MPRRDA awards the works after issuing notice for inviting tenders (NIT). For transparent calling and awarding of work, it is essential that the NIT contain correct information as available on the date of inviting tenders. However we noticed that in the following cases the NIT was called without giving correct information:

- In Sagar district, the NIT for road from SH-14 (Nirtala) to Tihar under package 3,371 was invited (September 2010) showing length of road as 5.20 km. However, we noticed that the alignment of road works was already changed in June 2010 due to which the expected length was to increase by 1.80 km. Further, the amount of tender was also not revised accordingly.
- In Sagar district, the NIT for Major District Road to Chakpipla (12.73 km) road under package 3,360 was published in September 2010. The Authority was already aware (March 2010) that the length of road would be

NIT was invited with incorrect data about the scope of works.

⁴¹ (2,926 km + 2,754 km + 3,006 km + 5,181 km)/4= 3,467 km

⁴² Balance work in hand = 9,257 km as on 31-3-2015. The expected period of completion for 9,257 km at average of 3,467 km per year would be 2.67 years.

about 3.9 km⁴³ due to non-availability of permission from Forest Department but NIT was published and work was awarded with inflated length and incorrect estimated cost of ₹ 3.88 crore instead of ₹ 1.19 crore.

The Government stated that NIT was floated as per sanction and road length increased due to change in alignment and non-availability of permission from Forest Department.

The reply is not acceptable as the change in alignment and length of road was already known to MPRRDA and therefore tender should have been invited with revised length of the roads.

(ii) Irregular subcontracting of work

As per clause 7.1 of General conditions of agreement, the contractor may subcontract part of the construction work up to 25 per cent of the contract price with the approval of the employer in writing.

We however, noticed in two packages⁴⁴ having contract amount of ₹ 3.85 crore that the whole works were subcontracted to individual/firm on the basis of power of attorney by the original contractor. Thus, such assigning of whole work to other individual/firm was irregular, besides agreements for these two packages do not provide for such arrangement.

The Government replied that no work was assigned on power of attorney and the contractor might appoint any one for supervision of work on power of attorney which is legal document.

The reply is not acceptable as the whole activity relating to the contract was assigned to such individual/firm through power of attorney having no established business relationship with the original contractor. Further, the objective of assessing qualifications for bidding was also defeated by engaging other persons.

(iii) Delay in execution

Under PMGSY the time specified for completion of roads ranged from 9 months to 18 months from the date of issue of work order. The timely completion of work would extend the desired socio-economic benefits to the inhabitants.

We noticed during test check of records of 219 completed packages under 13 districts that only 14 packages were completed in time. The extent of delays in completion of packages is depicted in the **Chart- 3** below:

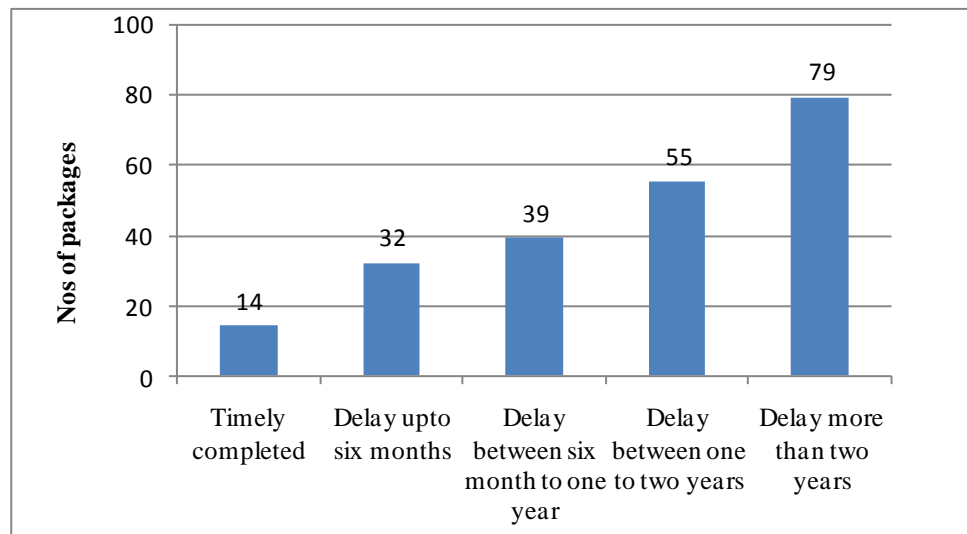
Works were irregularly assigned by original contractors to other individuals/contractors on power of attorney.

Seventy nine per cent of the packages could be completed with delays of over six months.

⁴³ Actual length constructed 4.20 km

⁴⁴ (1) Package- 2291 with contract amount of ₹ 3.03 crore, (2) Package 22104- with contract amount of ₹ 0.82 crore.

Chart 3: Details of delay in completion of packages



It may be seen from the chart that only six *per cent* packages were completed within scheduled completion period. About 79 *per cent* packages were completed with delays ranging from six months to more than two years. The main reasons for delays as stated by the contractors during finalisation of liquidated damages, in respect of 107 packages test checked by us included—delay in mining permission (22), non-availability/transportation of material (42), standing crops on both sides of road alignment (25), excessive rains (52), shortage of labour (44), land dispute (33), shortage of water (24), forest cases (24) etc. It may be noticed that the reasons such as, delay in mining permission, non-availability/transportation of material, shortage of labour, shortage of water, forest cases etc. were controllable. The delays in completion of roads deprived the inhabitants from deriving timely benefit of the asset.

The Government, while replying, did not give details of any remedial measures to remove these bottlenecks.

Recommendation

The Authority should step in to facilitate contractors in removing bottlenecks in obtaining permission for mining right, availability of land and material required for construction for ensuring timely completion of road works.

(iv) Delay in pole shifting/lifting of line

As per Operational Guidelines, the State Level Standing Committee (SLSC) was responsible for quarterly review of road safety issues.

In view of public safety, electric poles/lines on the road way need to be timely shifted/lifted. We noticed that in 217 cases of the proposal of shifting/lifting of poles/lines pertaining to eight districts⁴⁵, actual shifting/lifting of poles/lines was not found to have been done and in 194 cases, the delay ranged from one year to seven years after completion of concerned road works. Thus, the safety of the users was not ensured despite the fact that the SLSC was responsible for quarterly review of road safety related issues.

The work of shifting of utilities was not completed even after completion of road works.

⁴⁵ Ashok Nagar , Betul , Chhindwara, Datia , Khargone , Ratlam , Sagar and Shajapur

The Government stated that, prior to August 2009, the work of electric pole shifting was done by the MP Electricity Board (MPEB) and looking to the delay, presently the works were being taken up on priority basis by MPRRDA.

The reply is not acceptable as we have noticed continuing delays in pole shifting/lifting even after completion of the road works.

(v) Imposition of liquidated damages

The LD was not levied as per the provisions of contract and manner of deciding the LD was not in order, resulting in short levy of ₹ 34.43 crore.

As per clause 44.1 of General conditions of contract the contractor, shall pay liquidated damages (LD) to the employer at the rate of one *per cent* per week of the initial contract price or actual value of work, whichever is less subject to maximum of 10 *per cent* for the period of delay beyond intended completion date. Further clause 27.1 provides that the Engineer shall extend the intended completion date if a compensation event occurs or a variation is issued which makes it impossible for completion by the intended completion date. Therefore, MPRRDA has to decide the extension of intended completion date and the period of delays attributable to contractors to work out amount of LD. In case of occurrence of any compensation event⁴⁶ or consequential loss, the agreements did not specifically provide for any compensation to contractor, except extension in intended completion date.

In analysis of the time extension cases in respect of 107 packages in 13 selected districts, we observed that:

- The main reasons for delays claimed by contractors included agricultural activities, non-availability of labour, shortage of water, non-availability of road material, transportation of material, heavy rains, mining permission, election, festival etc. In terms of the agreements, all such reasons were part of contractors risk as they were deemed to be aware of the condition of sites including availability of water and road material etc. Therefore, these reasons for delays were attributable to contractors.
- Cases for imposition of LD were submitted by PIU to headquarters of MPRRDA without analysis of the reasons stated by the contractors in terms of the contract and determination of delays in terms of weeks. The CEO, instead of deciding the extent of delays on the part of contractors, decided amount of LD in certain *per cent* of contract value/value of work done. Thus, the cases of imposition of LD were decided beyond the provision of the contract. In the 107 packages (**Appendix-2.16**), LD at the rate of 0.25 *per cent* to 8 *per cent* only was levied against leviable 10 *per cent* of the contract value for the delays ranging from 13 weeks to 251 weeks attributable to the contractors. Thus, there was short levy of LD of ₹ 34.43 crore.
- The orders were based on hearing of case although the agreements did not provide for conduct of such hearing for imposition of LD. Test check of orders and note sheets of 25 cases revealed that in all cases the orders were not speaking orders as specific period of delays attributable to contractor and/or department, and admissible period of compensation events was not found to have been analysed and recorded in the orders.

⁴⁶ As per clause 40 and 28 of General Conditions of the Contract, compensation events include risk other than employer risk and delay of work for more than 30 days under prior approval of the CEO.

- As per the orders issued by Finance Department (May 2009) in case of delays due to departmental reasons, responsibility should be fixed along with orders for recovery of financial loss to government. No such action was found to have been taken in case of delays on the part of the PIUs.

The Government (October 2015) stated that, the LD was decided by the competent authority after giving due opportunity to both the parties to present their case and taking into account the delay on the part of the department and that on the part of contractor. It was further stated that no other benefit such as price adjustment was given to contractor for delay on the part of department.

The reply is not acceptable as detailed period-wise analysis of delays specifically on account of compensation events or on the part of contractor was not made while deciding the quantum of LD. Further the intended date of completion was to be decided at the time of extending the period of contract, and the LD levied and the manner of deciding the LD was not in order.

Recommendation

The Authority should decide the extent of delays in completion of works attributable to contractors and impose liquidated damages as per the terms of the agreements based on the extent of delays.

(vi) Insurance

As per the terms and conditions of the contracts, the contractor shall at his cost provide in joint names of the employer and contractor, insurance cover from the start date to the date of completion for loss or damage to the works on account of contractors risk.

We noticed that in 264 packages the contractor either did not submit the documents of insurance policy or the policy submitted did not cover the risk on account of natural calamities⁴⁷ required to be covered under the contract. The failure of the department to enforce the clause resulted in accrual of financial benefit⁴⁸ valuing ₹ 2.60 crore to the contractors on account of the premium not paid by them. Besides works to that extent remained exposed to risk of damage.

The Government agreed to issue appropriate instructions in this regard.

(vii) Short recovery of amount recoverable from contractors

As per clause 53.1 of general conditions of contract, on termination of contract because of fundamental breach of contract by contractor, the amount due to contractor or the employer is computed on the basis of the prescribed procedure/method. In case, the total amount due to the employer exceeds any payment due to the contractor, the difference shall be recovered from the security deposit and performance security. If any amount is still left unrecovered it will be a debt payable to the employer⁴⁹. We noticed that:

⁴⁷ Cyclone, Earth quake, Flood, Hurricane, Inundation, Storm, Tempest, Tornado and Typhoon.

⁴⁸ Computed at the rate of 0.1 *per cent* per annum of the contract amount; computed for each month of currency of agreement

⁴⁹ As per definition given in part-I of section 4 of contract, the employer is the CEO, MPRRDA

Undue financial benefit of ₹ 2.60 crore was passed on to contractors on account of premium for insurance policies.

a) In 37 cases of PIUs under eight districts⁵⁰, recoverable amount of ₹ 34.89 crore due from contractors was lying unrecovered for the period up to 84 months from date of termination of contract/issue of RRCs (**Appendix-2.17**).

b) In 11 cases under PIUs of three districts⁵¹, recoverable amount of ₹ 12.45 crore was assessed by the PIU but the amount was not recovered/adjusted nor were RRCs issued (**Appendix -2.17**).

c) The PIUs of Sagar and Shajapur districts had provided nil information on this account whereas PIU, Rewa having 10 terminated cases (**Appendix -2.17**), did not assess recoverable amount for initiating process of recovery from contractors.

We further noticed that the recoverable amount was neither shown under debtors (current assets) in the annual accounts nor disclosed in the notes to accounts. The details of recoverable amount from contractors could not be made available to us, indicating non-maintenance of records and weak monitoring mechanism.

The Government stated (October 2015) that, the amount available with the Department was adjusted immediately and process of recovery of balance amount had been started as per Rules and it was a continuous process. It was further stated that up to financial year 2013-14, the total recoverable amount was ₹ 386 crore; out of which ₹ 252 crore was recovered.

The reply is not acceptable as authenticated records relating to recoverable amount and disclosure in the annual accounts were lacking and in respect of cases examined by us the amount remained unrecovered for the period up to 84 months from the date of termination of contract/issue of RRCs.

Recommendation

The Authority should ensure maintenance and updation of records of debtors and have control over the follow-up action and receipts of recoverable amount from contractors.

(viii) Deployment of technical Staff

As per the conditions of contract, the contractor has to employ specified technical/qualified personnel during the currency of agreement. Recovery at the rate of ₹ 20,000 per person per month will be made from contractor, if the contractor fails to deploy required number of technical staff with the requisite qualification.

We noticed that in 179 packages under nine districts⁵², information about deployment of staff was neither being sent by the consultant along with running bills nor being recorded/attested by any authority of the PIU. Since this was a condition for payment/recovery, it needed to be recorded in the MBs to ensure/verify the deployment of sufficient staff on the work.

The Government stated that instructions has been issued from time to time for observing the provisions of agreement and maintain proper records.

⁵⁰ Ashok Nagar, Balaghat, Betul, Chhindwara, Datia, Khargone, Umaria and Vidisha

⁵¹ Jhabua, Ratlam and Rewa (PIU Mauganj)

⁵² Balaghat, Betul, Chhindwara, Datia, Khargone, Ratlam, Rewa, Sagar and Shajapur

The fact remains that in significant number of packages information about deployment of staff was neither being sent by the consultant along with running bills nor being recorded/attested by any authority of the PIU.

2.2.8.2 Deviations from specifications and guidelines

(i) Execution of road beyond specified width

As per the circular (January 2008) of NRRDA and clause 2.6.3 and 2.6.4 of the Rural Road Manual, the road way width of link routes⁵³ with motorised vehicle less than 100 per day was to be kept at only six metre.

Roads were constructed beyond specification with extra width than required which resulted in avoidable expenditure of ₹ 4.98 crore.

We noticed that in case of 27 roads (**Appendix-2.18**) despite being link roads with traffic ranging from 28 to 78 motorised vehicles per day and without assigning any specific reason the roads were constructed with roadway width of 7.5 metre instead of the specified 6 metre. This resulted in avoidable expenditure of ₹ 4.98 crore⁵⁴ on the construction of the roads.

The Government stated that road width of 7.5 m was kept keeping in view the future traffic growth and it was scrutinized by State Technical Agency (STA) and sanctioned by GoI. The circular for minimum roadway width of 6 m for traffic less than 100 motorised vehicles was issued in September 2010.

The reply is not acceptable as the provisions of keeping the roadway width to 6 m for traffic less than 100 motorised vehicles was already provided in the specification issued by IRC in the year 2002 and the provision was only reiterated through the circular by NRRDA in the year 2008 and 2010.

(ii) Expenditure beyond the scope of PMGSY

As per para 3.3 of the guidelines, an unconnected habitation is the one situated at least at a distance of 500 m or more from existing AWR or from habitation already connected by AWR. Thus, habitations situated within a distance of less than 500 m are not covered under PMGSY. Further as per para 1.6.4 of operational manual, PMGSY does not permit repairs to black-topped or cement-concrete roads, even if the surface condition is bad.

We observed that in Shujalpur Mandi Kalapipal to Bhugor road under package 3942 in Shajapur district, the DPR was prepared for 400 m with a cost of ₹ 17.67 lakh and the road was constructed for 167 m with cost of ₹ 5.15 lakh. Further in PWD road to Guda, under package 3392 in Sagar district, 190 m long CC road was reconstructed with cost of ₹ 6.27 lakh which was in contravention to the provisions of guidelines and the Operational Manual.

In case of road with length lesser than 500 m the Government replied (October 2015) that some portion of the roads was constructed by other agencies, whereas in respect of reconstruction of existing CC road, no reasons were intimated.

The reply is not acceptable as construction with length less than 500 metre was not covered under the guidelines.

⁵³ Link routes are the roads connecting a single habitations or a group of habitations through roads or district roads leading to market centres

⁵⁴ Computed at 20 per cent of the cost incurred on the road for reduction of width

(iii) Plantation

As per the PMGSY guidelines⁵⁵ and Operational Manual, fruit bearing and other suitable trees and shrubs on both sides of the road was to be planted by the State Government/Panchayat from their own fund. However, during joint physical verification of 39 roads under 13 districts we noticed that no plantation of such trees on both sides of road was carried out.

The Government stated that this task was taken up by State Government/Panchayats from their own funds, the GoMP instructed (February 2006) all the CEOs⁵⁶ to generate rural employment through plantation along the roads of the State and MPRRDA had also issued instruction (June 2015) to all the PIUs in this regard. The fact remains that the plantation work is still to be taken up.

2.2.8.3 Measurement and payments**(i) Payment for hume pipes**

(a) As per General Note- 9 of the Standard Schedule of Rates (SSR), ISI marked reinforced cement concrete hume pipes must be used in construction of roads. GM may also allow use of hume pipes conforming to IS specifications duly tested by Directorate General Supply and Disposals (DGS&D). The testing certificate of DGS&D will be kept on record before making payment against such items. In such cases, the rates of relevant item shall be paid five *per cent* less than the rates prescribed.

Payment of ₹ 11.21 crore for hume pipes were made without ISI certificate and excess payment of ₹ 69.41 lakh due to non-deduction of rate and incorrect application of rates.

In 135 packages, we noticed that non-ISI hume pipes valued at ₹ 11.21 crore were used in the work without support of DGS&D testing certificate. We further noticed that in 61 packages (**Appendix-2.19**) out of 135 packages, the contractors were paid at full rate without deduction of stipulated five *per cent* of the rates amounting to ₹ 29.68 lakh, in contravention to the provisions of SSR.

The Government stated in case of Shajapur district that, the DGS&D certificates for minor quantities could not be collected from the contractors or could not be located at the time of audit but did not offer any reply with respect to other districts. It was further stated that contractors had been issued notices to deposit five *per cent* amount.

The reply confirms that the conditions of SSR were not adhered to by the PIUs and recovery of five *per cent* amount should have been made from the payment through running bills of the contractors in case of non-ISI hume pipes.

b) In the SSR effective from May 2012 onwards, separate rates are provided for ISI marked and non-ISI marked pipes. We noticed that in 15 packages (**Appendix-2.20**), non-ISI marked pipes were used in the road works but payments were made for the rate provided for ISI marked pipe. Thus incorrect application of rates for non-ISI marked pipes resulted in excess payment of ₹ 39.73 lakh to contractors.

⁵⁵ 21.2 of guidelines 2012 and para 6.9.6 of operational manual

⁵⁶ The CEOs operating the Madhya Pradesh Rural Employment Guarantee Scheme

The Government in case of Shajapur and Sagar districts stated that some ISI certificates had been located/produced and in case of other PIUs information would be collected and necessary action taken after due examination.

The reply in respect of Shajapur and Sagar districts is not acceptable as it was not supported by such certificates.

(ii) Execution of Water Bound Macadam (WBM) Grade II and III

Payment of ₹ 29.20 crore for WBM courses could not be substantiated due to non-recording of levels, recording of insufficient quantity of material for the work and non-recording of thickness of compacted/loose layers.

The Specifications for Rural Roads (Clause 112.3) provides that the finished thickness for base course (WBM-II and III) to be paid on volume basis shall be computed after taking levels before and after construction. Further, in the Quality Control Register (QCR) part-I, a form has been prescribed for recording depth (of loose quantity) using wooden blocks during execution.

The Specifications and the SSR, specify that each 1.00 cu m of 75 mm finished thickness of WBM-II and WBM-III would require 1.37 cu m and 1.45 cu m respectively of loose quantity of aggregate including screening. Further, as per the terms of the reference of the Supervision and Quality Control Consultancy (SQC), the consultant had to record the quantity of material incorporated in the work.

In respect of 250 packages, we noticed that the volume of WBM grades II and III were being computed by standard thickness recorded in measurement book (MB) without actual recording of levels before and after construction. SQCs had been recording the quantity of material in the MB for the purpose of computation of royalty based on the executed quantity of WBM instead of measuring material received for the work.

In test checked 250 packages, 12.38 lakh cu m WBM grading II and III was executed by the PIUs for which 17.44 lakh cu m material was required. We noticed that material consumed in WBM courses as recorded in MB was 12.38 lakh cu m from which only 8.79 lakh cu m WBM could have been actually executed. Thus, the payment for 3.59 lakh cu m WBM courses valuing ₹ 29.19 crore could not be substantiated and possibility of laying of WBM in lesser thickness than specified cannot be ruled out.

The Government stated that loose thickness of 10 cm WBM was ensured by putting the wooden blocks and camber plates, consultant/PIU staff ensured the loose thickness of material of WBM at the time of spreading. It was further stated that before making payments, compaction and thickness were checked and payments were made as per SSR.

The reply is not acceptable as neither the levels were recorded nor the record of checking of thickness of compacted/loose quantity were maintained and total quantity of material incorporated in the work was also not recorded specifically. The payments were made on the basis of theoretical/standard thickness.

Recommendation

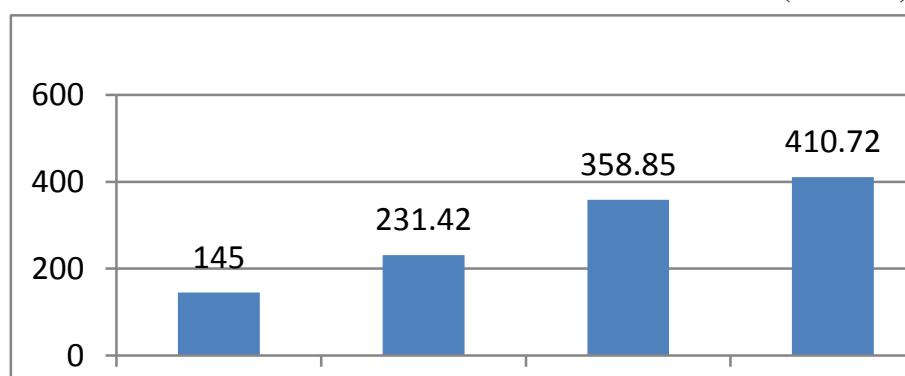
The authority should enforce measurement of road works as prescribed and ensure supply of material as per the specifications for correct payment to contractors and quality in the works.

