

Chapter II

Performance Audit

2.1 Construction of Omkareshwar Sagar Project (Canals)

Chapter-II

Performance Audit

Narmada Valley Development Department

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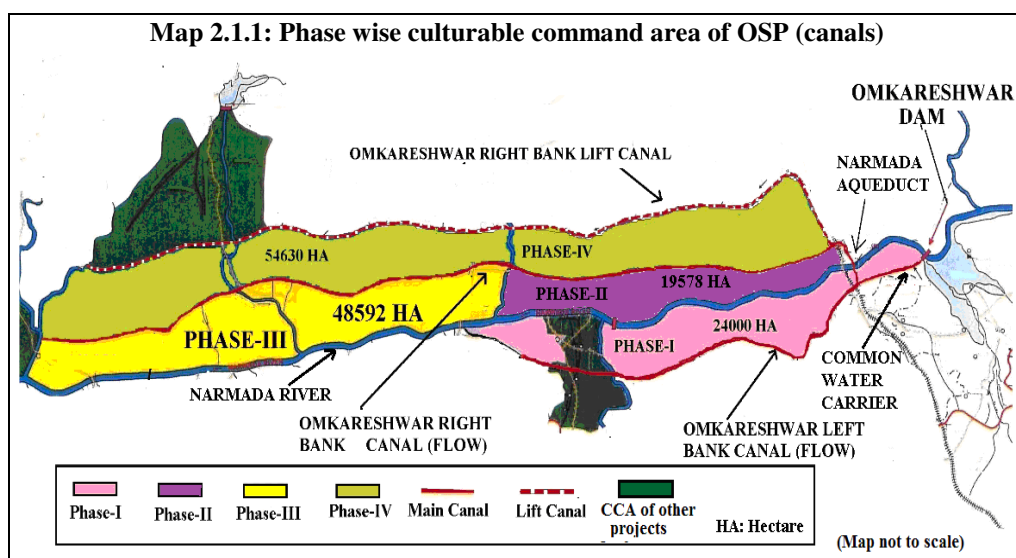
2.1.1 Introduction

The Narmada Water Disputes Tribunal¹ allocated (December 1979) the State of Madhya Pradesh 22,511.01 million cubic metre (MCM) water each year from the Narmada River. The Omkareshwar Sagar Project (OSP) is a major multipurpose project of the Government of Madhya Pradesh (GoMP), for utilisation of 1,300 MCM Narmada water. The Project consists of three units, viz., Dam located at Omkareshwar in Khandwa district, Canals and Power House.

The canal system of OSP, fed from Omkareshwar dam, aimed at irrigation of 1.47 lakh hectare culturable command area² (CCA) of Khandwa, Khargone and Dhar districts. The OSP (canals) consists of 362.88 km long main canals including Common Water Carrier, Left Bank Canal (LBC), Right Bank Canal (RBC) and Omkareshwar Right Bank Lift Canal (ORBLC). It envisages construction of 1,670.64 km of distribution system of main canals including distributary canals, minor canals and sub minors. The OSP (canals) was taken up in four phases, as detailed in **Table 2.1.1** and **Map 2.1.1**.

Table 2.1.1: Details of different Phases of OSP (canals)

Phases of OSP (canals)	Details of canals covered
Phase – I	Common Water Carrier from 0 km to 12.39 km, LBC from 0 km to 64.11 km, RBC from 0 km to 9.775 km
Phase – II	RBC from 9.775 km to 68.92 km
Phase – III	RBC from 68.92 km to 162.70 km
Phase – IV	ORBLC



(Source: Records of Narmada Valley Development Authority)

¹ Narmada Water Disputes Tribunal was constituted in October 1969 to adjudicate upon the dispute regarding sharing of water of the Narmada River among Gujrat, Madhya Pradesh, Maharashtra and Rajasthan.

² The area which can be irrigated from a scheme and is fit for cultivation.

2.1.1.1 Project cost

The details of administrative approval for OSP by GoMP are given in **Table 2.1.2**.