2.2.8.4 Maintenance of roads

As per PMGSY guidelines the maintenance of the road is to be done by the State Government using its own fund. As per clause 32.2.1 of the standard bidding document, the contractor is responsible for routine maintenance of the road during the period of defect liability i.e. up to five years from date of completion of work. After lapse of defect liability period, maintenance of roads are done through separate agreements, commonly referred to as MTN works.

The MPRRDA received ₹ 1,557.23 crore during the period 2010-15 from various sources⁵⁷ of the State Government for the purpose of maintenance of roads as detailed in the **Chart 4** below:

Chart 4 : Showing fund received from the State Government by MPRRDA (₹ in crore)



(Source : Data provided by MPRRDA)

During test check of records of 109 post five-years maintenance packages (MTN packages) out of 406 MTN packages available in test checked districts, we noticed the following:

(i) Delayed award of post five years maintenance work

During the defect liability period the original contractor has to maintain road in good condition as specified in the specification which includes routine maintenance.

We noticed that in 103 packages (**Appendix-2.21**) the MTN works were awarded with delays over one month to 59 months from the date of completion of period of defect liability. Delay in award of works caused creation of potholes in 33 packages (**Appendix-2.21**) out of 103 packages and expenditure of ₹ 93.30 lakh on patch repair was incurred which was avoidable if MTN works were awarded in time.

The Government stated that, on completion of defect liability period tenders were invited for fixing agencies after technical and administrative sanctions and multiple calls were required sometimes for fixing of agency. Therefore, there was delay in award of contract in some packages.

The fact remains that continuous maintenance of roads were not ensured.

Avoidable expenditure of ₹ 93.30 lakh was occurred due to delay in award of MTN works and non-maintenance of roads after end of defect liability period.

⁵⁷ State budget- ₹ 561.02 crore, Mandi Board- ₹ 735 crore, 13th Finance Commission- ₹ 261.21 crore

(ii) Non-maintenance of road during defect liability period

The roads were not maintained by original contractors during defect liability period.

In four packages⁵⁸ we noticed that despite awarding the work of MTN immediately on completion of defect liability period, the PIUs incurred expenditure of ₹ 11.90 lakh (**Appendix-2.21**) on pothole repair during the initial period of MTN contract. Since the original contractor was required to carry out routine maintenance during defect liability period, hence incurring of expenditure on pothole repair immediately under MTN contract indicated that the roads were not maintained properly by the original contractor.

The Government stated that the expenditure was not for patch repair but for additional quantity of bituminous material required in patches as profile correction.

The reply is not acceptable as the measurements were specifically recorded for pot hole repairs in the cases pointed out by us.

Recommendation

The Authority should ensure timely initiation of process of award of works for maintenance of roads before the date of termination of defect liability period to ensure continued good condition of roads.

2.2.8.5 Construction of bridges

As per the instructions issued by the GoI (July 2004 and December 2008), the pro-rata cost of bridges with span of over 50 metre was to be borne by the State Government. Further, as per instructions (January 2008) of NRRDA, in link roads the clear width of bridges was to be kept at 4.25 metre⁵⁹ with provision for widening. In case motorised vehicle is more than 100, it shall be 5.5 metre.

We noticed that the Empowered Committee in its 39th meeting (March 2010) decided that all bridges would be constructed with clear width of 7.5 metre. This decision was not in accordance with the directions of NRRDA for keeping the clear width of bridges to 5.5/4.25 m. Thus the additional cost due to extra width of bridges was to be borne by the State Government. This resulted in avoidable extra burden of ₹ 77.66 crore⁶⁰ on the State exchequer in case of 169 bridges. Some instances of avoidable expenditure noticed during audit are discussed in details in **Appendix 2.22**.

The Government stated that construction of bridges is done for life span of 50 years or more, widening of bridge work is technically not possible to accommodate increased demand of traffic in future and in order to avoid reconstruction of wider bridge with huge financial burden, it was decided to go ahead with 7.50 metre wide bridges.

⁵⁸ 1. Khargone: MP-2218, ₹ 1.05 lakh, 2. Khargone: MP-2252, ₹ 1.20 lakh, 3. Sagar: MP-3325, ₹ 4.27 lakh, 4. Sagar: MP-3322, ₹ 5.38 lakh

⁵⁹ Before this instruction, it was 4.25 metres, in case where traffic less than 100 motorised vehicles per day and 5.5 metres where motorised vehicle is more than 100 per day. In revised instruction also in through roads the width of bridge was to be 5.5 metres.

⁶⁰ Sanctioned in 2010-11, 57 nos ₹ 11.45 crore; sanctioned in 2013-14, 112 nos ₹ 66.21 crore

The reply is not acceptable as the NRRDA circular also provides for designing of bridges for future widening and technical aspects relating to this was not found submitted or discussed in the meeting as per the agenda note and minutes of meetings. Thus the decision was not based on assessment of actual requirement.

Recommendation

The Authority should ensure adherence to guidelines for construction of bridges as per the specified width for optimisation of resources.

2.2.9 Monitoring and quality control

2.2.9.1 Non-holding of meetings

The meetings of General Body and Executive Committee were not held as required in the Act.

As per the provision of Madhya Pradesh Society Registration Act (MPSRA), 1973, meetings of the General body of the society are to be held twice in a year and Executive Committee shall meet once in every quarter.

We noticed that during the period April 2010 to March 2015, the meetings of the General Body and Executive Committee were not held as provided in the by-laws of the MPRRDA as detailed in the **Table 2.9** below:

Table 2.9: Showing number of meetings held

Year	No of General body meetings		No of Executive Committee meetings	
	Required	Actually held	Required	Actually held
2010-11	2	1	4	1
2011-12	2	0	4	0
2012-13	2	0	4	0
2013-14	2	0	4	1
2014-15	2	0	4	1

From the above table, it can be seen that against the required 10 meetings of General Body during the five years ending 2014-15 only one meeting was held in 2010-11. Similarly, only three meetings of Executive Committee were held against the required 20 meetings during that period. This could have weakened the monitoring system and impacted policy decisions, particularly pertaining to inter-department coordination for ensuring timely completion of works.

2.2.9.2 Quality control monitoring through SQM

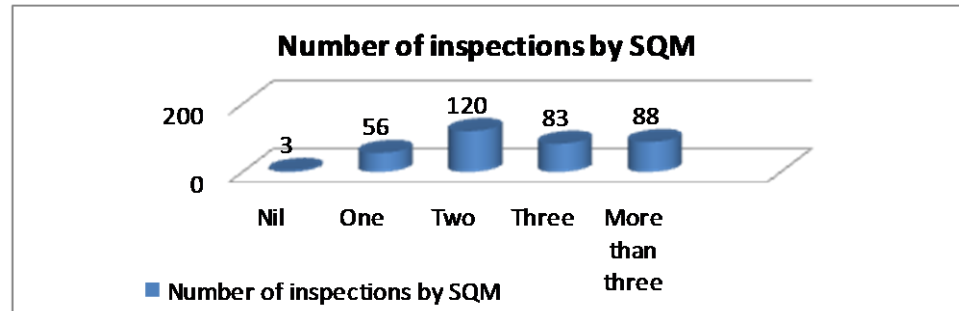
The visits of SQM for quality monitoring was not held as per stipulations and there was delay in rectification of defects pointed out by SQMs.

A three-tier Quality Management mechanism is envisaged under the PMGSY. The first tier of quality management system envisaged quality management by PIUs. The Second-tier is structured as an independent quality monitoring at State level through regular inspection of works by State Quality Monitors (SQMs). The third tier is envisaged as independent quality management mechanism operationalised by the NRRDA, as such, this tier would be enforced by NRRDA through the National Quality Monitor (NQM).

In second tier SQM needs to inspect each work at least three times during construction including one inspection within one month of its completion. Thus total three visits by SQM up to completion stage is mandatory. Our scrutiny of records of SQM visits as available at PIUs and on-line Management, Monitoring and Accountability System (OMMAS) data indicated following:

i) The records of 350 completed roads at PIUs of seven districts⁶¹ where inspection of roads were done by SQMs, were test checked by us. We noticed that in case of 171 roads, visits of SQMs were as per the stipulated provision of three visits. However, in case of 179 roads there was shortfall in visits by SQMs which is depicted in the chart-5 below:

Chart 5: Showing number of inspections by the SQM



From the above it can be seen that in 179 roads (51.14 per cent) of test checked roads, the SQMs did not visit the roads at least three times as stipulated.

On being pointed out the Government replied that, prior to November 2010 the system of online entry on OMMAS of SQMs inspections was not there; hence entries prior to November 2010 were not appearing on OMMAS; hence there was some difference between the actual inspection data as provided by the PIU and as available on OMMAS.

The reply is not acceptable as the data analysed by us was not of OMMAS but those maintained manually.

ii) As per the guidelines, the OMMAS is a vital mechanism for monitoring the implementation of the Programme. The audit has compared the data provided by the MPRRDA relating to the SQMs visits as entered in the OMMAS with the data provided by the PIUs. We found that out of 330 roads the data of which was available, there was mismatch of data in case of 269 roads, with variation ranging from 14 per cent to 400 per cent. Therefore, it is evident that the PIUs did not ensure furnishing of real time and accurate data regarding SQMs visits for OMMAS.

In reply the Government stated that sometimes the online Quality Monitoring System had functional problems and due to this, SQMs were not able to make online entry of their inspections; hence there was some mismatch in the data. It was further stated that adequate and required inspection had been carried out by SQMs of MPRRDA.

The reply confirms the audit observation of mismatch of the data.

iii) We noticed that during the period between November 2010 and March 2015, 68 roads were graded as unsatisfactory by SQMs of which 31 were upgraded. Out of the rectified 31 roads, 19 roads were rectified within six months but 12 roads could be rectified as late as 38 months. However, in case

⁶¹ Ashoknagar, Balaghat, Datia, Jhabua, Khargone, Ratlam and Sagar

of 37 unsatisfactory roads, 19 roads could not be rectified even after lapse of period over six months up to 47 months.

Recommendation

The Authority should ensure that SQMs perform inspection of roads as per the prescribed norms and rectification of defects at the earliest to provide good quality roads.

2.2.10 Conclusion and recommendations

- The component of tender premium and cost overrun against the sanctioned cost was not being timely computed and adjusted by MPRRDA.

The Government should take steps for providing funds of its share in timely manner after assessing cost over-run/savings and tender premium in respect of substantially completed packages.

- After 14 years of implementation of the scheme, 3,388 eligible habitations having population more than 500 were yet to be connected. There were deficiencies in planning of roads under the scheme due to provision of incorrect length of roads and alignment in core network, non-holding of transect walk, non-approval of roads on yearly basis by the Zila Panchayat, non-shifting of utilities etc. The DPRs were not accurate and realistic as there were huge variations in the executed quantities and there were substitution of items.

The Government should ensure the conduct and recording of the 'Transect Walk' and detailed survey/investigation for preparing realistic detailed project for desired road connectivity.

- There was delay in execution of works and the works were hampered due to lack of forest clearance, land disputes, non-coordination with other departments etc.

The Authority should step in to facilitate contractors in removing bottlenecks in obtaining permission for mining right, availability of land and material required for construction for ensuring timely completion of road works.

- The MPRRDA instead of deciding the extent of delays on the part of contractors, decided amount of LD in certain *per cent* of contract value/value of work done; therefore the cases of imposition of LD were decided beyond the provision of the contracts.

The Authority should decide the extent of delays in completion of works attributable to contractors and impose liquidated damages as per the terms of the agreements based on the extent of delays.

- Instances of incorrect payments, use of material beyond specification, incurring of extra cost, short/non-recovery of recoverable from contractors non-insurance etc were noticed.

The Authority should ensure supply of material and measurement for road works as per the specification. The Authority should ensure maintenance and up-dation of records of debtors and have control over the follow-up action and receipts of recoverable amount from contractors.

- The contracts for post five year maintenance works were not awarded timely.

The Authority should ensure timely initiation of process of award of works for maintenance of roads before the date of termination of defect liability period to ensure continued good condition of roads.

- The width of the bridges were not being fixed on the basis of technical requirement and economical considerations.

The Authority should ensure adherence of guidelines for construction of long span bridges by specialised agency of the State and construction of bridges as per the specified width for optimisation of resources.

- The quality monitoring through SQM were not being held as per prescribed norms for assessing quality of work and there was delay in rectification of defects.

The Authority should ensure that state quality monitors perform inspection of roads as per the prescribed norms and rectification of defects at the earliest to provide good quality roads.

Farmer Welfare and Agriculture Development, Forest and Water Resources Department

2.3 Implementation of Bundelkhand Drought Mitigation Package in Madhya Pradesh

Executive Summary

Bundelkhand region comprised of Chhattarpur, Damoh, Datia, Panna, Sagar and Tikamgarh districts of the State. In view of the severe drought condition and their impact on the livelihood of the people in the region, Government of India approved (December 2009) a special Bundelkhand Drought Mitigation Package (BDMP) with the objectives of optimisation of water resources through utilisation of river system, development of irrigation facilities, warehousing and marketing infrastructure, and watershed treatment in forest area up to end of 11th plan period.

A performance audit on “Implementation of Bundelkhand Drought Mitigation Package in Madhya Pradesh” by Water Resources; Farmer Welfare and Agriculture Development, and Forest Departments during 2009-10 to 2014-15 revealed the following:

- The Planning Commission, Government of India (GoI) announced (December 2009) a special package with cost of ₹ 3,760 crore for Madhya Pradesh for 11th plan period, which included ₹ 1,953.20 crore as additional central assistance (ACA). For 12th plan period for BDMP, the Planning Commission earmarked ACA of ₹ 1,884.50 crore for State.

(Paragraph 2.3.1)

Water Resources Department

- Water Resources Department was allotted ₹ 1,581 crore for creation of 2.16 lakh hectare irrigation potential through implementation of 177 schemes/projects under BDMP. As against this, 1.14 lakh ha irrigation potential could be achieved up to March 2015 after incurring expenditure of ₹ 1,098.86 crore.

(Paragraph 2.3.7)

- The work of development of 45,536 ha command area in Datia and Tikamgarh districts was undertaken in Rajghat Project for which ₹ 50 crore was allocated under BDMP. However, only 22,624 ha of command area could be developed at the cost of ₹ 56.11 crore. Further, out of the total expenditure of ₹ 56.11 crore, an amount of ₹ 11.54 crore was incurred in Bhind and Shivpuri districts, which were outside the Bundelkhand region.

(Paragraph 2.3.7.1)

- The additional fund of ₹ 117.08 crore under BDMP was augmented for Bariyarpur left bank canal (LBC) project with the objective to complete it by 11th plan period. However, lining in main canal, 12 numbers of structures in main canal, earthworks of distribution system and lining of distribution system were yet to be completed. We also noticed that the award of work on the basis of inflated estimates led to avoidable extra expenditure of ₹ 15.83 crore.

(Paragraph 2.3.7.2)

- Singhpur project, which intended to irrigate 12,474 hectare land in Chhattarpur districts, was allocated ACA of ₹ 100 crore with the objective of completing it by 2012-13. However, significant part of its distribution system was incomplete as of March 2015 due to frequent changes in the design parameters.

(Paragraph 2.3.7.3)

- The Department incurred expenditure of ₹ 708.13 crore up to March 2015 on 167 minor irrigation schemes. Of these, 135 minor irrigation schemes were completed and 37,028 ha irrigation potential created. There were frequent changes in selection of the schemes, resulting in delay in start of works as well as completion of works. Further, late initiation of land acquisition process resulted in delay in completion of schemes.

(Paragraph 2.3.7.4 (i))

Farmer Welfare and Agriculture Development Department

- The Farmer Welfare and Agriculture Development Department created warehousing capacity of 5.34 lakh metric tonne (MT) at the cost of ₹ 478.26 crore. Twenty seven marketing infrastructures (mini mandis) having capacity of 76,800 MT was constructed under BDMP after incurring expenditure of ₹ 80.14 crore. These mini mandis were envisaged to be run by the primary agriculture cooperative societies (PACS), however, these could not be handed over to PACS as of October 2015.

(Paragraphs 2.3.8 and 2.3.8.1)

- Detailed Project Reports (DPRs) of works of warehouse and marketing infrastructure sanctioned at the cost of ₹ 222.14 crore were based on similar drawings of warehouses instead of based on requirement of specific site. This resulted in large deviation in items of works at the time of execution.

(Paragraph 2.3.8.2 (i))

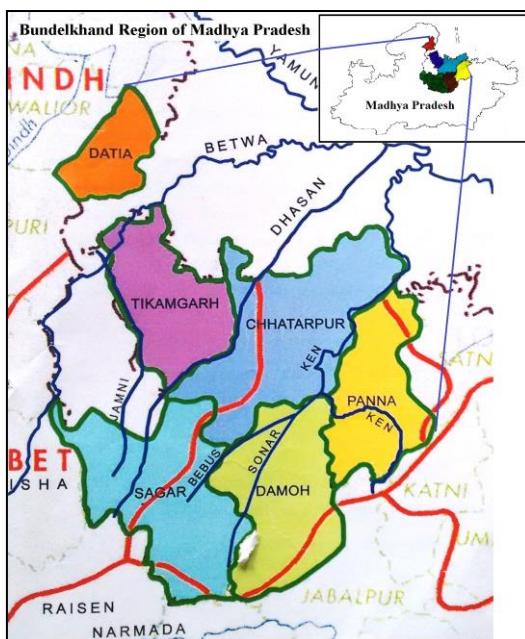
Forest Department

- Forest Department incurred ₹ 158.69 crore under BDMP as of March 2015, as against project cost of ₹ 322 crore for soil moisture and conservation (SMC) works in watershed areas. However, against targeted area of 2.88 lakh hectare for SMC works, only 1.39 lakh hectare area could be completed due to short release of funds by GoI during 12th Plan period.

(Paragraphs 2.3.9 and 2.3.9.1)

2.3.1 Introduction

Bundelkhand region comprised of Chhattarpur, Damoh, Datia, Panna, Sagar and Tikamgarh districts of the State. In view of the severe drought condition and their impact on the livelihood of the people in the region, GoI approved (December 2009) a special Bundelkhand Drought Mitigation Package



(BDMP) of ₹ 3,760 crore for the State to be implemented in 11th plan period with the objectives of optimisation of water resources through utilisation of river system, development of irrigation facilities, warehousing and marketing infrastructure and watershed treatment in forest area. The special package of ₹ 3,760 crore included ₹ 1,953.20 crore as additional central assistance (ACA). The balance of the package was envisaged to be met by converging resources from ongoing central sector and centrally sponsored schemes. BDMP continued during 12th plan period to address the

problems of the backward Bundelkhand region and GoI earmarked ACA of ₹ 1,884.50 crore for State.

2.3.2 Operational set-up for implementation of BDMP

The Planning Commission directed the State Government to identify the respective implementing agencies to draw the project proposals for implementation. National Rainfed Area Authority (NRAA), Planning Commission was to examine the proposals and approve the projects.

The State Government specified six implementing Departments for execution of works under BDMP. These Departments are Water Resources for irrigation works, Rural Engineering Services (RES) for water lifting works, Farmer Welfare & Agriculture Development (FW&AD) for development of warehousing/marketing infrastructure, Forest for soil moisture and conservation (SMC) works, Animal Husbandry for dairy strengthening and Public Health Engineering for water supply schemes.

For release of ACA, the implementing Departments prepared an abstract of projects to be taken up under BDMP and obtained approval of the State Government. The approved abstract of the projects was submitted to NRAA for their examination. NRAA after examination recommended projects to Planning Commission for release of ACA.

At Government level, an empowered committee headed by the Chief Secretary, Government of Madhya Pradesh (GoMP) was constituted (February 2010) to monitor execution of projects under BDMP. The committee comprised of Principal Secretaries of Water Resources, RES, FW&AD, Forest, AH and PHE Departments. The Chief Engineers (CEs), Executive

Engineers (EEs), Divisional Forest Officers (DFOs) at the district level were responsible for implementation of the projects.

2.3.3 Audit objectives

The objectives of the performance audit were to assess whether:

- planning was adequate for implementation of projects/schemes/programmes approved under BDMP,
- financial management and utilisation of funds was effective and economical,
- projects/schemes/programmes were implemented efficiently:
 - (i) for optimisation of water resources through water harvesting and proper utilisation of river system,
 - (ii) for construction of storage capacity of food grains and
 - (iii) for execution of work of soil moisture and conservation in forest area.

2.3.4 Audit criteria

The audit findings were based on criteria derived from the following:

- Madhya Pradesh Works Department (MPWD) Manual, Warehousing Manual, Forest Manual, Forest Act and Forest Rules,
- Guidelines for submission, appraisal and clearance of projects by National Rainfed Area Authority (NRAA), Planning Commission, GoI,
- Specification for irrigation works, building works, road works, IS codes,
- Unified Schedule of Rates (USR) for Works of WRD, Technical circulars and other orders issued by the Departments time to time,
- Madhya Pradesh Financial Code and Financial Rules, MP Purchase Rules and Treasury Code, Central Public Works Accounts (CPWA) Code and
- Terms and conditions of agreements with contractors.

2.3.5 Scope and methodologies of audit

The performance audit covers implementation of BDMP by Water Resources, Farmer Welfare and Agriculture Development, and Forest Departments. An amount of ₹ 1,562.50 crore under ACA was earmarked for these three Departments under 11th Plan period, which constitutes 80 *per cent* of total ACA. For 12th plan period, ACA of ₹ 910 crore was earmarked for these Departments for BDMP constituting 67 *per cent* of total ACA (**Appendix 2.23**). Out of allocated ACA, ₹ 1,814.75 crore was incurred on implementation of BDMP by these three Departments up to March 2015, as detailed in **Table 2.10**.

We scrutinised records of transactions relating to planning and implementation of the works executed by the three Departments under the BDMP in all the six districts of Bundelkhand region for the period 2009-10 to 2014-15.

The audit objectives, criteria and methodologies were discussed with the Principal Secretaries of WRD, FW&AD and Forest Departments, GoMP

during the entry conferences held on 22 January 2015, 23 February 2015 and 27 March 2015 respectively. The draft report was sent to the Government in August 2015 and response of the Government was received in October 2015 and November 2015 in respect of Forest and FW&AD Departments respectively.

The audit findings were discussed with the Principal Secretaries/ Additional Chief Secretary of the three Departments during the exit conferences held on 12 October 2015 (Forest Department), 29 October 2015 (FW&AD Department) and 5 & 18 November 2015 (WRD). The replies of the Government and views expressed during the exit conference have been included in the report.