Table 2.1.2: Administrative approvals for OSP by GoMP

Month/Year of administrative approval	Approved cost (₹ in crore)	Price Level Year ³	Components of project cost
August 1991	788.03	1987	₹ 462.72 crore for dam and power house and ₹ 325.31 crore for canals
June 1996	1,784.29	1993	₹ 1,076.29 crore for dam and power house and ₹ 708 crore for canals
March 2011	2,504.80	2009	The revised administrative approvals of March 2011 and May 2015 were entirely for canals. The dam and power house were completed in November 2007.
May 2015	3,699.48	2014	

Planning Commission approved (May 2001) the project for investment clearance of ₹ 1,784.29 crore under State Plan for completion by March 2010. Later on, the revised investment clearance of OSP (canals) for ₹ 2,504.80 crore was approved in September 2010 with stipulated completion of the project by March 2014, which was subsequently revised (September 2014) by Planning Commission to March 2017. All four phases of OSP (canals) were included for funding under the Accelerated Irrigation Benefit Programme (AIBP) of Government of India (GoI) as detailed in **Table 2.1.3**.

Table 2.1.3: Details of Phase wise inclusion of OSP (canals) under AIBP

Phases	Phase-I	Phase-II	Phase-III	Phase-IV
Year of inclusion under AIBP	2003-04	2007-08	2007-08	2014-15

The Central and State shares of funding under AIBP varied between 25:75 and 90:10 in different phases/years. As on March 2017, expenditure of ₹ 3,076.51 crore was incurred on construction of OSP (canals) and irrigation potential of 1.28 lakh hectare had been created by constructing 96.46 per cent of main canals and 88.60 per cent of distribution system.

2.1.2 Organisational setup

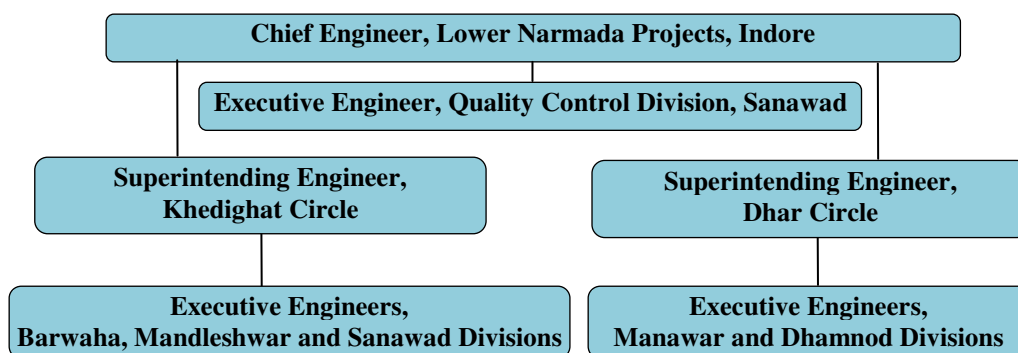
The OSP (canals) is executed by Narmada Valley Development Authority (NVDA), which is a multi-disciplinary authority under Narmada Valley Development Department (NVDD). NVDA is headed by a Chairman. Vice Chairman of NVDA is its Chief Executive Officer, who is assisted by five Members of NVDA⁴. Member (Engineering) is responsible for planning, execution and monitoring of irrigation projects.

At the field level, Chief Engineer (CE), Lower Narmada Projects, Indore is responsible for overall execution of OSP (canals). He is assisted by Superintending Engineers (SEs), Executive Engineers (EEs) along with the supporting engineers/staff, as depicted in **Chart 2.1.1**.

³ Price level year is the year of unified schedule of rates on which estimated cost for the project was prepared. The unified schedule of rates is published by Water Resources Department for preparation of estimates.

⁴ Member (Engineering), Member (Finance), Member (Rehabilitation), Member (Power) and Member (Environment and Forest).

Chart 2.1.1: Field level organisation setup of NVDA for execution of OSP (canals)



2.1.3 Audit Objectives

The performance audit of ‘Construction of OSP (canals)’ was conducted to examine whether:

- Funds were adequately available and effectively utilised;
- Planning of the canal project was adequate and it was effectively executed as per specifications and terms and conditions of the contracts; and,
- Quality control and monitoring mechanism for the project were effective.