2.3.6 Funding pattern

Planning Commission released ACA in instalments for the works under BDMP to be taken up during 11th plan period, through State Budget. ACA was continued by the GoI during 12th plan period for completion of ongoing projects of 11th plan period and taking up new projects in Bundelkhand region. Details of projects cost, ACA allocation by GoI, ACA released to Departments and expenditure incurred up to March 2015 on implementation of BDMP by the three Departments are given in the **Table 2.10**.

Table 2.10: Department-wise details of projects cost, ACA allocation by GoI, ACA released to Departments and Expenditure up to March 2015

(₹ in crore)				
Name of Department	Total cost of projects	ACA allocation by GoI	ACA released to Departments	Expenditure from ACA
11th Plan period (2007-12)				
Water Resources Department	1118.00	881.00	878.16	879.96
Farmer Welfare and Agriculture Development	980.00	574.50	574.50	558.40
Forest Department	242.00	107.00	106.54	106.54
Total	2,340.00	1,562.50	1,559.20	1,544.90
12th Plan period (2012-17)				
Water Resources Department	938.70	700.00	193.50	218.90
Farmer Welfare and Agriculture Development	130.00	130.00	21.56	21.56
Forest Department	80.00	80.00	29.39	29.39
Total	1,148.70	910.00	244.45	269.85
Grand Total	3,488.70	2,472.50	1,803.65	1,814.75

(Source: Information provided by the Department)

Audit findings

Shortcomings in implementation of programmes under BDMP have been discussed Department-wise in the succeeding paragraphs.

2.3.7 Implementation of programme in Water Resources Department

WRD is principal agency to create infrastructure of water resources in the State. As envisaged in the BDMP, the Department planned to develop the command area of Rajghat Canal System, complete/ongoing Bariyarpur

Project, Singhpur Barrage Project and minor irrigation (MI) schemes, repair/renovate/restore ponds, tanks, canals and construct new medium irrigation and MI schemes⁶². The summarised position of plan and achievement of these projects as on March 2015 is given in the **Table 2.11**.

Table 2.11: Phase wise details of target, achievement, ACA allocation to WRD and expenditure as on March 2015

(₹ in crore)

Phase	Particulars of projects/scheme	No. of scheme/projects	Target Irrigation Potential (IP)	Achievement (IP)	ACA allocation to WRD	Expenditure
11 th Plan (2007-12)	Rajghat Project (Major ⁶³ Project)	1	45536	22624	50	35.09
	Bariyarpur Project (Major Project)	1	43850	43850	117	117.08
	Singhpur Barrage (Medium Project)	1	12474	0	100	74.05
	Ongoing scheme (MI schemes)	49	16785	11759	125	147.57
	New schemes (MI schemes)	97	31749	25269	397	459.33
	Repair, Renovation and Restoration of Scheme	03	24391	10000	92	46.84
12 th Plan (2012-17)	Three Medium Projects	3	29552	0	456.47	117.67
	21 new schemes (MI schemes)	21	12153	499	203.53	101.23
	CADA work (Major Project)	1	NA	NA	40	0
Total		177	2,16,490	1,14,001	1,581	1,098.86

(Source: Information provided by the E-in-C, WRD)

The projects under the 11th plan period were to be completed by the end of March 2012. However, no irrigation potential was created in Singhpur Barrage and it was 50 per cent in Rajghat Project due to incomplete works as on March 2015. In case of incomplete Bariyarpur project, creation of 100 per cent irrigation potential was reported. Against the target of total 146 ongoing and new MI schemes⁶⁴ taken up for completion during 11th plan period, total 135 schemes⁶⁵ were completed up to March 2015. None of the scheme approved in 12th plan period was completed.

We further noticed that WRD divisions in six districts incurred overall expenditure of ₹ 2,045.11 crore during 2010-11 to 2014-15, of which ₹ 1,098.86 crore was from ACA under BDMP constituting 53.73 per cent. The Department created total 1,14,001 ha irrigation potential against targeted 2,16,490 ha up to March 2015 under BDMP, which was 52.66 per cent of the target. We analysed that the main reasons for shortfall in achievement were short release of funds during 12th plan period, frequent changes in selection of the schemes and late initiation of calling for tenders. Shortcomings in

⁶² The projects having command area between 2,000 ha and 10,000 ha are called medium projects and those having command area less than 2,000 ha is called minor irrigation schemes.

⁶³ The project having command area more than 10,000 ha is called major project.

⁶⁴ Contracts for these schemes were awarded with scheduled period for completion of 9 months to 24 months.

⁶⁵ Ongoing scheme: 45 and New schemes: 90

implementation of BDMP by WRD are discussed in succeeding paragraphs.

2.3.7.1 Execution of works in Rajghat Project

Rajghat Project is an inter-state multipurpose project of the Government of Madhya Pradesh and Uttar Pradesh constructed on Betwa river. The canal system including distributaries, minor and sub minors of the project were completed in 2006. Total command area of Rajghat canal system in Madhya Pradesh is 1,64,789 ha of which 1,02,749 ha (99,366 ha in Datia and 3,383 ha in Tikamgarh district) lies in Bundelkhand region. As full irrigation potential of 1,02,749 ha in Bundelkhand region was not achieved from the project due to heavy seepage in canal, disruption of canal profile, slippage and sedimentation, the work of development of 45,536 ha command area in Datia and Tikamgarh districts was taken up in BDMP.

(i) Physical and financial progress of project

For command area development (CAD), ₹ 50 crore was allocated (February 2010) under BDMP with a view to complete it by 2012-13. Against this, the work of CAD in 22,624 ha only was completed (as on September 2015) at the cost of ₹ 56.11 crore, indicating excess expenditure of ₹ 6.11 crore though only 50 per cent of the work was completed. Thus, the objective of achieving full irrigation potential by March 2012 was not fulfilled.

(ii) Shortcomings in execution of the work

Out of the total expenditure of ₹ 56.11 crore on the project, an amount of ₹ 11.54 crore was given to the WUAs⁶⁶ of Bhind and Shivpuri districts for construction of CAD works. As Bhind and Shivpuri districts were outside the Bundelkhand region, the execution of work was irregular.

The Government stated (October 2015) that Datia and Tikamgarh districts lie at the middle and tail end of the system, hence the work in initial reaches had to be done.

The reply is not acceptable as the provision of ACA was made for Datia and Tikamgarh districts of Bundelkhand region hence works out side of the region was not to be supported by the funds of ACA without specific approval of NRAA.

2.3.7.2 Execution of works in Bariyarpur left bank canal project

The Bariyarpur left bank canal (LBC) project envisaged irrigation in 38,990 ha area in the State. The project comprising of construction of Kutni dam and Bariyarpur left bank canal system, was taken up for construction in 1978-79 which was incomplete as of 2009-10. Therefore, the project was planned (December 2009) to be taken up under BDMP for augmenting its completion.

(i) Physical and financial progress of project

The cost of project was revised (February 2013) to ₹ 545.90 crore by the GoMP. An expenditure of ₹ 559.13 crore was incurred on the project up to March 2015 which included ₹ 117.08 crore from ACA. Up to March 2015, Kutni dam was 99 per cent complete. The status of completion of Bariyarpur

Only 50 per cent of targeted command area development works of Rajghat project was completed after expending more than the total allocation of ₹ 50 crore .

The Bariyarpur project could not be completed in all respect though the project was planned for completion in 11th plan period.

⁶⁶ Water User Associations are constituted under *MP Sinchai Prabandhan main Kisano ki Bhagidari Adiniyam*, 1999 for running and maintenance of canals.

left bank canal system as of March 2015 is as detailed in **Table 2.12:**

Table 2.12: Details of work executed in main and distribution canal

Components of the Bariyarpur left bank canal system	Unit	Target	Achievement	Achievement in percentage
Earth work of main canal	cu m	7706000	7777000	100.92
Lining of main canal	km	79	71	89.87
Structures in main canal	No	169	157	92.90
Earth work of distribution system and branch canal	cu m	3270000	3263000	99.79
Lining of distribution system and branch canal	km	97	80	82.47
Structures in distribution system and branch canal	No	1290	1290	100.00

(Source: Progress report of project issued by Central Water Commission)

As evident from table, lining in main canal (8 km), structures in main canal (12 nos), earthworks distribution system (7,000 cum) and lining of distribution system (17 km) were incomplete though additional fund was augmented for the project under BDMP with the objective to complete it by 11th plan period.

We noticed shortcomings in execution of the project as described below;

(ii) Non-consideration of earlier work while awarding new work

The project was funded under Accelerated Irrigation Benefit Programme (AIBP) and by ACA under BDMP. The Central Water Commission (CWC) was the monitoring agency for AIBP works. As per progress report of the CWC, the Department had incurred (2001-10) expenditure of ₹ 225.44 crore on execution of works of canal network for development of 13,155 ha irrigation area of Bariyarpur left bank canal and its Umraha branch canal. Project proposal prepared (2009-10) by the Department for Central Assistance under AIBP also included similar details of the works earlier executed, indicating existence of works in distribution network.

We noticed that the Department granted (April 2010) technical sanction for ₹ 51.00 crore for creating irrigation potential in 36,984 ha out of total 38,990 ha area envisaged in the project. The estimates⁶⁷ for the turnkey work included work in 11,149 ha⁶⁸ command area where canal network was already executed as revealed from project proposal prepared (2009-10) by the Department and progress report of AIBP indicating execution of distribution system. Thus, inclusion of earlier completed work of 11,149 ha inflated the estimates. The work was completed and contractor was paid (August 2014) ₹ 52.53 crore for the work. Therefore, award of the work on the basis of inflated estimates, led to avoidable extra expenditure of ₹ 15.83 crore⁶⁹.

The Government stated (October 2015) that no distribution system was prepared prior to year 2009-10.

The reply is not acceptable as the work of distribution system in 11,149 ha was executed earlier and existed as per the project proposal for funding under

Award of work on the basis of inflated estimates due to non-consideration of earlier works, led to avoidable extra expenditure of ₹ 15.83 crore.

⁶⁷ The estimate did not contain details of length, width and height of items of canals.

⁶⁸ 13,155 ha minus (total irrigation area: 38,990 ha minus total area taken up under BDMP:36984 ha)

⁶⁹ ₹ 52.53 crore/ 36,984 ha = ₹14,203 per ha * 11,149 ha = ₹ 15,83,49,247

AIBP sent by the Department to CWC.

Recommendation

The Government should ensure that records of assets and expenditure incurred thereon are properly maintained so that works already completed are not included in subsequent works.

(iii) Absence of accounting of hard rock

As per paragraph 7.2.10 of CPWA Code, material at site (MAS) account is to be maintained to keep control over receipt and issue of material for works being executed.

We noticed that 63,598.59 cu m hard rock valued at ₹ 88.65 lakh⁷⁰ obtained in excavation for construction of Kutni dam was not taken in MAS account. In the absence of entries of hard rock in MAS account, use or otherwise of the excavated hard rock in the said work, could not be ensured in audit.

The E-in-C in the exit conference stated that the matter would be examined.

(iv) Non-reduction of payment to contractor for not doing compaction

As per the Irrigation Specifications, earthwork of canals having height of embankment more than three metre should be watered and compacted. The USR provides for deduction of 25 per cent shrinkage allowance from the earthwork if watering and compaction is not done.

We noticed that shrinkage allowance of 25 per cent was deducted from total quantity of 34.42 lakh cu m earthwork done in canal of the projects, indicating that the earthwork was not watered and compacted as required in the Irrigation Specifications. Therefore, payment of ₹ 6.45 crore made for watering and compaction of earthwork was not justified besides the deviation from the specifications.

In the exit conference, the E-in-C while agreeing with the observation, stated that recovery on account of not doing watering and compaction should have been done.

2.3.7.3 Execution of works in Singhpur project

GoMP sanctioned (July 2006) Singhpur project at the cost of ₹ 94.38 crore, envisaging construction of a dam to irrigate 12,474 ha land in Chhattarpur district, to be completed by 2012-13.

(i) Physical and financial progress of project

The project was taken up (January 2010) under BDMP in 11th plan period and the work was in progress. The cost of the project was revised (February 2013) to ₹ 260.68 crore. An amount of ₹ 100 crore out of ACA was earmarked for augmenting completion of the project. The work of the project was in progress after incurring expenditure of ₹ 220.16 crore (March 2015) which included expenditure of ₹ 74.05 crore from ACA. The status of completion of the project as of March 2015 is given in the **Table 2.13**:

Payment of ₹ 6.45 crore was made for watering and compaction of earthwork though not done besides deviation from the specifications.

Significant part of the distribution system of Singhpur project was not completed though targeted for completion in 11th plan period.

⁷⁰ 48,921.993 cu m * 1.3 = Loose quantity of 63,598.59 cu m, at rate of ₹ 139.39 per cu m

Table 2.13: Details of work executed in dam, main canal and distribution canal

Particulars	Unit	Target	Achievement	Achievement (per cent)
Earthwork of Dam	cu m	2125000	1833120	86.26
Earth work of main canal	cu m	878000	753000	85.76
Lining of main canal	km	0	2	NA
Structures in main canal	No	74	74	100.00
Earth work of distribution system and branch canal	cu m	745000	292000	39.19
Lining of distribution system and branch canal	km	0	0	0
Structures in distribution system and branch canal	No	408	206	50.49

(Source: Progress report of project issued by Central Water Commission)

It is evident from the table that the project was not completed as significant part of the distribution system was incomplete. We analysed that the main reasons for delay in completion of the works were the frequent changes in design parameters due to not carrying out detailed basin survey before start of work as discussed below in details.

(ii) Significant changes during execution of project

Significant changes in the DPRs regarding submergence area, live storage capacity and cost of land acquisition for submergence area of the project were made during execution of the project as detailed in the **Table 2.14**;

Table 2.14: Details of submergence area, live storage capacity and cost of land acquisition

Parameter	As per DPR of 2006	As per DPR of 2009	As per DPR of 2012
Submergence area in ha	798.26	798.26	1241.00 ⁷¹
Live storage capacity (LSC) in MCM	22.57	22.57	49.01
Cost of land acquisition (₹ in lakh)	1559.21	3314.85	3552.26

(Source: Information provided by the Department)

These changes were made in the DPRs without mentioning reasons indicating inadequate survey and investigation before start of the work which contributed delay in completion of the project.

The Government stated (October 2015) that after obtaining AA, detailed basin survey was conducted to fix full tank level line on village map and to assess the capacity of the barrage. After survey, gross capacity of barrage was increased from 24 Million Cubic Metre (MCM) to 49.01 MCM keeping principal levels same.

The reply not acceptable as adequate survey and investigation including basin survey was not carried out initially subsequently resulted in changes in the Project afterwards.

2.3.7.4 Execution of minor irrigation schemes

The WRD proposed (January 2010) completion of ongoing minor irrigation (MI) schemes and construction of new MI schemes under BDMP at the estimated cost of ₹ 672.22 crore.

⁷¹ 980 ha in MP and 261 ha in UP

(i) Physical and financial progress of minor irrigation schemes

Details of MI schemes proposed, approved by NRAA, expenditure and status of completion as of March 2015 are given in the **Table 2.15**;

Table 2.15: Details of schemes proposed, approved, taken up for execution and completion of MI schemes

Phase	Particulars of MI schemes	Ongoing schemes	New schemes
11 th Plan (2007-12)	Number of proposal as per DPR	57	108
	Number of MI schemes approved by NRAA	52	93
	Finally taken up for execution (No.)	49	97
	Status of completed MI scheme (No.) as of March 2012	20	19
	Status of completed MI scheme (No.) as of March 2015	45	90
	Percentage completion for March 2015	91.84	92.78
	Total sanctioned cost of MI schemes (₹ in crore)	193.37	479.75
	Total expenditure incurred up to March 2015 (₹ in crore)	147.57	459.33
12 th Plan (2012-17)	Number of schemes	NA	21
	Total cost of MI schemes(₹ in crore)	NA	206.60
	Total expenditure incurred up to March 2015 (₹ in crore)	NA	101.23

(Source: Information provided by the Department)

Department created 37,028 ha irrigation potential against planned 60,687 ha from 167 MI schemes; delay was mainly due to late initiation of the process of land acquisition.

As evident from the table, the Department incurred expenditure of ₹ 708.13 crore up to March 2015 on the works of total 167 ongoing MI schemes⁷² and new MI schemes and created 37,028 ha IP through completion of 135 MI scheme against planned IP of 60,687 ha. Out of the total 146 MI schemes of 11th plan period, 39 MI schemes having 6,177 ha IP were completed and 107 MI schemes having IP of 42,357 ha remained incomplete up to March 2012.

We test checked in detail the works of 16 ongoing MI schemes and 67 new MI schemes and deficiencies in execution of ongoing/new MI schemes have been discussed below;

(ii) Planning for execution of works

The terms and conditions for release of funds by NRAA, Planning Commission, GoI under BDMP, provided for preparation of site specific detailed estimates for MI schemes by the Department and approval from their competent authority based on approved USR. Out of total 146 MI schemes taken up for construction during 11th plan period, deficiencies noticed in planning are discussed below;

- Out of 93 MI schemes⁷³ sanctioned by NRAA, one scheme was repeated twice and 10 schemes was placed in the list of 52 ongoing MI schemes. Subsequently, 10 schemes were dropped after incurring an expenditure of ₹ 7.65 crore as detailed in **Appendix 2.24** either without recording any reasons or on finding these schemes were not feasible due to overlapping of command area .

Further, 20 new MI schemes were taken up under BDMP in March 2012 at total sanctioned cost of ₹ 140.74 crore at end of 11th five year plan. Thus, there

⁷² Expenditure of ₹ 62.41 crore had already been incurred prior to BDMP on MI schemes.

⁷³ Four more new MI schemes were taken up by the department against sanction of 93 schemes.

Ten MI schemes were dropped after incurring expenditure of ₹ 7.65 crore either without recording any reasons or on finding these schemes were not feasible.

were frequent changes in selection of the schemes, resulting in delay in start of works as well as completion of works as discussed in succeeding paragraphs.

Due to mistakes in calculation of benefit-cost ratio, unfeasible 22 MI schemes were taken up for construction.

- NRAA guidelines for BDMP provide for benefit-cost (BC) ratio of more than one for MI schemes. In DPRs of 22 ongoing and new MI schemes⁷⁴ estimated to cost ₹ 248.57 crore, we found mistakes in calculation such as, rate of interest on capital, pre-development cost were taken on lower side and rates of crops to be produced were taken on higher side for deriving BC ratio. We worked out BC ratio less than one as detailed in **Appendix 2.25**. Thus, the unfeasible schemes were taken up for construction.

The E-in-C during exit conference stated that there might be the possibility of putting incorrect values of yield at the time of preparation of BC ratio and assured that BC ratio of MI schemes would be re-examined and intimated to audit.

- In case of other 18 new MI schemes costing ₹ 58.10 crore sanctioned by NRAA during 2010-11 under three divisions⁷⁵, tenders for the execution of work were floated after March 2012 (**Appendix 2.26**). This indicated that planning for all the process was not timely undertaken so as to complete these works before the end of 11th plan period.

The E-in-C during exit conference admitted the observation and stated that reasons for delay would be examined.

- The process of land acquisition for 11 new MI schemes out of total 97 new MI schemes was started with delays of 25 to 589 days after the award (during November 2010 to October 2012) of work (**Appendix 2.27**). Evidently, delays in initiating process of acquisition of land impacted timely completion of the works.

Recommendation

The Government should prepare DPRs based on actual survey and investigations of MI schemes so as avoid infructuous expenditure on works, which leads to delay in completion of the works.

(iii) Irregular execution of works

- In 28 ongoing and new MI schemes, expenditure of ₹ 131.63 crore had been incurred against the AA of ₹ 101.79 crore. Revised AA from the competent authority had not been obtained for the excess expenditure of ₹ 29.84 crore (**Appendix 2.28**).

Works of nine new minor irrigation schemes costing ₹ 56.14 crore were executed without detailed estimates.

- In Panna division, the works of nine new MI schemes costing ₹ 56.14 crore (**Appendix 2.29**), were executed without detailed estimates. We further noticed that basic records of MI schemes such as bench mark register, level book, graph MB etc. were not maintained or produced to us when requisitioned (February 2015). Thus, control over expenditure through preparation of estimates was not ensured.

- In Panna division in case of 12 MI schemes, only 562.52 ha land was acquired against the requirement of 804.65 ha area resulting in reduction of

⁷⁴ To be taken up in 11th plan period in seven divisions viz WR division Damoh, Kesli, Nowgong, Panna, Pawai, Sagar and Tikamgarh

⁷⁵ WR division Damoh, Sagar and Tikamgarh

the designed irrigation capacity (**Appendix 2.30**).

(iv) Deviations from specifications/guidelines in execution of works

- Weirs of eight MI schemes of Damoh, Sagar and Tikamgarh constructed at the cost of ₹ 7.72 crore were having command area less than 50 ha as detailed in **Appendix 2.31**. Thus guidelines of NRAA for minimum 50 ha was not followed.
- Weirs of eight MI schemes under Sagar and Tikamgarh divisions constructed at the cost of ₹ 13.97 crore (**Appendix 2.31**) were having distance of two km to four km between the two weirs against the required distance of minimum six km as per the instruction of the CE, Dhasan Ken Basin, Sagar. Therefore, possibility of less availability of submergence area and consequently lesser availability of water for irrigation cannot be ruled out.
- In foundation work of weirs of 20 new MI schemes in Sagar and Tikamgarh divisions, richer specification of CC (M15 in place of M10 grade) was used. This resulted in extra cost of ₹ 1.03 crore (**Appendix 2.32**).

(v) Violation of contractual obligations and irregular payment

- In Panna division, ₹ 2.33 crore was paid to 19 firms (on piece work basis through 524 bills on account of survey work for the MI schemes being implemented under BDMP. Piece work agreement register, copy of agreements, details of work done, survey reports etc. in respect of these payments were not produced to us when requisitioned. As such, propriety of the expenditure could not be ensured in audit.
- In respect of four new MI schemes, ₹ 3.61 crore was paid to firms/persons other than the contractors through 33 running bills against the works (**Appendix 2.33**).
- As per provision of turnkey agreement of Harpura canal linking project of new MI scheme in Tikamgarh division, the contractor was liable to execute all structures in canal including part of the canal crossing below the railway line. We noticed that the Department paid (2013-15) ₹ 2.65 crore to railway authority for construction of canal below railway line in respect of Harpura canal linking project, which was recoverable from contractor. However the recovery was yet to be made (March 2015) from contractor.

(vi) Extra cost due to non-utilisation of hard rock

In case of works of five MI schemes of three divisions, hard rock to be obtained from excavation in the works was not accounted for in the estimates for utilisation in other items of those works. This resulted in avoidable extra cost of ₹ 2.25 crore (**Appendix 2.34**).

The E-in-C in the exit conference stated (November 2015) that these matters would be examined.

Recommendation

The Government should ensure the preparation of detailed estimates based on the specifications/instructions issued by technical authorities and approval of the same by the competent authority.

Amount of ₹ 2.65 crore paid by Department to railway authority for the construction of canal below railway line, was yet to be recovered from contractor.

2.3.7.5 Repair, Renovation and Restoration of Rangawn and Urmil irrigation projects

Rangawan project was constructed in 1973-74 with planned irrigation of 17,085 ha and Urmil project was constructed in 1999 with planned irrigation of 7,692 ha in Bundelkhand region. Compared to its planned irrigation potential, the two projects were achieving average actual irrigation of 4,608 ha and 4,080 ha respectively due to heavy seepage, deterioration due to cattle and cultivators etc. Therefore, the works of RRR of Rangawan and Urmil projects which included execution of works of re-sectioning, CC lining, repair and construction of canal structures, were taken up (2011-12) under BDMP for completion by March 2013. ACA of ₹ 75.32 crore was provided for the RRR projects work to achieve additional irrigation potential of 8,291 ha.

(i) Physical and financial progress of projects

The Department incurred total expenditure of ₹ 46.84 crore up to March 2015 on execution of RRR works and developed irrigation potential of 10,000 ha including existing average irrigation area (8,688 ha). Thus, there was shortfall in achievement of additional irrigation of 6,979 ha⁷⁶ even after lapse of more than two years from the scheduled completion period (March 2013).

(ii) Extra cost due to adopting higher specifications

As per the provision of TC⁷⁷, CC lining in M-10 grade is required to be provided for canals carrying discharge of water from 0.3 cumec to 3 cumec and more. We noticed that total quantity of 39,286.62 cu m⁷⁸ of costlier grade of CC (M-15) was executed up to March 2015. This resulted in extra cost of ₹ 2.52 crore⁷⁹.

The E-in-C during exit conference admitted that M-10 grade CC lining was sufficient for canal and authority granting technical sanction would be enquired for the same.

(iii) Extra cost due to use of Low Density Poly Ethylene film/execution of sleeper

As per the instructions issued (September 2012) by E-in-C of the Department, provision of LDPE film below CC lining and sleeper⁸⁰ are not required where lining is to be done with paver machine. We noticed that though the work of CC lining was done with paver machine in Urmil project, the Department paid ₹ 1.34 crore up to March 2015 to the contractor for use of LDPE film in 5.62 lakh sq m area in the work. We further noticed that sleepers (20,675.08 cu m) were also executed in CC lining of the work, resulting in avoidable extra cost of ₹ 1.21 crore.

The E-in-C during exit conference admitted that if the subgrade of canal is properly saturated prior to lining there was no need of LDPE film.

⁷⁶ 8291 ha minus (10,000 ha minus 8688 ha)

⁷⁷ Technical Circular (TC) No 1/84 issued by the E-in-C WRD

⁷⁸ CC M-15 for Urmil Canal: 19,762.70 cu m and Rangawan Canal 19,523.92 cu m

⁷⁹ Rangawan Canal: ₹ 1,29,34,107 and Urmil Canal: 1,23,09,000 Total ₹ 2,52,43,107

⁸⁰ Sleepers are CC structures provided in bed and sides of canal lining under the joints.

There was shortfall in achievement of additional irrigation of 6,979 ha from repair, renovation and restoration works of two medium projects.

Deviating from the orders, costlier grade of CC works was executed in the medium project which resulted in extra cost of ₹ 2.52 crore.

Expenditure of ₹ 43.95 crore on establishment, contingency, land acquisition etc. was met from ACA instead of State fund.

2.3.7.6 Diversion of ACA fund

We noticed the instance of diversion of funds from ACA amounting ₹ 43.95 crore as discussed below:

- As per Administrative Approval (AA) for schemes given by the GoMP, the expenditure on establishment, contingency, survey and preparation of DPRs were to be borne by the State Government from its resources. The Department incurred (2010-15) expenditure of ₹ 13.51 crore (**Appendix 2.35**) on account of establishment, contingency, survey and preparation of DPRs out of the ACA funds.

In the exit conference, E-in-C stated that instruction had been issued for accounting such expenditure from separate budget allocation.

- As per terms for approval⁸¹ of ACA for projects under BDMP for 12th plan period, the expenditure on land acquisition were to be borne by the State Government from its resources.

In four WR divisions⁸², an amount of ₹ 30.44 crore (**Appendix 2.36**) were paid (2013-15) out of the ACA against the directive of the Planning Commission for acquisition of land for the projects under BDMP under 12th plan period.

The E-in-C during exit conference stated that payment of land acquisition being major part of the cost should have been met from ACA.

The reply is not acceptable as NRAA guidelines (February 2011) provided for meeting expenditure on land acquisition by State Government from its own resources.

Recommendation

The Government should ensure that expenditure on establishment, contingency, survey, preparation of DPRs and land for projects under BDMP are met as per the guidelines of NRAA.

2.3.8. Implementation of programme in Farmer Welfare and Agriculture Development Department

The Government specified (May 2011) FW&AD as nodal Department for construction of warehouse and marketing infrastructure in Bundelkhand region by using fund of BDMP through three agencies viz. MP State Agricultural Marketing Board (Mandi Board), MP Warehousing & Logistics Corporation (Warehousing Corporation) and MP State Co-operative Marketing Federation Limited (MARKFED). The details of packages/schemes under BDMP, ACA allocation, number of completed packages and expenditure up to March 2015 have been given in the **Table 2.16**:

⁸¹ Vide letter no. Q-11050-20-2013-Agri dated 18.09.2013 of Planning Commission, GoI
⁸² WR divisions Kesli, Pancham Nagar Project, Panna and Pawai

Table 2.16: Details of ACA allocation, numbers of packages and expenditure up to March 2015

(₹ in crore)

Phase	Particulars of packages/schemes under BDMP	No. of packages	ACA allocation	Expenditure ⁸³
11 th Plan (2007-12)	Warehouse and Marketing infrastructure ⁸⁴	33	477.55	478.26
	Mini Mandies	27	96.95	80.14
12 th Plan (2012-17)	Mini Agriculture Markets	16	64.56	18.48
	Colour Sortex Plants	3	18	0
	Agriculture Input Centres	40	12	2.39
	Seed Processing Units	4	30	0.69
	Pulses Extension Programme	1	5.44	0
Total		124	704.50	579.96

(Source: Information provided by the Department)

The Department created warehousing capacity of 5.34 lakh MT with delay attributable mainly to delayed assessment of requirement of land and less release of funds.

The Department created warehousing capacity of 5.34 lakh MT⁸⁵ by executing construction works of 33 packages of warehouse and marketing infrastructure at a cost of 478.26 crore up to 2014-15. These packages were envisaged to be completed by March 2012, however, there were delays in completion of packages⁸⁶. Further, there was short utilisation of created capacity, as only 4.36 lakh MT was being utilised up to March 2015. The main reasons for the delay in completion of 11th and 12th Plan works were delayed assessment of requirement of land and less release of funds against the sanctioned cost for 12th plan period, as discussed in detail in paragraphs 2.3.8.2 and 2.3.8.3 below.

Twenty seven marketing infrastructure (mini mandis) having capacity of 76,800 MT was constructed at a cost of ₹ 80.14 crore during 2011-15 (up to June 2015) with delays⁸⁷ instead of their planned completion in 11th plan period.

We examined in details the implementation of 11 out of 33 packages of warehousing and marketing infrastructures costing ₹ 250.23 crore, all the 27 mini mandies costing ₹ 80.14 crore and all the packages taken up in 12th plan period on which expenditure of ₹ 21.56 crore had been incurred up to March 2015. The shortcoming in implementation are discussed in the succeeding paragraphs.

2.3.8.1 Utilisation of constructed marketing infrastructures

As per guidelines issued by NRAA (March 2011), the Government was to pursue for effective involvement of private sector agencies for identified activities for the marketing structures of godowns, shops, information centres, etc. NRAA approved (January 2012) ACA of ₹ 96.95 crore for development of mini mandis at 27 locations in Bundelkhand region to be run by the Primary

⁸³ Figures of expenditure as indicated in utilisation certificate up to March 2015 sent to Niti Aayog

⁸⁴ Marketing infrastructure include construction of former information centers, rest house, auction platform, Road work, CC and WBM road cutting, filling, leveling, Toe wall Road work etc.

⁸⁵ Metric Tonne

⁸⁶ Completion of packages: 2012-13 (2), 2013-14 (18) and 2014-15 (13) = 33 packages

⁸⁷ Completion of packages: 2012-13 (1), 2013-14 (14), 2014-15 (10) and 2015-16 (2)

Agriculture Cooperative Societies (PACS). We noticed that:

No plan was made in advance for involvement of private sector agencies for utilisation of 85 marketing infrastructure constructed at the cost of ₹ 17.68 crore.

- During 2013-15, the Department constructed 85 marketing infrastructure in warehousing campuses, including machinery workshops at 39 places, at the cost of ₹ 17.68 crore (**Appendix 2.37**). We did not find any plan having been made in advance for involvement of private sector agencies for its utilisation. In physical verification at Pawai, Panna, we found that constructed shops, canteen and farmers rest house etc. were not being utilised (June 2015).

The Government stated (October 2015) that the Department took suitable efforts and the process of handing over the structures and its operation under PPP mode was being adopted.

The reply is not acceptable as the suitable efforts for ensuring utilisation of marketing infrastructures in warehousing campuses should have been done in advance.

- The Department constructed 27 mini mandis at the cost of ₹ 80.14 crore during February 2013 to April 2015. The mini mandis could not be formally handed over to PACS till June 2015 though the Planning Commission had already given approval (January 2012) with the condition of running of mini mandis by PACS.

In the exit conference, the Government stated (October 2015) that the storage facilities in mini mandis were being utilised by the PACS. The Government further stated (October 2015) that the Co-operative Department, which is supposed to run mini mandis, demanded ₹ 7.035 crore per annum for recurring expenditure. As per the decision in meeting held (August 2015) by the Chief Secretary, proposal for non-recurring expenditure was to be submitted by all the three construction agencies for utilisation of mini mandis.

The fact remains that these mini mandis were yet to be handed over to PACS.

2.3.8.2 *Planning for execution of works*

The terms and conditions for release of funds by NRAA under BDMP provided for preparation of site specific detailed estimates for works of warehousing & marketing infrastructure by the executing agencies and approval (technical sanction) from their competent authority⁸⁸ based on approved Schedule of rates. Only abstract of the detailed estimates was to be sent to NRAA for approval.

(i) *Preparation of identical DPRs*

The DPRs of the test checked 11 packages of works of warehousing and marketing infrastructure sanctioned at the cost of ₹ 222.14 crore were based on identical drawings and item of works were included in the estimates were not based on requirement of specific site. We found that items of works technically sanctioned such as, CC drain, display boards, boundary wall, water supply arrangement, sump well, septic tanks, transformers etc. valued at ₹ 42.77 crore were deleted/deviated (**Appendix 2.38**) or quantities of the items such as, CC roads/parking, auction platform, highmast and external electrification works etc. increased during execution enhancing the cost by

DPRs of works of warehousing and marketing infrastructure sanctioned at the cost of ₹ 222.14 crore were based on similar drawings, but there were significant changes in items and quantity.

⁸⁸ A technical committee consisting of CEs of Mandi Board and State Warehousing Corporation and EE of MARKFED is the Competent Authority.

₹ 69.38 crore. This indicates inadequate survey and investigation for the works for the preparation of detailed estimates.

The Government stated (October 2015) that drawings were similar for capacities warehouses but those were different on the basis of ground level and geographical conditions, different structures were made according to availability of sites and all the deviations were approved by the competent authority.

The reply is not acceptable as DPRs were prepared on basis of identical drawings and lack of adequate survey for preparation of DPRs resulted in significant changes in items and quantities.

(ii) Delayed assessment of land

Requirement of 65.60 acre of land for the works of all the planned warehousing and marketing infrastructures in 11th plan period was assessed in November 2011. Consequently, the tenders of works were floated only in November 2011. This contributed delay in completion of the works of warehousing and marketing infrastructures which were completed by March 2015.

During the physical verification (May 2015) of warehouse and marketing infrastructure (78,000 MT) at Badorghat, Tikamgarh by us, we noticed that acquisition of land for approach road to the warehouse was not done by that time. As a result, functioning of the warehouse would be affected.

The Government stated (October 2015) that Mandi Board provided land at its own Mandi premises and handed over to MARKFED and MPWLC. During preparation of DPRs availability of land for approach road was not clear and a separate proposal was being initiated for approach roads.

The reply confirms that requirement of land was assessed belatedly in November 2011.

Recommendation

The Government should ensure timely acquisition of land and carrying out survey and investigation for each site for preparation of realistic DPRs.

2.3.8.3 Financial Management

During 11th and 12th plan periods, GoI approved ACA of ₹ 704.50 crore and released ₹ 596.06 crore. The GoMP allotted ₹ 597.83 crore during that period against which ₹ 579.96 crore was utilised on works.

During the year 2011-12, total ACA of ₹ 270 crore was released by GoI. Against this, GoMP allotted ₹ 271.77 crore which was drawn by the FW&AD Department and allocated to the executing agencies.

The Government in the exit conference stated that reconciliation for difference of ₹ 1.77 crore would be done.

2.3.8.4 Execution of works of warehousing and marketing infrastructure

As per guidelines of NRAA, as far as possible the work relating to development of CC roads, pavements etc. may be kept to the minimum and

There was delay in assessment of requirement of land and consequently tenders for works of warehousing and marketing infrastructures were floated belatedly.

greater focus may be given towards development of infrastructure for storage. Warehousing infrastructures were to be executed as per the provisions of relevant specifications as provided in agreements for works. A technical committee consisting of CEs of Mandi Board, State Warehousing Corporation and MARKFED is the Competent Authority for granting technical sanctions for works. We noticed following shortcomings in execution of the works;

(i) Excess expenditure on cement concrete works

In 11 test checked packages of warehousing and marketing infrastructure and 10 out of total 27 packages of mini mandis, quantity of CC roads/parking included in the works of warehousing and marketing infrastructures and mini mandis increased from estimated cost of ₹ 35.73 crore to ₹ 60.42 crore (**Appendix 2.39**) during execution (an increase by 69.11 per cent over the original provision). The CC works actually executed constituted 22.83 per cent of the total value of work done of the 11 packages in place of 13.50 per cent works planned in the estimates.

It was further noticed that the expenditure of ₹ 2.85 crore⁸⁹ on execution of the two CC road works was incurred irregularly, as these were not part of technical sanction. The Department created total storage capacity 5.34 lakh MT against the envisaged capacity of 5.69 lakh MT indicating reduction in storage capacity due to excess execution of CC works.

The Government stated (October 2015) that to make the premises dust free and long service life and having load bearing capacity, the CC roads were provided and executed.

The reply is not convincing as excessive execution of CC roads and parking was done contrary to guidelines of NRAA.

(ii) Deviation from specifications

- As per provisions of IRC: 15 (Appendix to IRC: 58), a sub-base⁹⁰ layer of minimum 15 cm thickness comprising of granular sub-base (GSB) and/or WBM⁹¹ should be laid before laying of concrete pavement over sub-grade⁹² in the road works of warehousing infrastructures. IRC provides for assessment of nature of soil of subgrade.

In 10 out of the selected 11 packages of warehousing and marketing infrastructure being executed by the three executing agencies, WBM Grade II and dry lean concrete (DLC) layers were provided in the estimates and executed below CC roads in addition to execution of GSB in 15 cm thickness without assessing nature of subgrade soil. Thus, avoidable quantity of 30,165.526 cu m DLC and WBM-Gr-II costing ₹ 4.27 crore was executed resulting in extra cost to that extent (**Appendix 2.40**).

The Government stated (October 2015) that laying of two layers of sub-base including WBM and DLC was done on the basis of design as per code of practice for construction CC road and estimates were approved by the

Contrary to guidelines of NRAA, CC works actually executed constituted 22.83 per cent of the total value of work against 13.50 per cent CC works planned in the estimates.

Due to deviations from specifications, extra cost of ₹ 4.27 crore was incurred on the road works of warehousing infrastructures.

⁸⁹ CC roads at Bina and Khimlasa (Package No 118 of MPWLC) : ₹ 1.46 crore and ₹ 1.39 crore: Total ₹ 2.85 crore

⁹⁰ A layer of material such as natural sand, moorum, gravel, crushed stone, etc.

⁹¹ WBM consists of coarse aggregate, screening material for filling voids.

⁹² The subgrade is the foundation of the pavement structure on which the sub-base is laid.

Technical Committee.

The reply is not acceptable as WBM and DLC was executed in addition to 150 mm thick GSB without assessing nature of soil of subgrade which was contrary to the specifications.

- As per provisions of Warehousing Manual, 230 mm of stone dust, 150 mm CC (1:5:10) in two layers (total 150 mm) in flooring of warehouse and a layer of bitumen maxphalt or polythene sheet between two layers of cement concrete, were to be laid.

Due to deviations from specifications, extra cost of ₹ 5.40 crore was incurred in the works of warehousing and marketing infrastructure.

In all the 11 test checked packages of warehousing and marketing infrastructure, a layer of 300 mm stone dust and 200 mm CC (1:3:6) respectively in flooring of warehouse were laid deviating from the provision of the Manual. This resulted in extra cost of ₹ 5.40 crore (**Appendix 2.41**). Further, a layer of bitumen maxphalt or polythene sheet was not provided and executed though required as per the Manual. Therefore, resistance against moisture was not ensured in the warehouses.

The Government stated (October 2015) that as per conventional storage practice the goods were stacked up to 15 layers and as per present system it was enhanced up to 25 layers; hence 300 mm thick stone dust was provided which was approved by the Technical Committee. It was further stated that there was no water logging area; hence layer of bitumen maxphalt or polythene sheet was not provided.

The reply is not acceptable as Warehousing Manual provides for stacking up to 18 layers only and application of 230 mm thick layer of stone dust and bitumen maxphalt or polythene sheet in all climatic conditions.

(iii) Non/short levy of penalty for delays

Penalty of ₹ 2.75 crore for delays in completion of works of warehousing and marketing infrastructure were not imposed or short imposed on the contractors.

Clause 2 of the agreements for construction of warehouses provides that if contractor fails to complete the work in scheduled time, the Divisional Executive Engineer shall levy penalty of 1/16 *per cent* of contract value per week of delay subject to maximum six *per cent* of the value of work.

In five packages of warehousing and marketing infrastructure and six packages of mini mandies being executed by Mandi Board, the executing agency considered imposition of penalty under penal clause. We noticed that penalty of ₹ 2.75 crore for delays in completion of the work were not imposed or short imposed on the contractors (**Appendix 2.42**).

The Government stated (October 2015) that imposition of penalty was being decided by the competent authority after hearing each case and accordingly penalty was imposed.

The reply is not acceptable as time extension was granted under penal clause; hence penalty was to be imposed in terms of contracts but lesser penalty was imposed.

Recommendation

The Government should ensure that implementing agencies prepare estimate of works based on relevant provisions of Warehousing Manual, IS Codes and Schedule of Rates.

2.3.9 Implementation of programme in Forest Department

Against the SMC works in targeted area of 2.88 lakh ha, only 1.39 lakh ha area could be completed, mainly because of short release of funds by GoI.

The objectives of BDMP also included restoration of ecological balance by harnessing, conserving and developing natural resource like soil, water and forest, reducing soil erosion and checking further degradation of forest, enhancement of availability of fodder to the local community, augmentation of employment/income generating opportunities etc.

As per directions (July 2010) of the GoMP the works of soil moisture and conservation (SMC) were to be executed on watershed area basis. Watersheds were to be selected on the basis of classification given by All India Soil and Land Use Survey Organisation. The works of SMC in watersheds included construction of contour trenches, gully plugging⁹³ etc. in higher reaches, check dams and percolation tanks in middle reaches and storage tanks in the lower reaches of watershed area, to reduce volume and velocity of surface run off and increase regeneration of vegetation cover in forest. These projects were to be implemented through the Forest Development Agencies (FDAs) established as a confederation of selected Joint Forest Management Committees (JFMCs).

GoI earmarked (February 2010) ACA and Central Sector Schemes (CSS)/ Centrally Sponsored (CS) schemes under National Afforestation Programme (NAP) and Mahatama Gandhi National Rural Employment Guarantee Scheme (MNREGS) for works of SMC in watershed area. The details of expenditure and works executed up to March 2015 are given in **Table 2.17**:

Table 2.17: Phase wise details of approval, funds received, expenditure and watersheds (₹ in crore)

Phase	Particulars	Approval	Received	Expenditure up to March 2015	No. of watershed treatment executed	Targeted area of SMC/Achievement (Ha)
11 th Plan (2007-12)	ACA	107	106.54	106.54	396	200000/ 98511
	CS/CSS (NAP)	20	19.09	19.09		
	MNREGA	115	3.67	3.67		
12 th Plan (2012-17)	ACA	80	29.39	29.39	169	87530/ 40454
	CS/CSS (NAP)	0	0	0		
	MNREGA	0	0	0		
Total		322	158.69	158.69	565	2,87,530/1,38,965

(Source: Information provided by the Department)

GoI approved ₹ 242 crore for watershed treatment from ridge to valley of 2,00,000 ha degraded forest for 11th plan period. ACA component of ₹ 106.54 crore was released (2010-12) by the GoI for SMC works in 89,086 ha area of watersheds.

The Department executed the works of SMC in 565 watersheds⁹⁴ at the cost of ₹ 158.69 crore up to March 2015. Thus, against the SMC in targeted area of 2.88 lakh ha during 11th and 12th plan periods, only 1.39 lakh ha area could be completed, mainly because of short release of funds by GoI.

Out of total expenditure of ₹ 135.93 crore from ACA during 2010-15, the Department constructed 1,070 tanks (₹ 56.39 crore), 2,434 percolation tanks

⁹³ It is a stone based construction system to stop soil erosion and allow the flow of water.

⁹⁴ Area ranging from 19.98 ha to 1,243.39 ha

(₹ 31.53 crore), pits (₹ 9.46 crore) and contour trenches, check dams etc. (₹ 38.55 crore). Works of plantation and certain percolation tanks were executed out of funds of CS/CSS/MNREGS of ₹ 22.76 crore.