2.1.4 Audit Criteria

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

- Madhya Pradesh Works Department (MPWD) Manual;
- Specifications for Irrigation Works, Quality Control Manual, Technical Circulars, Unified Schedule of Rates (USR) for Works and other orders issued by Water Resources Department (WRD) of GoMP;
- Guidelines for Water Resources Projects issued by GoI and relevant Indian Standard (IS) Codes issued by the Bureau of Indian Standards;
- Detailed Project Reports (DPRs) of OSP (canals); and,
- Terms and conditions of agreements with contractors.

2.1.5 Audit scope and methodology

During the performance audit of ‘Construction of OSP (canals)’, records related to planning, implementation and execution of OSP (canals) were examined and related information was collected from NVDA headquarters and the respective offices of CE, SEs and EEs. This included examination of all six turnkey construction contracts and five consultancy contracts for execution of works during the period 2012-13 to 2016-17, as detailed in **Appendix 2.1**.

The objectives, criteria and methodology of audit were discussed in the entry conference held on 28 March 2017 with the Vice Chairman, NVDA, who is also the Additional Chief Secretary (ACS), NVDD. The draft report was issued to NVDD on 30 August 2017. The audit findings were also discussed on 30 January 2018 in the exit conference held with the ACS, NVDD.

The revised report, incorporating the replies of NVDD and views expressed by ACS during the exit conference, was issued to NVDD on 28 March 2018. The replies on the revised report were awaited as of May 2018.

Audit findings

2.1.6 Project funding

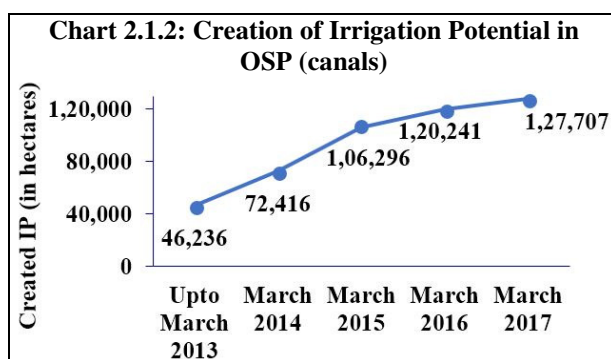
The administrative approval of OSP (canals) increased from ₹ 2,504.80 crore in March 2011 to ₹ 3,699.48 crore in May 2015. Audit scrutiny revealed that the increase in project cost was mainly due to increase in cost of command area development (CAD⁵) works (₹ 588.52 crore), price escalation (₹ 95.16 crore) and land acquisition (₹ 69.70 crore).

Funds for the project are provided through the State budget. Out of total expenditure of ₹ 3,076.51 crore incurred on construction of canals up to March 2017, ₹ 631.32 crore was provided by GoI as Additional Central Assistance under AIBP, ₹ 331.97 crore was augmented from National Bank for Agriculture and Rural Development (NABARD) loans and the remaining ₹ 2,113.22 crore was met from State resources. Budget provisions and utilisation for OSP (canals) during the period 2012-17 were as detailed in Table 2.1.4.

Table 2.1.4: Year wise details of funding of OSP (canals) during 2012-17

Year	Budget provision	Expenditure	Savings
2012-13	579.85	575.09	4.76
2013-14	426.61	425.18	1.43
2014-15	205.89	199.60	6.29
2015-16	252.37	239.15	13.22
2016-17	310.10	241.27	68.83
Total for 2012-17	1,774.82	1,680.29	94.53

(Source: Detailed Appropriation Accounts of respective years)



The savings in years 2015-16 and 2016-17 were mainly due to slow progress of canal works which resulted in creation of less irrigation potential (IP) during these years, as depicted in Chart 2.1.2.

2.1.7 Project planning and implementation

The phase wise details of physical progress of OSP (canals) were as given in the Table 2.1.5.

⁵ Command Area Development mainly includes development of field channels and field drains within the command of each canal.