We test checked works of SMC in 132 watersheds costing to ₹ 40.59 crore in details which included 264 tanks costing ₹ 13.64 crore and 695 percolation tanks costing ₹ 7.82 crore besides examination of DPRs. Shortcomings noticed in audit are discussed in succeeding paragraphs.

2.3.9.1 Deficiencies in preparation of DPRs

SMC works were executed based on the normative cost of ₹ 12,000/₹ 6,720 per ha instead of site specific requirements.

Approval (September 2013) of NRAA for implementation of the schemes under BDMP provided for preparation of a site specific detailed estimates and DPRs with type and location of various structures/activities in watershed. As per the delegation of financial powers (1995) of the Department, competent authority will approve detailed estimates with the consultation of the Chief Engineer of the concerned Works Department. In the revised delegation of financial powers (2012), however provision of consultation of the CE was not mentioned. For 12th plan period, DPRs were to technically vetted by NRAA.

We noticed that DPRs for SMC works were prepared based on the normative cost of ₹ 12,000 per ha and ₹ 6,720 per ha of the area of watersheds for 11th and 12th plan period respectively fixed by GoI on basis of Inter Ministerial Central Team. Thus, DPRs were not based on site specific requirements. For the DPRs of 396 watersheds for 11th plan period, details of consultation of the CE of Works Department for ensuring correctness of estimates and soundness of designs, was not on records. In case 196 watersheds of 12th plan period technical soundness of DPRs could not be ensured, as approval of NRAA on site specific DPR was not obtained. As a result, necessary components of the structure such as, puddle trench, waste weirs, stone pitching etc. were not provided in the DPRs and breach of tanks, heavy rain cuts in bunds, overlapping of command area, uneven top bunds and absence of pitching and pucca waste weirs in SMC works were noticed as discussed in details in succeeding paragraph 2.3.9.2.

The Department stated (October 2015) that the DPRs of specific works were based as per site requirement and as per delegation of financial power of the Forest Department there was no stipulation for the consultation with the CE.

The reply is not acceptable as consultation of the CE of Works Department was necessary for DPRs prepared during 11th plan period. Further, technical soundness of DPRs should have been ensured, which was not done.

Recommendation

The Government should ensure consultation of the relevant Works Department for SMC works for soundness of drawings and designs of works.

2.3.9.2 Deficiencies in execution of works

The Department incurred expenditure of ₹ 97.39 crore (up to March 2015) on civil works of SMC. Before taking up the civil works of SMC, the Department did not formulate procedure and specifications to be adopted for such works. The Department did not also arrange for training to field staff for taking up civil works for SMC as envisaged.

Deficiencies such as, breach of tanks, heavy rain cuts in bunds, overlapping of command area, absence of pitching and pucca waste weirs in tanks were noticed.

We noticed deficiencies in construction of percolation tanks and tanks such as, non-construction of puddle core, non-construction of waste weir, non-execution of stone pitching in upstream of tanks, earthwork without watering and compaction and execution of benching, excess excavation of puddle and jungle clearance this. This resulted in extra cost of ₹ 3.70 crore.

During joint physical verification of 18 tanks, we noticed deficiencies such as, breach of tanks, heavy rain cuts in bunds, overlapping of command area, uneven top bunds and absence of pitching and pucca waste weirs in 17 tanks (**Appendix 2.43**).

The Department stated (October 2015) that the Forest Officers were trained in forest engineering during their induction course, there might have been some deficiencies in construction of tanks and percolation tanks due to individual lapses or heavy rains during or immediately after construction.

The replies are not convincing as it does not give the details of training for construction of civil engineering structures being taken by the Department first time and details of heavy rains in the drought prone Bundelkhand region.

2.3.9.3 Non-association of JFMCs for execution of work

As per guidelines of NRAA, projects under BDMP were to be implemented through JFMCs. We noticed that the SMC works costing ₹ 135.93 crore were executed Departmentally instead of transferring funds to Forest Development Agencies for execution through JFMCs as provided in the DPRs. Thus, objective of organising the communities so as to create mass movement for conservation natural resources was not ensured.

The Department stated that the common guidelines specify that works in forest area would be implemented by forest Department with the help of JFMCs. The reply is not acceptable as details of participations of JFMCs were not found on records.

2.3.9.4 Execution of works through machineries instead of labourer

GoMP allotted funds for execution of works under BDMP through deployment of labourers⁹⁵. On construction of 1,371 percolation tanks/tanks, an expenditure of ₹ 24.11 crore was incurred on deployment of machineries instead of labourers. Thus, the opportunity of employment generation through BDMP was lost to that extent.

The Government, while agreeing to the fact (October 2015), stated that there was no ban on using machines in BDMP. The reply is not acceptable as NRAA guidelines envisaged for employment generation and accordingly the GoMP provided funds under wages head.

As per directions (May 2010) of Assistant Principal Chief Conservator of Forests (JFM), records of treated area of SMC works was to be kept in format of Plantation Journal and proposed works were to be indicated on maps. We noticed in eight forest divisions⁹⁶ that records were not maintained in format of Plantation Journal and proposed works were not indicated on maps along with details of progress of works on forest stock map and through

Instead of engaging labourers for works of tanks and percolation tanks, works were executed by engaging machinery on which expenditure of ₹ 24.11 crore was incurred.

⁹⁵ Funds were allotted under object head 12 - Wages

⁹⁶ Except Chhattarpur range (for the year 2013-15) of Chhattarpur forest division (G)

photographs. In the absence of this record, the Department may not be able to take appropriate action for future works of SMC.

The Government stated (October 2015) that in 12th plan period the records were being maintained by the divisions.

The reply is not acceptable as no reason for non-maintenance plantation journal for works of 11th plan period was provided.

2.3.10 Impact of works completed under BDMP

BDMP was commenced from 2009-10. Implementation of BDMP aimed at to enhance irrigation potential by 2.16 lakh ha through completion of major, medium and minor irrigation projects in Bundelkhand region. The Water Resources Department added irrigation potential of 1.14 lakh ha only up to March 2015 through the projects under BDMP. Production of rabi crops, which are the main crops of Bundelkhand region, was increased from 25.04 MT in 2011-12 to 26.97 MT in 2013-14 (an increase of 7.7 *per cent*). Production⁹⁷ of wheat was increased from 17.74 lakh MT in 2011-12 to 20.54 lakh MT in 2013-14. Production of gram was however decreased from 5.30 lakh MT in 2011-12 to 2.91 lakh MT in 2013-14 indicating change in cropping pattern with a marginal increase in crop production.

BDMP also aimed at construction of warehousing and marketing infrastructure to increase storage capacity in the region. Through Farmer Welfare and Agriculture Development Department, storage capacity of 5.34 lakh MT was added in the region up to March 2015 by completing construction under BDMP.

In forest area, works for SMC was taken up under BDMP. The Forest Department executed the works of SMC in 565 watersheds. Against the SMC in targeted area of 2.88 lakh ha, only 1.39 lakh ha area was completed up to March 2015. Tropical Forest Research Institute⁹⁸ in their report (2015) observed through interaction with people of the area that water level in wells, tube well and nallas around the watershed area had increased, water was available throughout the year in storage tank and cropping pattern had been changed from gram/mustard to wheat. However, in case of construction civil works it was reported that the selection of site was good but quality of work was poor and little water or no water was seen in the tanks and detailed estimates were not produced.

2.3.11 Conclusion and recommendations

- Command area works of Rajghat Project could not be completed within the target period. In Bariyarpur Canal Project, lining and structures in main canal, earthwork and lining distribution system were incomplete and new work was awarded ignoring the earlier work of distribution system. Significant part of distribution system of Singhpur Project could not be completed within the scheduled period. 81 *per cent* MI schemes were completed and 61 *per cent* of IP could be created besides instances of ill planning, irregular execution,

⁹⁷ Source of information is official website of FW&AD.

⁹⁸ The TFRI was engaged by Forest department for project impact assessment in respect of works under BDMP in respect of four Forest divisions.

deviation from specifications and violation of contractual obligations were noticed. There was shortfall in creation of irrigation potential of Rangawan and Urmil Projects besides incurring avoidable extra cost in execution of works.

The Government should ensure that records of assets and expenditure incurred thereon are properly maintained so that works already completed are not included in subsequent works.

- The MI schemes taken up by the Water Resources department were changed/dropped subsequently from BDMP, BC ratio of MI schemes were calculated erroneously, there was delay in acquisition of land and tenders for works were floating after 11th plan period, indicating inadequate planning.

The Government should prepare DPRs based on actual survey and investigations of MI schemes so as to avoid infructuous expenditure on works, which leads to delay in completion of the works and ensure the preparation of detailed estimates based on the specifications/instructions issued by technical authorities and approval of the same by the competent authority.

- There were instances of irregular diversion of funds as expenditure on account of establishment, contingency, survey and preparation of DPRs and land acquisition was incurred out of the ACA funds.

The Government should ensure that expenditure on establishment, contingency, survey, preparation of DPRs and land for projects under BDMP are met as per the guidelines of NRAA.

- In FW&AD department, utilisation of constructed marketing infrastructure of warehousing campuses and mini mandis was not ensured. Similar drawings were used for warehouses at different locations resulting in deviation/deletion of items of works and there were delays in identification of land for construction as well as approach road.

The Government should ensure timely acquisition of land and carrying out survey and investigation for each site for preparation of realistic DPRs.

- More emphasis was given on execution of cement concrete works in construction of warehouse and marketing infrastructure contrary to guidelines of NRAA. There were instances of deviations from specifications and non-levy of penalty for delay in execution of works.

The Government should ensure that implementing agencies prepare estimate of works based on relevant provisions of Warehousing Manual, IS Codes and Schedule of Rates.

- The Forest department did not prepare site specific plans for SMC works. Consultation of CE of Works department was not obtained for execution of the works and there were instances of deviations from specifications and subsequent failure of structures besides extra cost in execution.

The Government should ensure consultation of the relevant Works Department for SMC works for soundness of drawings and designs of works.

Water Resources Department

2.4 IT Audit on Implementation of “Enterprise Information Management System-EIMS” by Water Resources Department, Madhya Pradesh

Executive Summary

Introduction

Water Resources Department of Madhya Pradesh is entrusted with the responsibility of development of water resources of the State. A water management system including dams, large canal network, meeting water requirements of irrigation etc. exists in the state. The Enterprise Information Management System is a part of the World Bank funded Madhya Pradesh Water Sector Restructuring Project. Objectives of EIMS are to streamline and improve efficiency, facilitate better planning and management of the integrated water resources, irrigation and drainage systems. In the EIMS, focus would be to create an information backbone and information flow arrangements to make WRD deliver cost-effective and efficient services. EIMS has 34 modules related to most of the activities of the Department and out of these, 24 modules were checked by us in detail.

General Control

- Formal logical access control policy was not framed by the Department. The Department could not develop a change management policy for EIMS. The Department had not implemented business continuity and disaster recovery plan so far.

(Paragraphs 2.4.6.1 to 2.4.6.3)

Application Control

- The examination of the database in 24 modules of EIMS indicated inadequate input control, absence of data validation, incomplete mapping of business rules, incomplete capturing of data in many of the modules and non-utilisation of certain modules. Thus, the expenditure of ₹ 16.79 crore incurred on development of EIMS remained unfruitful to the extent the modules planned are not being developed/utilised.

(Paragraphs 2.4.7.1 to 2.4.7.17)

Contract management of EIMS

- An expired Secure Sockets Layer Certification was installed with the web based application. Thus, the web site was not secured. Agreement with the Consultant provided for installation of bilingual dictionary to switch between Hindi and English and phonetic conversion engine. However, these were not installed with the application.

(Paragraphs 2.4.8.2 and 2.4.8.3)

- The Department could not develop adequate manpower to utilise full potential of the EIMS application. One year historic and two years current data were not entered in modules by the consultant as envisaged in the agreement. Therefore, projected benefits from the data entry could not be achieved.

(Paragraphs 2.4.8.5 and 2.4.8.7)

- Some of the main functions of development phase of EIMS were executed through a sub-contracted firm in contravention of the agreement which led to system design deficiencies.

(Paragraph 2.4.8.8)

2.4.1 Introduction

Water Resources Department (WRD) of Madhya Pradesh (Department) is entrusted with the responsibility of development of water resources of the State. A water management system including dams, large canal network, lifting water through power, developed over the years for protecting floods, meeting water requirements of irrigation, drainage, industrial, domestic, power generation usages, exists in the state. Most of these systems require modernisation to achieve efficiency in water management and keep pace with the growing needs of the State.

The Government of Madhya Pradesh (GoMP) had approved (September 2003) State Water Policy (SWP) which intended to strengthen the existing water sector infrastructure for environmental balance, skilful and planned management for all types of developmental activities and economic use on the equitable basis.

To achieve the above objectives of the policy, Department had undertaken the Madhya Pradesh Water Sector Restructuring Project (MPWSRP) with World Bank Assistance. The project envisaged reforms in management of State's water resources in general and irrigation, drainage and groundwater in particular. The Enterprise Information Management System (EIMS) is a part of the World Bank funded MPWSRP. The Project Director, Project Implementation and Co-ordination Unit (PD, PICU), WRD awarded (August 2008) consultancy work to M/s Tech Mahindra Limited (Consultant) to design, develop and implement an EIMS for the entire WRD. The development phase of EIMS was completed on 30 September 2013.

Objectives of EIMS

The objectives of EIMS are to streamline and improve efficiency of the existing organisation and facilitate better planning and management of the integrated water resources, irrigation and drainage systems through timely and appropriate decisions. In the EIMS, focus would be to create an information backbone and information flow arrangements to make WRD deliver cost-effective and efficient services. The EIMS focuses on the creation and effective use of IT infrastructure and supporting information systems to institutionally strengthen the core functions of WRD by improving assets management, billing and revenue collections, procurement, financial management, accounting, human resources development and office automation.

Salient Features of EIMS application

EIMS has 34 modules⁹⁹ related to most of the activities of the Department such as, asset management, project management, core technical and operational, institutional functions, support functions, office automation,

⁹⁹ Link for EIMS is available on <https://www.mpwrd.gov.in>

billing and revenue collection, flood control & works, hydro meteorological etc. The application was developed on Java 2 EE (Enterprise Edition) as front end and Postgre SQL(Structured Query Language) an open source RDBMS¹⁰⁰ as back end. It was a Web based solution that could be accessed via internal intranet or World Wide Web. This was an open source, platform independent application and could be deployed on Windows/Linux/Unix/Sun. Various users such as Executive Engineers (EEs), Sub Divisional Officers (SDOs), contractors etc. could connect to EIMS through internet.

2.4.2 Organisational set-up

The Water Resources Department (WRD) is headed by a Principal Secretary at Government level and the Engineer-in Chief (E-in-C) at Department level. The Department is divided into eight basins each headed by Chief Engineer (CE), 33 circles headed by a Superintending Engineer and 128 divisions headed by EEs who are responsible for construction of Major/Medium/Minor Projects in the different basins in Madhya Pradesh. PD,PICU also functions under WRD which is established for the purpose of implementation of MPWSRP funded by the World Bank.

2.4.3 Audit objectives

Audit objectives were to assess;

- Adequacy of general and application controls,
- Effective utilisation of available database of 'EIMS' to assist planning and decision making and
- Contract management for a consultancy to design, develop and implement EIMS for the Department.

2.4.4 Audit criteria

Audit findings were based on criteria derived from:

- System Requirement Specifications (SRS), System Design Document (SDD),
- Best practices for development and implementation of application software,
- Circulars and Orders issued by the WRD regarding implementation of IT infrastructure and EIMS in WRD,
- Terms and conditions of Agreement with the Consultants, MPWD¹⁰¹ Manual as amended from time to time and CPWA¹⁰² Code.

2.4.5 Scope and methodology of audit

Records relating to award of consultancy contract to the Consultant (August 2008), available in the office of the PD, PICU since its conception to the date (June 2015) and also, database as available for the period up to 31 December 2014 provided to audit by PICU were scrutinised using Computer Assisted

¹⁰⁰ RDBMS: Relational Database Management System

¹⁰¹ MPWD: Madhya Pradesh Works Department

¹⁰² CPWA: Central Public Works Accounts

Audit Techniques (CAAT)¹⁰³. Besides, 13 Divisions which were about 10 *per cent* out of total 128 Divisions of WRD were also audited for ascertaining extent of utilisation of various modules of EIMS.

The Government informed (September 2015) that while 34 modules had been developed, five main modules i.e. SMS based Reservoir monitoring, Feasibility monitoring, Minor scheme monitoring, e-Measurement Book (e-MB) and Irrigation monitoring contributed 80 *per cent* weightage in terms of utility and value for money. Out of 34 modules of EIMS, we checked 24 modules in detail including the main modules.

An entry conference was held on 22 January 2015 with the Principal Secretary, WRD, GoMP for appraising the audit objectives, criteria and scope of audit. The draft report of the IT audit was issued to the Department/Government on 6 August 2015 and reply of E-in-C to the draft report was received on 5 November 2015. An exit conference was held on 22 September 2015 with the Principal Secretary and other senior officers. Reply given by the E-in-C and views expressed in the exit conference have been suitably incorporated in the report. The recommendations given in the report were agreed to by the Government.

Audit findings

Audit findings relating to general controls, application controls and management of contract for EIMS have been discussed in the succeeding paragraphs.

2.4.6 General Controls

Functions of the Department such as, asset management, bill payment, contract management, irrigation monitoring, dam safety monitoring, human resources management, revenue collection etc. had been covered in the EIMS for its operation and utilisation at division level. In all the modules data was being entered at division level.

General controls include controls over data centre operations, system software acquisition and maintenance, access security and application system development and maintenance. It creates an environment in which the application systems and application controls operate.

Shortcomings in general controls in respect of the IT application of EIMS such as, inadequate logical access controls, improper change management system and absence of business continuity and disaster recovery plan for EIMS were noticed in audit, which have been discussed in the succeeding paragraphs.

2.4.6.1 *Inadequate logical access controls*

Risks of unauthorised access to data include the possibility of information leaks that would permit outsiders to assess the present state and characteristics of an organisation. Logical access controls are protection mechanisms that limit users' access to information and restrict their forms of access on the system to only what is appropriate for them.

Formal logical access control policy was not framed by the Department.

¹⁰³ CAAT: Interactive Data Extraction and Analysis (IDEA)

We noticed in all the test checked divisions that the divisions adopted simple single word or only numeric password without using special character therein for access to the data. No norms in respect of password length, duration/expiry, change procedure, alphanumeric pattern etc. were specified to strengthen security for access of the information in EIMS system. Thus, there was a threat to the security of data in the computer system.

The E-in-C, WRD stated (November 2015) that password control was limited to minimum six characters which could be a combination or non-combination of alphabets, numerals and special characters. The reply confirms system does not enforce alpha-numeric and special characters in the password and may allow weak passwords. Also formal logical access control policy was not framed.

2.4.6.2 Improper change management system

The Department did not develop a change management policy for EIMS application.

According to the changed necessity, system as developed may require change. This change process may have an impact on the existing controls and may affect the underlying functionality of the system. As per agreement any change would be authorised by a review committee. Further, all changes to system configuration are authorised, tested, documented, controlled, the system operate as intended and that there was an adequate audit trail of changes as provided in the agreement.

We observed (April 2015) that change management for EIMS application was being performed by the Consultant themselves. We further noticed that G-schedule/estimate preparer module, which were previously present in EIMS, were removed from the Divisional Officer's login. Main web page of EIMS did not match with that mentioned in SDD and web page display had been changed more than three times without any change authorisation by the Review Committee. Documentation in respect of these changes was not available in the Department.

The E-in-C, WRD stated (November 2015) that the Department would soon develop a change management policy for EIMS and implement it.

2.4.6.3 Absence of business continuity and disaster recovery plan

The Department had not prepared any formal business continuity and disaster recovery plan.

The objective of having a business continuity and disaster recovery plan and associated controls is to ensure that the organisation can still accomplish its mission and it would not lose the capability to process, retrieve and protect information maintained in the event of an interruption or disaster leading to temporary or permanent loss of computer facilities.

The Department was keeping backup of data by updating it in another server kept at the same premises. No backup was maintained at offsite location. Therefore, in the case of disaster, damage may occur to the server being in the same premises and the Department may not be able to recover the data. Even after completion of development phase by September 2013, the Department had not prepared any formal business continuity and disaster recovery plan.

The E-in-C, WRD stated (November 2015) that business continuity and disaster recovery plan would be implemented after migration of EIMS to State Data Centre.

Recommendation

The Government should formulate and implement plan for change management and business continuity for an uninterrupted and intended system operation and utilisation.

2.4.7 Application controls

Application controls¹⁰⁴ are controls specific to an IT System and involve mapping of business rules into the applications; thus providing for input, processing, output controls. Input, processing, output controls include data entry in the modules, availability of data on demand, availability of reports in desired forms and master data management by removing duplicates, standardising data and incorporating rules to eliminate incorrect data from entering the system.

During test checked audit, we noticed instances of system design deficiencies and poor data quality e.g., incomplete and incorrect data, absence of validation checks and inadequate mapping of business rules in the modules. Further instances of incomplete and incorrect data were also observed by us in some of the reports available on website of the Department for monitoring purpose. Such instances have been discussed module-wise in details in the succeeding paragraphs.

2.4.7.1 Asset management module

In this module, holding of all immovable and movable assets such as, dams, canals, distributaries, etc. suitably categorised and maintained at basin, sub-basin and up to division level, were to be included. The objective of the module was to facilitate management of historic data of assets and monitoring for maintenance and operation of these assets. Significant instances of lack of input and output controls observed by audit in data entry in the database of the module are described below:

Database of fixed assets for the module contained 26,486 records of dams, canal, reservoirs, tanks etc. Data analysis of the database shows that:

- In the field of date of fixed asset acquired, data were not entered in case of 26,140 records.
- Expected date of end of life and date of next service of asset were not mentioned in 26,484 records.
- There were 23,507 records of dams etc. which did not show annual irrigation area.
- Database of dam additional details created for the module contained 6,947 records. Data analysis shows that:
 - Fictitious data (as 9999 etc.) was entered in the fields of top width of dam, catchment area and height above lowest foundation. In 261 records of dams, gross storage capacity of water at full tank level was shown as zero but dead storage capacity was shown as 0.001 MCM to 99,999 MCM.

¹⁰⁴ List of the modules and sub modules is as per the main web page of EIMS currently available. Data of the various tables had been analysed on the basis of module wise list of tables with their relations given by the PICU, SRS and SDD.

Database of geographical situation of the assets was having 24,663 records. Area of MP is situated at Latitude 21⁰⁶' – 26⁰⁵⁴' North and Longitude 74⁰ – 82⁰⁴⁷' East. We found incorrect data entry in the database related to geographical point of asset as below;

- Longitude was recorded as less than 0 (-111.696625) in one record of asset which shows that validation check was not there.
- In case of 24,660 records, elevation of geographical point of asset was recorded as “0”.
- In 15,908 records latitude was recorded as “0” and in 15,901 records longitude was recorded as “0”.
- In 1,146 records latitude was recorded less than 21⁰⁶'. In 263 records, it was recorded as more than 26⁰⁵⁴'.
- In 3,265 records longitude was recorded less than 74⁰ and in 26 records longitude was recorded as more than 82⁰⁴⁷'.
- The database, containing 373 records related to details of schemes of canals being used for irrigation, we noticed following deficiencies;
 - In case of 360 records, scheme name was not entered.
 - Discharge capacity of canals shown in the 15 records were either “0” cumec or “9,999,999,999” cumec which was not possible.
 - Similarly, normal depth of flow of canals was shown either “0” (229 records) or “9,999,999,999” (one record).

In the absence of these vital information in the database, monitoring of assets and decision making for maintenance and operation of these assets through the EIMS module would not be possible or appropriate.

The E-in-C, WRD stated (November 2015) that the data would be filled in the blank database and wherever found necessary, validation would also be done.

2.4.7.2 e-Measurement book module

The e-Measurement Book (e-MB) module facilitates recording of measurement of works and generating running bills for payment to contractors which also includes generation of contractors ledgers.

We noticed (October 2014 to June 2015) deficiencies in validation checks and designed system in the module and a few important deficiencies have been discussed in succeeding paragraphs;

- Instances of preparation of running bills manually had been observed by us in four divisions out of 13 test checked divisions. Facility to generate running bills of turnkey and lump sum contract had not been incorporated in e-MB module.

The E-in-C, WRD stated (November 2015) that since the process of turnkey and lump sum contracts were not standardised, each such contract was different from other and therefore this type of contracts were not incorporated in e-MB module.

The reply is not acceptable as turnkey and lump sum contracts could also be incorporated in e-MB module for payment as the percentage rate contracts also have different combinations of items for payment. Moreover, standard forms for payment of running/final bills of lump sum contract is already given as Form 27 A and 27 B respectively in CPWA code.

In e-Measurement Book module, facility for preparation of bills for turnkey/lump-sum contracts, contracts in Electrical & Mechanical formation and for calculation of escalation, was not included.

- As per clause 10.7 of the CPWA Code, all transactions with contractors in connection with contracts or jobs undertaken by them should be kept in the contractors ledger, in Form CPWA 43. Maintenance of contractors ledger was the duty of the divisions of the Department. Facility of generating contractors ledger was there in e-MB module but right to open and utilise contractors ledger had not been given to Divisional Officers. Thus, the control on payments to/receipts from contractors, envisaged through contractors ledger was not ensured.

On being pointed out by audit, the E-in-C, WRD stated (November 2015) that aforesaid facility which was suspended from Divisional Officers is now restored.

The fact remains that facility of control on payments/receipts envisaged through contractors ledger was not utilised during this period.

- Period of schedule of completion of works given in contracts creates obligation on the part of contractors to complete work during that period. Therefore, a valid time extension must be there for giving right to contractor to continue the work and claim for work done beyond the scheduled completion. We noticed that there was no validation check in the module to stop automatically the entries of running bills in the case of absence of entry of sanctioned time extension in e-MB module. Absence of such validation check may lead to payment to contractors without sanction of time extension.

The E-in-C, WRD stated (November 2015) that the running bill was being generated in some cases without time extensions in the interest of work and to ascertain liability on account of payment to contractors and a flag to notify completion of valid extension of time is available, which gives an alert to the Contractor and EE both.

The reply is not acceptable as the method adopted is against the provisions of the contracts.

- Escalation payment to contractor where provided in the agreement, was being done on the basis of index of various components of works i.e. Petrol Oil and Lubricant, material, labour etc. On the base date, which is usually date of opening of tender, facility for automatic calculation of escalation based on index on base date and variable data of quantities and index on the date of execution of work would have minimised manual intervention and ensured greater accuracy in calculations of amount of escalation payable to contractor. However, this has not been incorporated in e-MB module.

The E-in-C, WRD stated (November 2015) that the observation of audit was well taken and after detail examination it would be implemented, if found suitable.

- As per MPWD Manual, the MB containing details of measurement of each items of works, forms the basis for payment to contractors against the works executed under a contract. Work MB are used for detailed recording of each item of works executed and abstract MB (Bill MB), prepared on the basis of Work MB, includes summary of each item of work executed which forms the basis of running bills. References of the Work MB number and page

numbers are mentioned in abstract MB. No report on abstract MB was being generated through e-MB module.

We noticed that the Department stopped (August 2012 and March 2014)¹⁰⁵ preparation of abstract MB manually and instructed the divisions to paste copy of running bills in this MB generated through e-MB. As a result of this change, linking of quantities mentioned in the running bills with the quantities mentioned in MBs became difficult for verification of quantities by the Department as well as by the auditors and may lead to incorrect payment to contractors.

We further noticed that Sub-Engineer who is responsible for preparation of abstract MB, was not being associated with e-MB module as preparation of abstract MB had been discontinued. In earlier system, Technical Section, Divisional Accountant (DA)/Account Section of division were responsible for checking technical aspects and accounting aspects of running bills respectively before submission to the divisional officers. The e-MB system, however, does not provide for checking by these Sections/DA, increasing the chances of inaccuracies in recording measurements in e-MB module.

The E-in-C, WRD stated (November 2015) that it would be made mandatory to record reference MB and page numbers of detailed measurements in the remarks column and a circular to this effect would be soon issued. He further stated that the issue of involvement of Technical and Accounts sections as well as DAs in bill passing process would be discussed with field offices and if required suitable correction would be made in the module.

- Electrical & Mechanical (E&M) formation undertakes execution of earthworks on behalf of divisions undertaking civil works. Payment on account of hiring charges to earthwork contractors is made on hourly rate basis subject to execution of minimum quantity of earthwork per hour. Quantity of earthwork done by earthwork contractor is certified by civil divisions of the Department. Since two divisions of the Department are involved in the execution and authorisation of payment to earthwork contractor, coverage of E&M formation under e-MB module would facilitate linking and verification of actual executed quantity of earthwork by contractor through e-MB module. Thus, in the absence of e-MB module for E&M formation there is risk of incorrect/double payment to earthwork contractor.

The E-in-C, WRD stated (November 2015) that since the E&M formation did contracts for works related to multiple projects in a single agreement, it became difficult to incorporate it in current version of e-MB. He further added that after discussion with E&M authorities suitable process would be devised to include the monitoring of contracts of E&M formation.

- In the e-MB module, fields and nomenclature for deductions on account of royalty, income tax, commercial tax, labour welfare cess etc. are not fixed. Thus, there was no planning for accounting of these amounts in appropriate heads in the e-MB module itself. As a result, accounts of these deductions were being prepared manually. Thus, deductions from the running bills of contractors have not been mapped in the module.

¹⁰⁵ Vide order 205/AS/2012 dated 06 August 2012 and vide order 21/PA/Add. Sec./camp/wrd/2014 dated 20 March 2014

The E-in-C, WRD stated (November 2015) that the point of audit was well taken and would be implemented soon.

- Facility to check availability of allotment of funds for the work was not available in the e-MB module because Budget module of EIMS was not complete and Budget module was also not integrated with the e-MB module. Such integration was required while making payment so as to know availability of budget before generating running bills and avoid payments in excess of allotments.

The E-in-C, WRD stated (November 2015) that although a module 'Budget and Allotment' was available but after implementation of Financial Management Information System (FIMS) by the Finance Department, the 'Budget & Allotment module' has become redundant.

Full potential of the application could not be derived due to non-integration of two modules for checking up the availability of budget before generating running bills.

- The e-MB Module, which is for preparation of running/final bills and payment in respect of a work had not been designed to generate running bills in Form 26 of CPWA Code. We further noticed that the generated running bills did not contain information such as number and date of the previous bill for this work, figures for work abstract etc. as required in CPWA Code.

The PD, PICU replied (June 2015) that the generated bills were in the form and requirement of the Form 26.

The reply is not acceptable as some of the required columns as mentioned above were missing in the designed running bill proforma. Further, absence of aforesaid information in the generated bills was confirmed through records of test checked divisions.

Thus, facility of the e-MB module had not been utilised to the full extent and the relevant business rules were not completely captured for ensuring correct payments to contractors.

2.4.7.3 e-Measurement report

The e-Measurement report contains information about running bills of contractors with required related details of the work for payments. Total 1,645 records were available at the end of September 2015 in the e-measurement report analysed by us. Lack of input controls and validation checks at data entry level had been observed as below;

- In case of 42 records, same contract ID had been allotted to two different works. This also shows absence of validation checks to restrict such mistake.
- In the case of 340 records of completed contracts as on 30 September 2015, dates of first running bill and last running bill were not entered in the records.

The E-in-C, WRD replied (November 2015) that such instances had occurred during initial phase of implementation of e-MB during 2012-13 and necessary validation had been incorporated to avoid such error. He further stated that

some of the records might be of turnkey and E&M contracts and necessary validation would be activated to minimise inconsistency in the data entry.

The reply is not acceptable as instances of duplicate contract IDs were noticed in respect of contracts entered into after 2012-13 also.

2.4.7.4 Contract monitoring module

There were incomplete and inaccurate data of guarantee, time extension etc. in the Contract Monitoring module; therefore the module was not being utilised to the full extent.

The Department engages contractors for execution of works relating to construction of dams, canals, lift irrigation schemes etc. The contract monitoring module includes facility of registering contractors for assigning works and measuring financial progress of contracts for major/medium and minor works to facilitate monitoring of progress of works. In the module, details of 1,329 contractors in respect of 3,191 contracts were available as of July 2015.

A database of guarantee detail of the Contract Monitoring module contains details of guarantee submitted by the contractors as per the conditions of contracts. We noticed (April 2015) following deficiencies in the database:

- Guarantee details of only 92 agreements of ongoing contracts had been entered in database though ongoing contracts were more than 3,000.
- Description of nature of deposit such as, fixed deposit receipts (FDR), bank guarantee should have been explained in database but it was left blank in 30 records.
- Indian Financial System Code (IFSC Code) is an eleven character code assigned by the Reserve Bank of India (RBI) to identify every bank branch. In the absence of this validation check, entry of incorrect IFSC could not be restricted in case of 14 records.

We noticed following deficiencies during scrutiny of the database having 117 records related to details of time extension cases of construction works:

- Reasons for time extension was to be noted in extension remarks field but this was left blank in 51 records.
- Order numbers of sanction of extension of time of contracts were left blank in four records.

The contract progress review data table contains details of status of contracts. We noticed following deficiencies in the database containing 40,469 records (relating to contracts):

- Remarks of reviewing authorities for review of progress of the contracts, were not there in case of 28,846 records.
- Data entry of previous payment and percentage of completion was shown as “0” for all the 40,469 records.

The data table of history of financial progress of the contract contains 6,297 records (relating to 1,524 contracts). We noticed following deficiencies in the database:

- Current stage of work was left blank in case of 1,363 contracts (about 89 per cent) indicating incomplete database.

- In case of 72 contracts, current status of work was shown complete but field for issue of completion certificate showed that certificate was not issued or the field was left blank, indicating incomplete database.

As such, the facility of monitoring of works through this module was not being utilised to the full extent because of incomplete and inaccurate database in the module.

The E-in-C, WRD *inter alia* replied (November 2015) that the data would be filled in blank database and wherever found necessary, validation would be done.

2.4.7.5 Contract monitoring report

Contract Monitoring Report being displayed on web site of the Department for monitoring purpose contains information about running contracts and contractors. Data in respect of all the eight zones was available in the report. Report of CE, Chambal Betwa Basin, Bhopal as on 30 September 2015 was scrutinised by us. Following deficiencies were noticed;

- In case of 35 records out of total 551 records, contract agreement date was the date later to the date of completion of work. This indicates absence of validation checks.
- For looking after execution of 133 works, no Sub-Divisional Officer (SDO) or Sub-Engineer was shown assigned.

The E-in-C, WRD accepted (November 2015) the observations and replied that the validation would be done so that such error does not occur and concerned EE would be asked to assign the work to the concerned SDO and Sub Engineer.

2.4.7.6 Dam safety monitoring module

Dam Safety Monitoring Module facilitates in creation of dam data book, creation and maintenance of inspection records for important dams and inspection by DSO¹⁰⁶ and DSIP¹⁰⁷ etc. Thus, the module also facilitates monitoring of inspection of major, medium and minor dams/tanks by the Department.

We noticed (April 2015) following significant deficiencies in scrutiny of database of inspection of dams by DSIP:

- Against 4,431 minor, 142 medium and 24 major completed and ongoing irrigation projects, data in respect of inspections of 37 dams only was found available.
- Observations and comments of inspecting authorities were not available in the database though facility to record the same in the database was provided in the module.

¹⁰⁶ Dam Safety Organisation is a wing of the department established for evaluation of the present condition of dams and for giving technical advice for improvement therein.

¹⁰⁷ Dam Safety Inspection Panel is a panel for inspection of dams have storage capacity of 60 million cu m.

- In database of inspection of dams by DSO, only 238 records of dams were available in the database against 4,597 completed major, medium and minor projects as of December 2014.

These deficiencies indicated incomplete database and absence of validation checks.

The E-in-C stated (November 2015) that since inspection of dam is continuous process, data in the module would be populated as and when the inspections were carried out and now submission of inspection report was being done only through the module and no hard copy/paper submission was required.

The reply is not acceptable as these fields were related to safety of dams and consequently related to safety of assets and life of human being residing in nearby area. Therefore, these fields were required to be maintained and updated mandatorily.

2.4.7.7 Human resources management system module

The module, aimed at for management of human resources, includes database of employees postings, current Department, immediate superior details, details of head of the Department, employees personal data, information relating to the annual confidential report of employees, property returns filed by employees, attendance details and balance leaves. The module also provided for auto calculation of salary and terminal benefits of employees based on other relevant data.

- Database containing employee details having 5,235 records of employees i.e. address, contact number, computer skill, probation etc. Each record contained 47 fields. We noticed that in the database, data had been fed in only 12 fields and remaining 35 fields were left blank.
- 453 records belonging to the retired employees, were not automatically flagged as retired, indicating system design deficiency.
- Data in emergency contact number of employee was left blank in case of 5,042 records and contact person name in case of emergency was “self” in 105 records of employees.
- Postal address was not entered in case of 4,439 records of employees.
- Home district was not recorded in 4,763 records of employees.
- Bank account number of 4,829 employees not available in database.
- In records of employees family details we noticed that against 6,658 employees as on December 2014 in the Department, total 427 records of family members relating to only 137 employees were available.
- Age of dependent was not captured correctly and indicated as “Zero” in the records of 426 family members of employees.

Thus, the management of human resources was not possible through the module because of incomplete database.

The E-in-C, WRD replied (November 2015) that the data would be filled in blank database, validation would be done wherever found necessary and deficiencies pointed out would be corrected.

2.4.7.8 Non-agricultural revenue (industrial revenue) module

Non-agricultural revenue module, developed for monitoring revenue collection from industrial consumers, contains details of registration of industrial consumers, agreement with consumers, water usage records, generation of bills and recovery of water charges.

We noticed (April 2015) following deficiencies in the database of water usage in the module having 2,202 records:

- In 990 records, details of agreements with consumers were not available and shown as “non-agreemented”.
- Agreement ID was given in respect of 577 records but marked as “non-agreemented”; indicating inconsistencies in the database and absence of a validation check.

The E-in-C, WRD stated (November 2015) that the data would be checked, corrected and validated if required.

2.4.7.9 Flood control management module

Flood Control Management module is a SMS based monitoring application that facilitates sending of information on reservoir level through SMS by the field staff to the central server for the purpose of flood control. The module facilitates for drawing inferences about flood situation and water availability in the reservoir.

Daily rainfall is recorded at every rain gauge station and conveyed by the staff to their immediate officer and also at data centre at Bhopal.

We noticed following significant deficiencies in records regarding highest flood level, danger water level etc. of dams/river sites, having 5,297 records:

- Highest flood level, year of highest flood level and danger water level were shown as zero in all the records.
- District identity was also not entered therein.

In the absence of these data it would not be possible to adequately monitor and draw inferences about flood situation and water availability in the reservoir.

The E-in-C, WRD stated (November 2015) that the module would be implemented soon as per the audit observations.

2.4.7.10 Reservoir monitoring report

The SMS based reservoir monitoring system has been developed for the monitoring of water level especially during rainy season. This module provides facility of getting compiled information of daily water level and capacity available by sending a simple SMS by the tank gauge reader.

(i) SMS based reservoir monitoring daily report

SMS based reservoir monitoring report as on 25 September 2015 had been test checked by us. Instances of incomplete data had been observed by us as summarised below;

- Data in respect of only 136 reservoirs was being maintained in the report while number of completed projects are 4,597¹⁰⁸.

¹⁰⁸ Source of information is Administrative Report of the Department.

In the absence of data regarding flood level etc., in Flood Control Management module, it would not be possible to adequately monitor about flood situation.

- In case of 27 reservoirs, static data of reservoir levels, live capacity and live storage had not been recorded.
- Though required updation on daily basis, daily reports of reservoir monitoring data in respect of all the 136 reservoirs was not being updated by the departmental authorities.

The E-in-C, WRD replied (November 2015) that all important reservoirs, 136 in number, were being monitored through this module and it could be extended whenever required. He further added that due to technical problem, sometime SMS was not received by the server.

(ii) River gauge water level report

River gauge water level monitoring through SMS based system was developed to know the availability and flow of water in rivers. The river gauge reader sends SMS which are captured in server and a report is displayed.

We observed from river gauge water level report as on 4 October 2015 that out of 86 discharge stations data in respect of 15 gauge discharge stations only was available in the report.

The E-in-C, WRD replied (November 2015) that at present only 15 rivers gauge stations were brought on the system. He further added that the remaining river gauge readers would soon be brought on to use the system.

2.4.7.11 Surface water module

The Surface Water module is meant for entering meteorological and hydrological data and provides facility for entry of rainfall, water level and climate data as observed by field offices of the department. The module thus facilitates for drawing inferences about meteorology and hydrology of a place.

We noticed (April 2015) following significant deficiencies in the database of the module having 4,920 records for data relating to temperature, pressure and other climatic details:

- In 3,739 records, minimum temperature of the station was mentioned as zero, indicating that this information was not being collected and entered in the database.
- In 4,912 records, absolute pressure¹⁰⁹ was shown as zero though it has some value.

Thus, the database in the module was not complete/accurate to draw correct inferences about meteorological and hydrological status of a place.

The E-in-C, WRD *inter alia* replied (November 2015) that the data would be filled in and wherever found necessary, validation would be done.

¹⁰⁹ Absolute pressure is the pressure measured relative to zero pressure or a total vacuum.

2.4.7.12 Water user association¹¹⁰ and other participatory irrigation management module

The Water User Association (WUA) and other Participatory Irrigation Management module aims at to assist monitoring the activities of WUAs and funding to WUAs by the Department.

We noticed (April 2015) that details of 1,966 WUAs for 2,094 schemes under eight zones of the Department had been entered in the module. Performance grading of only 264 WUAs against 1,966 WUAs was mentioned in database of the year 2013-14. Data of the WUAs was not updated for the years 2014-15 and 2015-16. This shows that the module was being utilised partially.

The E-in-C, WRD stated (November 2015) that efforts were being done to use the module for WUA works. The reply confirms that the database of the module was not being updated for facilitating its meaningful use.

2.4.7.13 Irrigation Monitoring module

The Irrigation Monitoring module provides facility of monitoring of operations of major/medium/minor irrigation schemes and it includes details of water storage capacity, irrigation target and achievement, weekly irrigation, progress of irrigation across schemes and Department as a whole, historical records of irrigation activities and irrigation potential available.

We noticed (April 2015) following deficiencies in the table named 'irrigation potential details' having 20,971 records relating to 5,346 projects/schemes under the Irrigation Monitoring module:

- Actual irrigation potential area of tanks were shown as "0" hectare (ha) but designed potential were shown as more than "0" ha ranging between 1 to 3,62,102 ha in 12,709 records indicating inaccuracies in the database.
- Categorisation of schemes as major, medium and minor in the module was not according to the criteria based on irrigation potential area of such schemes in respect of 416 records.

The E-in-C, WRD stated (November 2015) that for the years 2009-10, 2010-11 and 2011-12 partial data entry was done which would be completed soon and the data entry of actual irrigation was started from year 2012-13. He further stated that the old system of categorisation of schemes on the basis of cost, might be the reason for wrong categorisation in 416 records which would be corrected soon.

2.4.7.14 Irrigation Monitoring Report

Irrigation monitoring report is meant for monitoring irrigation for Rabi crop on fortnightly basis against the target set for irrigation on the basis of availability of water in the irrigation scheme. Report generated on 25 September 2014 was analysed and we noticed shortcomings in the reports as described below projects-wise.

Due to incorrect and incomplete data regarding irrigation potential and categorisation of schemes in Irrigation Monitoring module, monitoring of operations of irrigation schemes would be difficult.

¹¹⁰ A water users' association is a farmers organisation. Objectives of WUA are to promote and secure distribution of water among its users, adequate maintenance of the irrigation system and efficient and economical utilisation of water to optimise agricultural production.

Major projects

Out of 24 existing major projects, data of 22 major projects only was being displayed in the report.

- In Gandhi Sagar Dam, information on ‘culturable command area in hectare’ and ‘Rabi designed irrigation in hectare’ were recorded as zero.
- In four records, reservoir level as on 25 September 2014 was recorded as zero metre but available live capacity of the dam ranging between 206.71 Million Cubic Metre (MCM) to 2,197.78 MCM were recorded, indicating absence of validation checks.
- For six schemes, targets for Rabi irrigation for the year 2014-15 were fixed but target remarks such as “Palewa *plus* one water”, “Palewa *plus* three water” which indicates water to be given for irrigation, etc. were not recorded.

Similar nature of shortcomings were noticed in the reports on Medium Projects and Minor schemes.

The E-in-C, WRD replied (November 2015) that the necessary correction and validation in the data feeding would be done. He further added that no remarks in target remarks column meant all required watering would be provided.