Table 2.1.5: Phase wise details of progress in works

Phases		Phase- I			Phase-II	Phase-III	Phase-IV	Total
Canals		Common Water Carrier	LBC	RBC	RBC	RBC	ORBLC	
Main canal (in km)	Planned	86.178			59.14	94	123.565	362.883
	Achieved (March 2017)	86.178			58.64	93.775	111.47	350.063
Distribution network (in km)	Planned	218.96			154.799	544.64	752.24	1670.639
	Achieved (March 2017)	171.30			125	451.71	732.24	1,480.25
Overall achievement of main canal and distribution network as on March 2017 (in per cent)		84.38			85.84	85.41	96.34	90.00
Dates of agreement for construction of canals		03-05-2006			27-03-2008	28-02-2008	26-03-2011	
Scheduled date of completion		November 2008			September 2010	February 2011	March 2014	
Revised target dates		30-06-2018			30-06-2018	31-12-2018	25-12-2017	

(Source: Records of NVDA)

2.1.7.1 Delays in execution of OSP (canals)

The construction of OSP (canals) was awarded to five contractors on turnkey basis. Consultants were also appointed to provide consultancy services to NVDA in respect of supervision, quality control and monitoring of works executed by turnkey contractors, as detailed in **Appendix 2.1**. Scrutiny of records revealed that the construction of canals in all phases was delayed by the contractors.

As per clause 71.1 of the turnkey agreements, the contractors were required to submit the work programme along with assessed monthly cash flow statement. The work programme of the contractor was to be monitored every six months. In the event of any shortfall in progress, penalty up to 10 per cent of contract value was to be imposed at the rate prescribed under clause 115 of the agreements till the shortfall was made up.

Audit scrutiny revealed that six monthly reviews of achievements *vis-à-vis* work programme of contractors were not conducted regularly by the CE, as detailed in **Table 2.1.6**.

Table 2.1.6: Phase wise status of six monthly review meetings as on March 2017

Details of meetings	Phase I	Phase II	Phase III	Phase IV	
				Group I	Group II
Number of meeting due	21	13	18	18	12
Number held	4	3	4	1	2
Date of last review meeting	November 2008	April 2010	March 2010	July 2012	July 2013

The reasons for not conducting six monthly review meetings were not available on record. Audit further noticed that the progress of works was not being reviewed using Programme Evaluation and Review Techniques (PERT)⁶ though this was specifically provided for under the scope of consultancy agreement. Thus, the progress of canal works was not monitored at the field level according to stipulations of turnkey contracts and consultancy contracts.

⁶ PERT is a time event network analysis system in which various events in a project are identified with the planned time for each and are placed in a network showing relationships of each event to other event.

During the exit conference (January 2018), it was stated that the PERT methodology was old and now the works were executed as per bar chart.

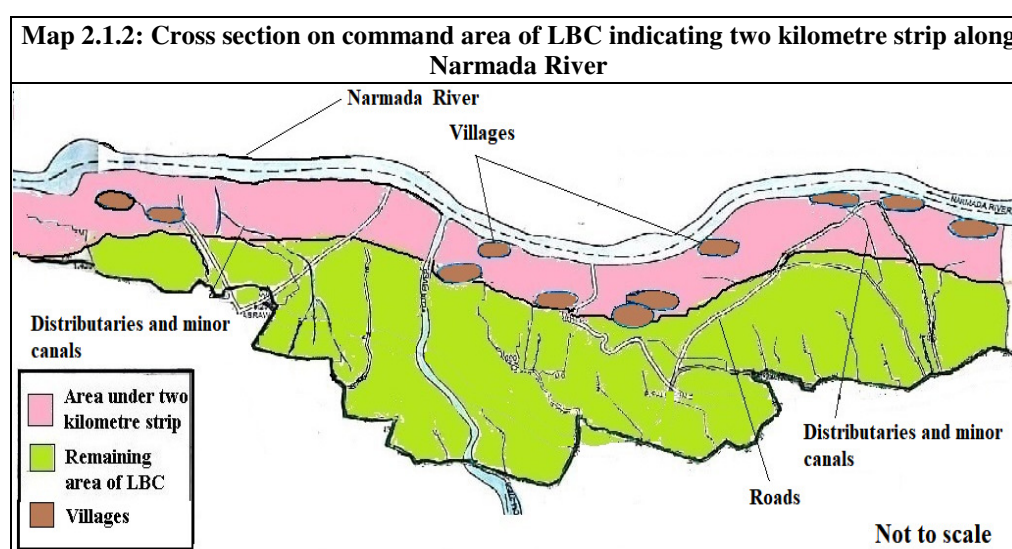
The reply is not acceptable, as consultants were required to submit PERT chart as deliverables under the consultancy contract and the contract was not amended to exclude PERT. Further, audit noticed that bar charts used for monitoring were only a linear representation of the actual status of works, which did not provide details of timeline for completion and identification of alternative activities that could have been simultaneously taken up in cases of hindrance so as to complete the project in the shortest possible time.