The reply regarding number of required watering is not acceptable as “target remarks” column is meant for recording number of spells of watering for irrigation.

2.4.7.15 Geographic Information System (GIS) module

As per terms and conditions of the agreement, geo-database¹¹¹ was to be one of the major application components and for that purpose GIS was to be the common source of information related to water resources of MPWRD.

Geo-database relating to water resources of the State was not provided to us when requisitioned. One link was given on the main page of EIMS webpage which did not show geo-database relating to water resources of the State.

The E-in-C, WRD stated (November 2015) that the GIS module was developed but due to shortage of server, it was not working and after shifting to State Data Centre, the GIS application would be made fully functional and in use.

2.4.7.16 Feasibility Reports (Sadhyata)

Feasibility Reports has three sub-reports viz., New Scheme Report, Repair, Renovation and Rehabilitation (RRR) Scheme Report. Dynamic data available on the WRD portal in respect of these sub-reports as on 5 October 2015 was analysed by us.

(i) New Scheme Report

The report contains information about “pinpointed” new schemes identified for feasibility study, approved schemes, schemes under survey, sanctioned schemes and rejected schemes. In scrutiny of 269 records of new scheme report we noticed that:

¹¹¹ The geo-database is a collection of geographic datasets of various types.

- In 13 pinpointed new schemes, total land cost did not match with total cost of irrigated land, un-irrigated land and forest land.
- In four of the feasibility approved schemes, total cost of land was also not equal to sum of cost of irrigated land, un-irrigated land and forest land.
- In the new scheme report, only one scheme “Keshariya Kund Tank” was shown as sanctioned contrary to the fact that many more schemes had been sanctioned by the Department.

The E-in-C, WRD replied (November 2015) that the sanctioned projects might be more which would be checked and updated.

(ii) Repair, Renovation and Rehabilitation Scheme Report

The RRR scheme report is meant to facilitate the government authorities to accord sanction for preparing DPRs for Repair, Renovation and Rehabilitation (RRR) work in respect of old projects. Records of 91 schemes were available in RRR Scheme Report. We noticed that:

- In four records, meaningless data in the column of catchment area in ha were found entered as "99,999,999.000" and "9,999,999.000" which shows that proper validation checks regarding field width were not there in the data base.
- In columns of estimated cost of total lining, head work and RRR scheme of canal, data were entered as 3.00 to 2,61,34,800.00 which indicates different units of monetary value being fed by different divisions.
- Report shows per ha cost of the 91 schemes ranging between ₹ 0.14 to ₹ 8,67,605.71 which was evidently incorrect.

The E-in-C, WRD accepted (November 2015) the observations and replied that proper validation would be done to ensure correct and reliable data in the module.

2.4.7.17 Other modules of EIMS

We also analysed other EIMS modules such as, mechanical works (E & M), SMS based canal monitoring system, establishment related assets, store keeping, procurement and tender management, grievance management, office administration, electronic document management system, environment management, assembly & parliament questions and reply, budget planning and monitoring, ground water and crop revenue and irrigation billing which were either not being utilised by the Department or were having very few but incorrect, incomplete data. Instances of incomplete and incorrect data were also observed by us in data of the reports for monitoring purposes being displayed on web site of the Department.

The examination of the database in these 24 modules of EIMS as described above indicates inadequate input control, absence of data validation, incomplete mapping of business rules, incorrect/incomplete capturing of data in many of the modules and non-utilisation of certain modules.

Database of the modules of EIMS indicated inadequate input control, absence of data validation, incomplete mapping of business rules, incorrect/incomplete capturing of data and non-utilisation of certain modules.

The expenditure of ₹ 16.79 crore incurred on development of EIMS remained unfruitful to the extent the modules planned were not being developed/utilised.

In the exit conference (September 2015) Principal Secretary, WRD while accepting the absence of validation, incomplete/incorrect entries of the data in the modules, stated that the EIMS had been a very effective tool for monitoring irrigation projects from the very start of a proposal until completion of construction and thereafter, from filling of reservoirs until irrigation. The inadequacy of server capacity, unwillingness of engineers to learn and use computer and web enabled systems, had been worthwhile obstacles, which had now been overcome. He also added that the consultancy was awarded as a composite contract having high value high priority modules as well as low utility low priority module.

The fact remains that the expenditure of ₹ 16.79 crore incurred on development of EIMS remained unfruitful to the extent the modules planned are not being developed/utilised.

Recommendation

The Government should ensure completeness, correctness and availability of data that is useful for management for decision making and monitoring. The Government should also completely implement all other modules developed for EIMS.

2.4.8 Contract management of EIMS

World Bank conveyed¹¹² (July 2008) no objection to sign the contract with M/s Tech Mahindra Limited for consultancy for EIMS design and implementation support for an amount of ₹ 15,00,47,100. PICU issued (August 2008) letter of acceptance to M/s Tech Mahindra Limited and notice to start the consultancy work on August 2008. Agreement¹¹³ for contract of consultancy was also signed in August 2008.

As per the Agreement, stipulated period of completion was 36 months (up to 31 July 2011). Provision of three years warranty period and three years Annual Maintenance Contract (AMC) period was also there in the agreement. As per reply of the Department, the development phase was completed on 30 September 2013 and warranty phase was effective since 1 October 2013.

An expenditure of ₹ 16.79 crore, including reimbursement of service tax of ₹ 1.79 crore, was incurred on the project up to 2013-14.

Shortcomings in management of contract for development of the EIMS were noticed in audit, which have been discussed in the succeeding paragraphs.

2.4.8.1 Non-availability of data dictionary of EIMS

A data dictionary defines the structure of the database and includes name, description, characteristics of every field of each table and types of inter relationships between data elements for facilitating others¹¹⁴ to refer to them or analyse.

Data dictionary in respect of the EIMS was not made available by the Consultant during concurrency of audit (October 2014 to July 2015). In the

The data dictionary of EIMS could not be provided by the Department during audit period.

¹¹² Through email dated 10 July 2008

¹¹³ Agreement number 3/EE (BVPP)/SAC/252/08 dated 12 August 2008

¹¹⁴ Programmers, data base administrators, auditors etc.

absence of data dictionary, change management, data base administration and auditing would be difficult.

The E-in-C, WRD stated (November 2015) that the data dictionary was now available and had been provided to Audit.

The reply is not acceptable as data dictionary was provided to us after completion of Audit and it was not comprehensive as details of table and description of field had not been mentioned in the data dictionary.

2.4.8.2 Installation of secure sockets layer

The installed Secure Sockets Layer Certification expired making the website prone to threats.

Development of web portal was the responsibility of the Consultant as per the agreement with them. The requirement of Secure Sockets Layer (SSL) certification for web portal was an integral part of the work to make the web site secured.

We noticed (May 2015) from the web page of EIMS portal that the portal was having an expired SSL certification. Thus, the web site was not secured.

The E-in-C, WRD accepted (November 2015) that SSL certification of website done earlier had expired. He further stated that hardware procured for data centre was being installed at State Data Centre and SSL certification would be done as soon as the EIMS is shifted at State Data Centre.

2.4.8.3 Bilingual dictionary and phonetic conversion engine not installed

Though provided in the agreement bilingual dictionary and phonetic conversion engine not installed with the application.

Agreement with the Consultant provided for installation of bilingual dictionary which allows user to switch between Hindi and English for key fields on data entry screen. Another feature of the dictionary is to enable users to search English words for which Hindi translations were available with the system. The Consultant was also required to design a phonetic conversion engine giving an additional feature of using phonetic Hindi equivalent of English Text.

We noticed (April 2015) that instead of providing bilingual dictionary for facilitating switching between Hindi and English language for key fields, the Consultant provided pre-defined Hindi labels for fields in programming, limiting the use of the software for Hindi users. Non-providing of bilingual dictionary as required in the agreement by the consultant had deprived the data entry staff of the Department the facility of conversion of textual element from Hindi to English and vice versa. Phonetic conversion engine was also not found but total payment as per the agreement was made to the Consultant.

The E-in-C, WRD while accepting the audit observation stated (November 2015) that the compilation of bilingual dictionary field items had been done and installed. He further stated that the use of both bilingual dictionary and phonetic conversion engine would be fully available at the portal as well as with the application after completion of migration of EIMS to State Data Centre.

2.4.8.4 Non-deployment of key personnel by consultant

In the agreement, 11 key personnel and sub-consultants were indicated by name who were responsible for development of EIMS. Eleven other key personnel were to be nominated later on. As per clause 4.2 of the agreement no change shall be made in key personnel except for the reasons beyond the

control of the Consultant. As per Annexure IV of Appendix A¹¹⁵, in case of non-deployment of key personnel and support staff, remuneration was to be deducted proportionately from the payment considering breach of contract by the Consultant.

We noticed (April 2015) from the records of the Department that four key personnel were not deployed up to July 2009 by the Consultant though the development of EIMS was started in August 2008. The PICU, however, did not recover any amount from the remuneration payable to the Consultant on account of non-deployment of key personnel.

The E-in-C, WRD stated (November 2015) that, the case was not of non-deployment but of delay in approval of change in four key personnel positions by the World Bank and as no shortage in overall man-month for any of these four positions had occurred, therefore no recovery was done.

The reply is not acceptable as four key personnel were not deployed up to July 2009 by the Consultant. Further, the PD PICU (July 2009) had communicated to the Consultant that non-deployment of key personnel had reflected on the quality of the deliverables which was treated as breach of the contract.

2.4.8.5 *Capacity building and institutional strengthening*

As per the agreement¹¹⁶, the Consultant was required to identify the requirements for a specialised team of IT/IS¹¹⁷ specialists within WRD and setting up an appropriate IT/IS organisation, including infrastructure, resources, and maintenance strategy. As per the Institutional Framework Report submitted (September 2009) by the Consultant, in order to provide information and technology support to the IT/IS team, a Central Information and Technology Office (CITO) was to be set up within WRD. The Consultant was also required to provide training in the area of application usage, application support and application administration to the WRD staff.

We noticed (May 2015) that no IT/IS specialist group of WRD personnel had been formed. After the development phase, all the works i.e. web server, implementation of EIMS, database administrators activities and change management control were being done by the Consultant. No development in respect of setting up CITO was observed by us. Though it was stated that training to trainers and users had been provided (June 2009 to May 2013) but deployment of outsourced staff at divisional level indicated inadequate training to users in the Department. When enquired, the Department could not produce to us proper documentation regarding personnel trained, types of training, venue, dates and duration of training programme by the Consultant. As a result, the Department had not developed adequate manpower at field offices as well as at PICU to utilise full potential of the EIMS application.

The E-in-C, WRD while accepting the audit observation stated (November 2015) that the necessary set up proposal for CITO had been prepared by the Consultant and the Department would make necessary arrangement for development of in-house capacity.

The Department could not develop adequate manpower to utilise full potential of the EIMS application.

¹¹⁵ Negotiated terms and conditions at point number 12 of the agreement

¹¹⁶ Clause 1.4 (g) of the Annexure V of Appendix A (ToR) of the agreement

¹¹⁷ IT/IS: Information Technology/Information System

The reply confirms that the Department had so far not developed adequate manpower to utilise full potential of the EIMS application.

Recommendation

The Government should ensure identification of a specialised team of IT/IS specialists within WRD for self-dependency along with adequate capacity building to deal with all the tasks of EIMS at Department level.

2.4.8.6 Non-adherence to tests procedure of EIMS application

Tests procedure for EIMS application as provided in the agreement were not adhered to.

As per the terms of the agreement¹¹⁸ the Consultant was required to prepare a master test plan to test entire application at every step of software development. The Consultant was responsible for maintaining documentation, test reports and entire test logs generated during testing whereas personnel from the Department were responsible for tests and final rating of all accepted test results.

We however did not notice maintenance of a systematic documentation of test reports and entire test logs generated during testing as well as acceptance of test results by the Department. We further noticed flaws in system designs, validation checks etc. as discussed in details in paragraphs 2.4.7.1 to 2.4.7.17.

The E-in-C, WRD accepted (November 2015) that the code level¹¹⁹ testing and their logs needed to be deciphered and understood but due to lack of IT staff, such an understanding was not available with the Department resulting in lack of maintenance of test log record. He further stated that the Consultant had been asked to submit application test documentations.

2.4.8.7 Non-entry of data by the Consultant

One year historic and two years current data were not entered in modules by the consultant as envisaged in the agreement.

As per the agreement¹²⁰, the Consultant was responsible for historic data entry of one year and current data entry of two years for demonstrative pilot phases and for supervision/facilitation of data entry by the users for the roll-out phases.

We found (April 2015) incomplete, invalid and inaccurate data in all the modules in analysis of the data. Most of the modules were unused confirming that one year historic and two years current data were not entered in modules by the Consultant. As a result, benefits expected from the data entry could not be achieved so far. This also indicated absence of effective monitoring by the Department.

The E-in-C, WRD stated (November 2015) that 34 modules were developed for EIMS and during development phase these modules were rolled out after piloting. He further stated that the historic data for five pilot divisions was to be entered in the module, which had been done by the Consultant.

The reply is not acceptable as complete data entry was not done by the Consultant in any of the modules as envisaged in the agreement. Incomplete and inaccurate data in the modules proves that the data entry done by the users was not supervised by the consultant. Therefore projected benefits from the data entry could not be achieved.

¹¹⁸ Clause 1.1.10 of Appendix A (Description of Services) of the Agreement

¹¹⁹ Programming for the EIMS application

¹²⁰ Annexure V of Appendix A {ToR clause, 1.8 (5) (e)} of the agreement

2.4.8.8 Irregular sub-contracting of some of the main functions of development phase

Some of the main functions of development phase of EIMS were executed through a subcontracted firm.

As per the acceptance letter to the consultant (August 2008), the consultant was not to intend to subcontract any component of the work. The consultant requested to sought help and support from another firm (September 2008) to provide local logistic support in Madhya Pradesh, just after 01 month from signing of the contract. The permission for the above request was granted by the PD, PICU.

We found that the sub-contracted firm, who was engaged by the Consultants for logistic support, also performed some of the main functions of development of EIMS, which was irregular.

The PD, PICU replied (June 2015) that the no objection to the proposal of consultant to engage another firm for getting logistic support only was given. There was no issue of subcontracting.

Reply is not acceptable as records showed that some of the main functions of development phase of EIMS was got executed through the subcontracted firm which led to system design deficiencies as pointed out in paragraphs 2.4.7.1 to 2.4.7.17.

Recommendation

The Government should ensure comprehensive evaluation of contract implementation and take remedial action accordingly.

2.4.9 Conclusion and recommendations

- General controls in respect of the IT application of EIMS were deficient as there were inadequate logical access controls, change management for EIMS application was being performed by the Consultant themselves without documented procedure. Business continuity and disaster recovery plan for EIMS were not prepared.

The Government should formulate and implement plan for change management and business continuity for an uninterrupted and intended system operation and utilisation.

- In four out of five main modules implemented by the Department, data was incomplete, incorrect or inconsistent or full potential of the module was not utilised. The database in the other test checked modules of EIMS indicates inadequate input control, absence of data validation, inadequate mapping of business rules of the Department. Instances of incorrect and incomplete entries of data in these modules also and non-utilisation of certain modules were noticed. Thus, the objectives of providing improved and cost-effective services to clients and help improved access to information, transparency and collaborative working and the expenditure of ₹ 16.79 crore incurred on development of EIMS remained unfruitful to the extent the modules planned are not being developed/utilised.

The Government should ensure completeness, correctness and availability of data that is useful for management for decision making and monitoring. The Government should completely implement all other modules developed for EIMS.

- Contract management for EIMS application was deficient as the EIMS portal was having an expired SSL certification; causing threat to its security. Bilingual dictionary for facilitating switching between Hindi and English language for key fields was not provided by the Consultant. The Consultant did not form IT/IS specialist group of the Department personnel as required in the agreement; consequently objective of capacity building in the Department was not achieved.

The Government should ensure identification of a specialised team of IT/IS specialists within WRD for self-dependency along with adequate capacity building to deal with all the tasks of EIMS at Department level. The Government should ensure comprehensive evaluation of contract implementation and take remedial action accordingly.

The recommendations given in the report were agreed to by the Government.

Water Resources Department

2.5 Long Draft Paragraph on Quality Assurance in works

Executive summary

Water Resources Department is the principal agency of the Government of Madhya Pradesh for construction of irrigation schemes, development of irrigation potential and its actual utilisation. The Department had established two Central Laboratories, two quality control divisions with its eight sub-divisions and 12 other quality control sub-divisions. The adequacy of quality control establishment and adherence of prescribed quality control norms were test checked for the period 2012-13 to 2014-15 in three major, two medium and 23 minor irrigation schemes costing ₹ 1,250.52 crore being executed through 72 agreements. The significant audit findings are as follows:

- The number of quality control circles, divisions and sub-divisions were not established as per the norms given in Quality Control Manual of the Department. There was shortage of staff including technical staff in the quality control divisions/sub-divisions affecting quality assurance in works.

(Paragraphs 2.5.5.1 (i) and (ii))

- Test reports relating to quality of cement and steel reinforcement bars costing ₹ 121.71 crore, physical properties of cohesive non-swelling soil material and low density polyethylene film costing ₹ 12.90 crore were not available and requisite tests of materials and cement concrete/reinforcement cement concrete were not done as per the prescribed frequencies. As such, there was no assurance that materials having requisite quality and physical properties were used in the works.

(Paragraph 2.5.5.2)

- The test results of cement concrete work in the work of Rampur distributary indicated strength of cement concrete work was less than the specified strength. For defect in the cement concrete work valued at ₹ 7.01 crore, the Department neither directed the contractor for removal of the defect, nor reduced the payment.

(Paragraph 2.5.5.3)

- In respect of six turnkey agreements of canal lining and structures of Pench diversion scheme costing ₹ 580.77 crore, reports of joint measurements for works, checking by the competent authority and reports of tests of materials, cement concrete/reinforcement cement concrete works in the frequency specified in the Quality Control Manual, were also not found.

(Paragraph 2.5.5.4)

2.5.1 Introduction

Quality Control (QC) in construction involves compliance with minimum standards of material and workmanship in order to ensure the performance of the facility according to the design and specifications. QC is important to a successful construction project and is required to be adhered to throughout from conception and design to construction and installation.

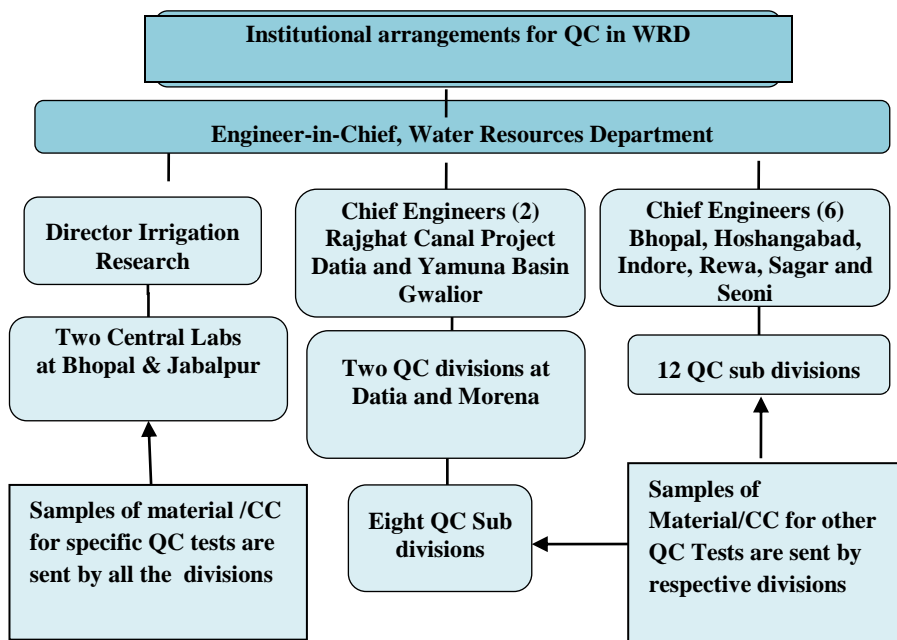
Water Resources Department (WRD) is the principal agency of the Government of Madhya Pradesh (GoMP) for construction of irrigation schemes, development of irrigation potential and its actual utilisation. WRD had adopted a ‘Quality Control Manual’ (QC Manual) since June 1995 which provides for establishment of quality control units, equipment in laboratories for quality tests and frequency of tests for material. The QC Manual has not been updated since then.

WRD has also issued Unified Schedule of Rates (USR) which is revised from time to time for the purpose of keeping the estimates in parity with the current market rate. The USR also provides a list of mandatory tests (provided in the QC Manual as well) which are required to be carried out for better quality control. The contract agreements for the irrigation works provide that the Department shall conduct requisite tests as prescribed in the Manual and USR.

Institutional arrangements for Quality Control in WRD

There were as on March 2015, 10 major, 30 medium and 316 minor schemes under construction as per the Administrative Report of the Department for the year 2014-15 which were being executed through 127 divisions of the Department. The Engineer-in-Chief (E-in-C) of the Department is responsible for quality assurance in works.

The organogram of the institutional arrangements for QC in WRD and flow of quality test activity are given below:



The Department had established two Soil and material Testing Laboratories (Central Laboratories) under Director, Irrigation Research and two QC divisions with its eight sub-divisions under two Chief Engineers (CEs) at Datia and Gwalior. Twelve other QC sub-divisions were functioning directly under the other six CE of the zones of the Department. The Central Laboratories, QC divisions and sub-divisions have equipment for conducting tests of material, process and finished works. Central laboratories conduct test on samples of soil, cement, sand, aggregates, stone etc. besides evolving

design mix of concrete. Sub-divisions conduct tests of soils and filter material, aggregates, and concrete mortar. Central laboratories and QC divisions/sub-divisions prepare report of tests and communicate to officer in charge of execution.

2.5.2 Audit objectives

Audit was conducted with a view to assess:

- availability of adequate QC establishment,
- availability of trained/qualified manpower,
- adherence with prescribed norms/frequency of tests and supervision during execution,
- availability of adequate testing facilities and its proper utilisation.

2.5.3 Audit criteria

The criteria followed in the course of audit:

- Madhya Pradesh Works Department Manual, QC Manual, USR effective from 1 February 2009, Irrigation specifications issued by the WRD, GoMP and Indian Standard Codes (IS-Codes)
- Rules and orders issued by the GoMP, WRD and contract documents of works executed by the Department.