The phase wise analysis of delays in execution of canal works are detailed below:

- **Phase-I of OSP (canals)**

The Phase-I of OSP (canals) was scheduled for completion in November 2008. The contractor⁷ was subsequently granted 14 time extensions, citing delays in diversion of forest land, court stay, delay in getting permission from railways, delays in land acquisition and hindrances due to *Narmada Bachao Andolan* (NBA). NVDA considered these delays as circumstantial for which neither Department nor contractor was responsible and no penalty was imposed on the contractor.

Audit scrutiny revealed that the clearance for diversion of forest land was granted by GoI in March 2009. The court stay had affected canal works during the period July 2009 to February 2010. The permission from railways was received in January 2012 and land acquisition for LBC was completed by February 2013. Further scrutiny of records revealed that there was hindrance by villagers in distribution network falling under the area of two km stretch along the banks of Narmada River, as detailed in **Map 2.1.2**. However, the contractor did not complete canal works even in areas excluding two km of Narmada *patti* (stretch).



EE informed (May 2013) SE that the areas under hindrance was not more than five *per cent* of total area acquired and the slow progress in works was due to non-deployment of sufficient resources by contractor. Later on, CE recommended (June 2013) for time extension to the contractor after reserving

7 M/s Som Datt Builders Private Limited

the right to impose penalty on contractor. The balance works of Phase-I of OSP (canals) at the end of time extension for the period from April 2013 to December 2013 was as detailed in **Table 2.1.7**.

Table 2.1.7: Details of balance works of Phase-I as on December 2013

Item of works	LBC main canal		Distribution System of LBC	
	Total quantity	Balance quantity	Total quantity	Balance quantity
Excavation/filling (in km)	64.11	5.11	188.90	90.07
Cement concrete lining (in km)	64.11	18.11	188.90	104.72
Structures (in numbers)	195	56	751	644

In view of slow progress, the project coordination committee (PCC⁸), headed by the CE, considered (March 2014) the option to terminate the contract under turnkey agreement's clause 92 (termination by Department due to breach of contract), but continuance of contract was preferred in view of perceived delays of six months in new tendering process and risk of increase in cost of remaining work. The turnkey contractor was accordingly allowed to execute some portion of works through sub-contractors so as to complete the works by June 2014. Despite this, the contractor failed to complete the work. However, CE did not impose penalty for delays on the part of contractor.

Further scrutiny revealed that CE directed (August 2016) the contractor to complete the balance works in connecting area other than two km of Narmada *patti*, if farmers were not willing to allow the canal works on their land. However, this was not done and as of May 2018, 34.36 km of distribution network of LBC remained incomplete. Of these incomplete canals, 10.52 km of distribution network (31 *per cent*) was in the area excluding two km of Narmada *patti*.

Thus, slow progress in Phase-I of OSP (canals) was attributable to contractor and the sanction of subsequent time extensions citing circumstantial delays without fixing the accountability of contractor was injudicious. The non-imposition of penalty on contractor, as per terms and conditions of agreement, resulted in undue benefit of ₹ 17.80 crore⁹ to contractor.

- **Phase-II of OSP (canals)**

The delays in execution of Phase-II of OSP (canals), injudicious grant of time extension up to November 2013 and non-imposition of penalty of ₹ 19.30 crore for delays attributable to the contractor¹⁰ were highlighted in the Audit Report for year ended 31 March 2014.