2.5.4 Scope and methodology of audit

We conducted audit during June 2015 to August 2015 in 10 selected divisions¹²¹, two QC divisions along with its eight sub-divisions and one Central laboratory by scrutinising records relating to testing facilities, frequencies, results, execution and supervision by the concerned officers for the period from 2012-13 to 2014-15.

Out of three major, two medium and 103 minor irrigation schemes costing ₹ 1,890.18 crore which were under construction during 2012-13 to 2014-15 in the selected divisions, all the three major, two medium and 23 minor irrigation schemes costing ₹ 1,250.52 crore being executed through 72 agreements were test checked by us.

An entry conference was held on 22 June 2015, with the Principal Secretary, WRD for apprising the audit objectives, criteria and scope of audit. Long Draft Paragraph was issued to the Government on 16 September 2015. Reply from the Government was awaited (November 2015).

An exit conference was held on 5 November 2015 with the Additional Chief Secretary, WRD and views expressed by the Government/Department have been suitably incorporated in the report.

¹²¹ WR division Wainganga Balaghat, Pench Diversion division Dam division Chhindwara, Canal division Chhindwara, WR division Dindori, Kutni dam division Chhattarpur, Upper Purwa Canal division Rewa, Lower Sinhawal Canal division Churhat, EE WR division Khargone, Seoni, Dhar, Quality Control division Datia, Morena and Dy. Director Soil & Material Testing division Hathaikheda, Bhopal

2.5.5 Audit findings

Shortcomings noticed relating to QC establishment, availability of trained/qualified man powers, adherence with prescribed norms and frequencies of testing for material and testing facilities, have been discussed in succeeding paragraphs:

2.5.5.1 Inadequate formation of quality control units

Against the norms of establishment of 10 circles and 30 divisions for quality control function, only two divisions were established.

(i) The QC Manual of the Department provides that one QC circle headed by Superintending Engineer (SE) for each major project, one QC division headed by an Executive Engineer (EE)/Research Officer for each medium project costing above ₹ 10 crore, and a separate QC unit for all dams and structures costing more than ₹ 50 lakh, shall be established.

We noticed that 10 major and 30 medium irrigation projects were in progress (2014-15) in the Department. Therefore, minimum 10 QC circles on the basis of norm of one each for a major projects and 30 QC divisions on the basis of norm of one each for a medium projects, were required to be established. Against this, no QC circle was established. Only two QC divisions for catering the need of quality control in respect of 20 existing divisions¹²², were established. Thus, the establishment of QC formations was deficient compared to the norms.

The Additional Chief Secretary stated in the exit conference (November 2015) that the QC Manual was very old and technique of execution of work had changed. He also mentioned that the cost of projects increased manifold due to escalation and therefore, the cost criteria specified in the Manual for quality tests were inappropriate and informed that the Manual was under revision.

Since, the Department itself has accepted that costs have increased exponentially, the requirement of effective QC system assumes a greater significance. Department needs to be proactive in this regard.

Recommendation

The Government should ensure establishment of quality control units in sufficient numbers in accordance with the prescribed norms.

(ii) Shortfall in qualified manpower

There were shortages of 39 per cent of technical staff and 24 per cent of non-technical staff against the required strength.

The QC Manual specifies technical and support staff for QC divisions and QC sub-divisions. For QC divisions, 13 staff including six technical staff¹²³ and for QC sub-division, 18 staff including 13 technical staff¹²⁴ is required to be posted.

We noticed that there was inadequate manpower for quality control functions in quality control units as depicted in **Table 2.18 and 2.19** below:

¹²² The two QC divisions cater the need of 20 divisions in Yamuna basin out of total 127 divisions.

¹²³ EE, Quality Control/Research Officer (1), Research Assistant/Embankment Inspector (1), Draftsman (1), Asst. Draftsman (2) and Tracer (1)

¹²⁴ Assistant Engineer/Assistant Research Officer- Quality Control (1), Research Assistant/Embankment Inspector (5), Lab. Technician (1), Lab. Assistant (1), Lab. Attendant (5)

Table 2.18: Requirement and posting of Technical Staff

Name of unit/(number)	Required	Posted	Shortfall	Shortfall in per cent
Division (2)	12	4	8	67
Sub-divisions(19)	247	153	94	38
Total	259	157	102	39

(Source: information provided by the E-in-C)

Table 2.19: Requirement and posting of Non-Technical Staff

Name of unit/(number)	Required	Posted	Shortfall	Shortfall in per cent
Division (2)	14	11	3	21
Sub-divisions (19)	95	72	23	24
Total	109	83	26	24

(Source: information provided by the E-in-C)

As evident from table 2.18, against requirement of 259 technical staff in two QC divisions and 19 sub-divisions¹²⁵, only 157 technical staffs were posted in those divisions/sub-divisions (June 2015). Thus, there was shortage of 102 technical staff (39 per cent) in the divisions/sub-divisions.

We further noticed that against requirement of 109 non-technical staff in two divisions and 19 sub-divisions, only 83 non-technical staff were posted in those divisions/sub-divisions. Thus, there was shortage of 26 non-technical staff (24 per cent) in the divisions and sub-divisions. The shortage in quality control staff, especially in technical category, has impacted smooth functioning of QC functions as discussed in paragraphs 2.5.5.2, 2.5.5.3 and 2.5.5.4.

The Additional Chief Secretary in the exit conference stated that large numbers of Engineers were retiring and therefore, there were serious constraints in this respect. He further replied that technical and non-technical staff posted in the laboratories would be rationalised keeping in view present constraints and information/communication technology. Action as envisaged in this regard was yet to be taken by the Department.

Recommendation

The Government should formulate the norms based on rational criteria for deployment of staff and ensure their availability in laboratories accordingly for smooth functioning of quality control units.

(iii) Training to staff for quality control

The QC Manual provides that seminars and technical symposiums for all the supervisory staff should be arranged at regular intervals to discuss various technical problems at length. The Manual further provides that no separate quality control staff needs to be posted in individual minor irrigation project but staff posted in the divisions shall be trained in taking samples, carrying out field tests themselves and interpret the results.

In test checked 10 divisions, two QC divisions with its sub-divisions and one Central laboratory, it was informed (June-August 2015) by the Divisional Officers that the supervisory staff posted in minor irrigation project were not

¹²⁵ Eight sub-divisions under two quality control divisions and 11 sub-divisions under the civil CEs of Zones and SEs of Circles.

imparted any such training. No seminars or technical symposium was arranged during the last three years up to 2014-15.

The Additional Chief Secretary in the exit conference accepted the need of periodic training to the staff posted for quality control.

2.5.5.2 Quality control tests for materials

The QC Manual specifies type and frequency of tests of materials. USR issued by the Department provides for mandatory tests for materials such as, cement, soil, coarse aggregates, cement concrete/reinforcement cement concrete (RCC), reinforced steel etc. We noticed instances of utilisation of material in the work without requisite quality tests and non-conduct of tests in required frequencies as discussed in succeeding paragraphs.

(i) Utilisation of material without quality tests

The terms and condition of test checked 72 irrigation works laid down following requirements relating to quality of material to be used in works:

- i. Contractors were required to procure cement conforming to relevant IS Codes from the cement factories having production capacity more than 450 MT per day and produce test report from authorised laboratories regarding adulteration in cement.
- ii. Contractors were also required to produce a certificate of conformity with physical properties of steel reinforcement bars as specified in relevant IS Codes.
- iii. The cohesive non-swelling (CNS) soil to be used in works should have liquid limit¹²⁶ less than 55 per cent but greater than 30 per cent and plasticity index¹²⁷ less than 30 per cent but greater than 15 per cent. Department is required to conduct tests for ensuring these quality parameters before use of materials
- iv. Low Density Polyethylene (LDPE) film, to be laid below the lining of canal to reduce seepage loss and improve water tightness, should conform relevant IS Codes. Department is required to conduct tests for this purpose.

We noticed (June-August 2015) in test check of records of the 10 selected divisions¹²⁸ that:

- In nine divisions (**Appendix 2.44**) 2,27,709.37 MT cement valued at ₹ 97.92 crore¹²⁹ were consumed in 43 works. Invoices of procurement of cement of the consumed quantity for ascertaining production capacity of cement factory and test reports regarding adulteration in cement were not

¹²⁶ Liquid limit of a soil is the water content expressed as a percentage of the weight of the oven dry soil.

¹²⁷ The plastic limit of a soil is the water content expressed as a percentage of the weight of the oven dry soil at the boundary between the plastic and semi soil state of the consistency of soil.

¹²⁸ WR division Wainganga Balaghat, Pench Diversion dam Division Chaturai, Pench Diversion canal division Signa Chhindwara, Kutni dam division Chhattarpur, Upper Purwa canal division Rewa, Lower Sinhawal Canal Churhat, WR division Khargone, Seoni, Dhar, Dindori

¹²⁹ Quantity 227709.368 MT (rate of cement as per USR was ₹ 4,300 per MT) = ₹ 97.92 crore

produced to us by the divisions when requisitioned, indicating that the quality of cement was not ensured.

Quality of cement and steel utilised in works was not ensured as test reports/certificates were not produced to us.

- In five divisions (**Appendix 2.45**) 3,964.26 MT steel reinforcement bars valued at ₹ 23.79 crore¹³⁰ were consumed in 13 works. Invoices of procurement of steel reinforcement bars of the consumed quantity along with certificates of conformity with relevant IS Codes, were also not produced to us by the divisions.

The E-in-C in the exit conference stated that the production of invoices of procurement of cement/steel and certificates of conformity with specifications were not required in view of WRD not procuring these any more. He further stated that cube tests and hammer tests were better means of ensuring quality and this requirement had been dispensed with in new agreements.

The reply is not acceptable as in terms of the agreements the contractors were required to produce relevant test reports, certificates and invoices for procurement of cement/steel for ascertaining conformity with specifications, physical properties of material and name of plant for ascertaining required production capacity. Further, cube test was also not conducted in required frequency and reports of cube test in 38 *per cent* of the samples, showed compressive strength of CC less than the specified strength, as discussed in the paragraph 2.5.5.3 below, indicating weak quality control.

Tests for ascertaining quality of CNS material and LDPE film used in works were not produced to us.

- In four divisions (**Appendix 2.46**) 6,79,551.47 cu m CNS material valued at ₹ 9.70 crore was consumed in construction of seven canal works. Reports of requisite tests (Liquid limit and Plasticity index) for ascertaining physical properties of the total CNS material consumed in these works were not made available to us.

- In construction (2012-13 to 2014-15) of four canal works in three divisions total 11,31,182.45 sq m LDPE film valued at ₹ 3.20 crore was used. Reports of requisite tests (density and thickness tests) for ascertaining physical properties of the total LDPE film consumed, were not produced to us for verification (**Appendix 2.47**).

Thus, there was no assurance that materials having requisite quality and physical properties were used in those works.

E-in-C in the exit conference stated that directions for non-laying of LDPE film had been issued and the practice had been discontinued in view of questionable utility of LDPE films.

The fact remains that LDPE film was used in the said works without ascertaining its density and thickness for its suitability in the works.

(ii) Tests conducted in less than prescribed frequency

As per the provisions given in USR issued by the Department and QC Manual of the Department, field density/compaction test of soil, tests for flakiness index/particle size distribution/percentage of soft and deleterious material in aggregates, tests of particle size/silt contents in sand, test of compressive

¹³⁰ Quantity 3,964.263 MT (Rate of steel as per USR was ₹ 60,000 per MT) = ₹ 23.79 crore

strength of CC etc. were required to be conducted in prescribed frequency by the Department.

We noticed in test check of records relating to reports of test of material in 10 divisions that requisite tests of materials and CC/RCC were not done (as detailed in **Appendix 2.48**) as per the prescribed frequencies as summarised below:

- Field density tests of soil, meant to ascertain bearing capacity of soil, were conducted by the four divisions¹³¹, only in respect of 0.69 *per cent* of the required samples.
- Compaction test of soil, meant to determine the compaction characteristics of soil, were conducted by the four divisions¹³¹, only in respect of 5.21 *per cent* of the required samples.
- Flakiness index test of aggregates, which is conducted to ascertain its suitability for the work, were conducted by the 10 divisions¹³², only in respect of 0.24 *per cent* of the required samples.
- Particle size distribution test of aggregate to ascertain its suitability for the work, were conducted by the 10 divisions¹³², only in respect of 0.93 *per cent* of the required samples.
- Tests for ascertaining percentage of soft and deleterious material in aggregates, which is conducted to ascertain its suitability for the work, were conducted by the 10 divisions¹³², only in respect of 0.29 *per cent* of the required samples.
- Particle size distribution test of sand were conducted by the nine divisions, only in respect of 1.34 *per cent* of the required samples. Silt content test of sand, to ascertain that silt content has not exceeded the permissible limit, were conducted by the nine divisions¹³³, only in respect of 0.55 *per cent* of the required samples.
- Compressive strength test of CC/RCC, to ascertain strength of the CC/RCC works, were conducted by the nine divisions, only in respect of 1.48 *per cent* of the required samples.

As evident from above, frequency of tests of materials used in the works and CC/RCC were very less compared to the prescribed norms and therefore quality of materials used in the works and construction of CC/RCC, was not assured.

¹³¹ Pench Diversion canal division Signa-Chhindwara, WR division Dindori and Khargone, Kutni dam division Chhattarpur

¹³² WR division Wainganga Balaghat, Pench Diversion division Dam division Chhindwara, Canal division Chhindwara, WR division Dindori, Kutni dam division Chhattarpur, Upper Purwa Canal division Rewa, Lower Sinhawal Canal division Churhat, EE WR division Khargone, Seoni, Dhar, Quality Control division Datia, Morena and Dy. Director Soil & Material Testing division Hathaikheda, Bhopal

¹³³ Pench Diversion division Dam division Chhindwara, Canal division Chhindwara, WR division Dindori, Kutni dam division Chhattarpur, Upper Purwa Canal division Rewa, Lower Sinhawal Canal division Churhat, EE WR division Khargone, Seoni, Dhar, Quality Control division Datia, Morena and Dy. Director Soil & Material Testing division Hathaikheda, Bhopal

Frequency of quality tests of materials, CC/RCC were significantly less ranging from 0.24 *per cent* to 5.21 *per cent* of the required samples.

The E-in-C in the exit conference stated that the requirement would be revised in the Manual and the USR.

The reply is not acceptable as QC tests were prescribed in the Manual as well as in the USR as amended from time to time (2009) which was appended with the agreements, therefore prescribed frequency of the tests was applicable in respect of the works.

Recommendation

The Government should ensure conduct of quality tests of material as per the prescribed frequencies for ensuring quality of material being used in works and CC works.

2.5.5.3 Execution of Cement Concrete work not conforming to specifications

According to the terms and conditions of item rate contracts (clause 4.3.16 of the contract agreement), in case of execution of bad or inferior quality works, contractor is liable for following:

- i. Rectification of the defect in the work at his own cost.
- ii. Compensation at the rate of one *per cent* of the amount of the estimate for every day, subject to maximum 10 days in the event of his failure to rectification in the work continues after notification to him.
- iii. Recovery of the cost of rectification of the defect, carried out by the Department.

If the work is accepted by the Department with defects/deviations from specifications, payment to contractor shall be made at the reduced rate as may be fixed by Engineer in Charge of the work.

Irrigation Specifications stipulate that the compressive strength of M-15 cement concrete should not be less than 150 kg per cm² after 28 days of laboratory test. We noticed that in the work of construction of structures in Rampur distributary¹³⁴, 18,669.02 cu m CC (M-15) was executed. For that, cube tests of 374 samples were required to be conducted as per the prescribed norms. Test reports of only 55 samples of cube tests were produced to us. Out of these, the compressive strength of CC in 34 samples were found as specified. However compressive strength of CC was reported ranging from 71 kg per cm² to 145 kg per cm² in the remaining 21 samples which was below prescribed specification. Thus, the executed work was not conforming to the specifications.

We further noticed that the Department neither directed the contractor for removal of the defect nor reduced the payment if defects were considered acceptable. Thus, the payment of ₹ 7.01 crore for CC work at full rate was not justifiable and resulted in undue benefit to the contractor.

The E-in-C in the exit conference assured for the examination of the matter regarding less compressive strength of the CC work.

For defect in the CC work valued at ₹ 7.01 crore, the Department neither intimated the contractor for removal of the defect nor limited payment at reduced rate.

¹³⁴ Agreement number : 7DL/12-13

The fact remains that the payment to contractor should have been released only after considering the test reports of the compressive strength of CC work.

2.5.5.4 Non-observance of quality control in turnkey agreements

Reports of joint measurements and evidence of squad checks of works by the Department were not found by us.

Clause 106.10 of the conditions of turnkey contract agreement (Volume II) stipulated that contractor shall record the joint measurements for work carried out as per procedure laid down by the Department for purpose of keeping record and same shall be got checked from competent authority before payment. All hidden measurements shall be got 100 *per cent* checked from the competent authority before making payment to contractor. The contractor shall produce result of quality control tests carried out by quality control organisation of the Department and quality certificate from employer's representative¹³⁵.

The QC Manual appended with turnkey agreements also provided for squad checks including physical inspection, quality of workmanship, action plans for improving quality of works etc.

In respect of six 'turn-key' agreements¹³⁶ of canal lining and structures of Pench diversion scheme costing ₹ 580.77 crore, reports of joint measurements for works checked by the competent authority and reports of test of materials, CC/RCC works in the frequencies specified in the QC Manual were not found. We also did not find evidence of squad checks by the Department as envisaged in the agreements. Thus, quality of materials used in the works was not assured in the turnkey agreements.

The E-in-C in the exit conference stated that physical inspection was being carried out, *cent per cent* checking was not required as it adds to work volume without adding to quality and random and routine inspections by higher authorities gave desired results.

The reply is not acceptable as the provisions of the agreements were not followed and evidence of squad checks were not produced to audit.

Recommendation

The Government should strengthen internal control system regarding conducting of quality tests and supervision of works to ensure execution of works according to the laid down specifications.

2.5.5.5 Inadequate maintenance of record

The QC Manual prescribed for okay report (card), which is given for earthwork, lining of canal, material used, masonry works, gates and valves etc. by EE (Works), EE (QC), AE (QC). Thus, the okay reports confirm progress of works according to prescribed norms, procedure and quality. These okay reports are maintained in QC divisions/sub-divisions, civil divisions and work sites.

We noticed that okay cards and registers showing okay reports were not being maintained in any of the divisions or work sites test checked by us. Thus, there

¹³⁵ Employer's representative is the Chief Engineer of project or basin or the Superintending Engineer

¹³⁶ 1/2012-13 and 1,2,3,4,5/2013-14

was no assurance of quality and workmanship in construction of works envisaged through the okay reports.

The E-in-C in the exit conference stated that okay card was not required to be maintained but okay register should be maintained.

2.5.5.6 Non-availability of equipment in laboratories

For certain quality control tests, equipment were either not available or not in working condition.

(i) The QC Manual does not specify kind and number of equipments required to be installed in laboratories at QC circles/divisions/sub-divisions and central laboratories. Significant and mandatory tests included in QC Manual and USR, particle size and silt contents tests for sand, adulteration test for cement, flakiness, particle size distribution, percentage of soft or deleterious material for aggregates, compressive strength¹³⁷ tests for CC/RCC and strength tests for steel bars. QC Manual prescribed for 23 types of tests for various quality control purposes of which Central laboratories, QC divisions and sub-divisions would conduct, 6, 14 and 3 types of tests respectively.

We noticed (June - August 2015) that total 192 equipment were available in the test checked one Central laboratory, two QC divisions and 19 sub-divisions for testing physical/chemical properties of cement, specific gravity of sand and metal, permeability test of CC cubes etc. For measuring shear strength¹³⁸, swelling pressure¹³⁹ of soil, pH value/silt contents/soluble salt and hardness of water to be used in works, equipments were either not available or not in working condition in the test checked QC divisions/sub-divisions.

(ii) *Obsolete machines and equipment in QC sub-divisions*

In Balaghat QC sub-division, seven equipments for testing compressive strength test, cube casting of cement, swelling pressure test of soil were not in working condition and five equipments in Shahdol QC sub-division for testing permeability test of concrete cube, accessories of concrete permeability apparatus, grain size analysis, lab permeability test, shear test were in repairable condition (**Appendix 2.49**). Thus, facilities of tests from these equipments were not available in the sub-divisions.

It was informed by the sub-divisions that details regarding make and year of purchase of the 118 equipment installed in laboratories of 14 QC sub-divisions, were not available. We further noticed that there was no system available for upkeep/maintenance and calibration of the equipment installed in the laboratories.

The E-in-C in the exit conference stated (November 2015) that new instruments had been installed and automatic batching plants had been introduced requiring lesser numbers of quality control tests and accordingly changes were to be done in Works Manual. The Additional Chief Secretary further stated that the obsolete equipment would be disposed of.

¹³⁷ Compressive strength is the capacity of material of structure to withstand loads tending to reduce size.

¹³⁸ Shear strength test is conducted for assessing bearing capacity of soil.

¹³⁹ Expansive soils on absorption of water swells and exert pressure outside.

The reply is not acceptable as no new machine and equipment were procured by the Department since 2012 and no new instruments were found installed in QC divisions and sub-divisions audited by us.

Recommendation

The Government should install required equipment in QC divisions/sub-divisions for conduct of prescribed tests for assurance of quality.

2.5.6 Conclusion and recommendations

- Establishment of QC formation was deficient, as the number of quality control circles, divisions and sub-divisions were not established as per the norm.

The Government should ensure establishment of QC units in sufficient numbers in accordance with the prescribed norms.

- There was shortage of staff including technical staff in the QC divisions/sub-divisions affecting quality assurance in works.

The Government should formulate the norms based on rational criteria for deployment of staff and ensure their availability in laboratories accordingly for smooth functioning of quality control units.

- Test reports relating to quality of cement, steel reinforcement bars, physical properties of CNS material and LDPE film utilised in works were not available. Department did not conduct requisite tests of materials and CC/RCC as per the frequencies.

The Government should ensure conduct of quality test of material as per the prescribed frequencies for ensuring quality of material being used in works and CC works.

- In respect of works executed under turnkey agreements, reports of joint measurements and evidence of squad checks were not found maintained. Records relating to quality tests were also not being maintained in the divisions. As such, there was no assurance that materials having requisite quality and physical properties were used in all the works.

The Government should strengthen internal control system regarding conducting of quality tests and supervision of works to ensure execution of works according to the laid down specifications.

- Equipment for many important quality tests were either not available or not in working condition in quality control divisions/sub-divisions.

The Government should install required equipment in quality control divisions/sub-divisions for conduct of prescribed tests for assurance of quality.