Further audit scrutiny revealed that the contractor was allowed (March 2014) to sub-contract the works in view of slow progress and granted third time extension in May 2014 to complete the work up to March 2015. In the status report on progress of works submitted to SE, EE Mandleshwar also proposed (July 2014) for imposition of penalty on the contractor under Clause 115 of the agreement due to shortfall in achieving the targeted progress. However, no penalty was imposed. Subsequently, time extensions were granted by CE/NVDD up to June 2018. The work was incomplete as of December 2017.

⁸ PCC consists of CE, SE, EEs and Consultant, which was constituted under clause 21 of Consultancy Agreement to discuss the design, drawings and specification to avoid unreasonable delay in progress of consultancy works.

⁹ Penalty at the rate 10 *per cent* of contract amount for Phase-I (₹ 177.99 crore).

¹⁰ M/s Som datt Pvt. Ltd and M/s Karan Development Services (Joint Venture)

The non-imposition of penalty resulted in undue benefit of ₹ 19.30 crore¹¹ to the contractor.

- **Phase-III of OSP (canals)**

Under the scope for turnkey contract, the contractor was responsible for submission of proposals for land acquisition. The contractor was required to submit all proposals for land acquisition of distribution network by February 2009 in view of approved work programme and considering the requirement of four to six months period to complete land acquisition procedure (as estimated by NVDD). However, as of February 2009, contractor had submitted proposals for land acquisition of 104.76 hectare (12 *per cent*) against the requirement of 878.57 hectare of land for distribution network.

Canal works under Phase-III were affected due to court stay during July 2009 to February 2010. The contractor¹² was subsequently granted first time extension for completion of work up to June 2012 on the grounds of court stay and delays in land acquisition. Audit scrutiny revealed that the contractor submitted proposals for land acquisition for main canal up to March 2012 and for distribution network up to May 2012. Further proposals of supplementary land acquisition were also submitted in December 2013. Thus, contractor did not submit the land acquisition proposals within the first extension period up to June 2012.

Considering delays on part of the contractor, CE calculated (June 2013) penalty of ₹ 31.02 crore¹³ in terms of agreement after excluding the period of court stay. However, the time extension was granted (October 2013) from July 2013 to June 2014 without imposing penalty. The reasons why the CE did not levy penalty either then, or thereafter, are not available on record. The CE/NVDD continued to grant further time extensions (up to December 2018) without penalty.

NVDD stated (January 2018) that the work was delayed due to procedural delays in land acquisition, obstruction by NBA activists, court stay, enforcement of new Land Acquisition Act, abnormal heavy rains in non-monsoon period and works of distribution network in two km reach of Narmada River was to be carried out after approval of Gram Sabha as per the direction of Ministry of Environment and Forest.

The reply is not acceptable. The delays were entirely due to the contractor, since factors like procedural delay in land acquisition, obstruction by NBA activists, enforcement of new Land Acquisition Act, etc., did not apply to the submission of proposals. The contractor failed to submit the land acquisition proposals even within the extended period of June 2012. Since the CE had calculated penalty of ₹ 31.02 crore in June 2013 after giving due weightage to period of hindrance to work, non-imposition of penalty then or thereafter resulted in undue benefit of ₹ 31.02 crore to the contractor.

- **Phase-IV (Group II) of OSP (canals)**

Due to non-achievement of targets in Phase-IV (Group-II) during September 2011 to January 2016, SE, Dhar imposed (February 2016) penalty of

¹¹ Penalty at the rate 10 *per cent* of contract amount for Phase-II (₹ 193 crore)

¹² M/s Sadbhav Engineering Limited

¹³ Penalty at the rate of 10 *per cent* of contract amount for Phase-III (₹ 310.20 crore)

₹ 34.92 crore on contractor¹⁴. As per agreement conditions, the penalty was recoverable from intermediate payments. However, EE, Manawar recovered only ₹ 17.36 crore up to March 2017. The remaining amount of ₹ 17.56 crore was not recovered, for reasons not on record.

NVDD stated (January 2018) that remaining amount of penalty would be recovered from the contractor.

As discussed in preceding paragraphs, the main reasons for delay in completion of canal works were delays in land acquisition, poor progress in execution of works by contractors and inadequate monitoring of works. NVDA did not initiate action for termination of any of the contracts for rearrangement of the works. One of the deficiencies of these contracts was absence of debit clause¹⁵ for recovery of extra cost for the balance works to be executed through engagement of another contractor. Penalties, which could have been levied under the contract, were also not imposed/recovered from contractor for slow progress attributable to them. Further, as a result of delays in canal works, NVDA had to pay ₹ 1.01 crore to consultants on account of price escalation.

Recommendation

NVDD should review all cases of delays in OSP (canals) to fix the accountability of contractors and penalty may be imposed as per provisions of turnkey agreements. NVDD should also review the cases of delay to fix accountability on the CE and EE for not enforcing penalty on delays, as per the contract and orders of superior officers respectively. NVDD should also ensure that progress of works under each turnkey contract are adequately monitored by field engineers so as to complete the entire canal system within the revised target for completion of OSP (canals).

2.1.7.2 Creation and utilisation of irrigation potential

The planned/designed, created and utilised irrigation potential under each phase of OSP (canals) are as detailed in **Table 2.1.8**.

Table 2.1.8: Creation and utilisation of irrigation potential as on March 2017

(Area in hectare)					
Phases	Phase-I	Phase-II	Phase-III	Phase-IV	Total
Designed CCA	24,000	19,578	48,592	54,630	1,46,800
Created irrigation potential	20,036	12,700	40,341	54,630	1,27,707
Utilisation of irrigation potential	14,500	10,000	6,500	30,000	61,000

The shortfall of 66,707 hectare (52 per cent) in utilisation of created irrigation potential was due to delays in CAD works, incomplete distribution network deficient water in Omkareshwar Dam. Substantial shortfall (84 per cent) in utilisation of created irrigation potential under Phase-III was mainly due to insufficient water in canal. Under Phase-IV, which has piped distribution network, the shortfall of 45 per cent in created irrigation potential was mainly due to incomplete works of Supervisory Control and Data Acquisition (SCADA¹⁶) system and non-upgradation of electric line for providing water to

¹⁴ M/s Sadbhav Engineering Limited – GKC Projects Limited (Joint Venture)

¹⁵ As per provision of the MPWD manual, after rescinding the contract, the Divisional officer may award the balance work to another contractor on the risk and cost of original contractor and any expenses incurred in excess than the original cost shall be borne by the original contractor.

¹⁶ SCADA was to be installed for ensuring equitable distribution of water in field

reservoir (Sisliya tank) which led to insufficient pumping of water and deficient water after 37 kilometer of main canal of ORBLC, as detailed in para 2.1.8.7. Development of infrastructure to facilitate use of sprinkler/drip irrigation systems for efficient use of water under CAD works were also not executed in the command area in ORBLC (Phase IV).

The project envisaged requirement of 1,356 MCM water for 1.47 lakh hectare with annual water allowance¹⁷ of 0.924 MCM for 100 hectare. As against this, NVDA could provide only 407.824 MCM water during July 2016 to May 2017 for irrigation of 61,000 hectare. Thus, the actual annual water allowance (0.612 MCM for 100 hectare) was less than the designed capacity of the canal. Audit scrutiny revealed that, as against the designed capacity of 8.88 MCM per day of the Common Water Carrier, the maximum actual discharge in



Artificial obstruction in LBC for feeding direct minor-13 (status as on July 2017)

Common Water Carrier was 3.88 MCM per day during the period November 2015 to February 2017. The low availability of water in main canals had also affected the flow of water in minor canals whose off taking levels were fixed at two third of full supply level of main canal, i.e., above the level of present availability of water. As a result, farmers had to make artificial obstructions for raising the level of

water to feed the minor canals.

Audit observed that low availability of water in main canals was due to insufficient storage of water in dam due to delays in rehabilitation of families residing in submergence area of the dam. For storage of water in the dam up to the Full Reservoir Level (FRL) of 196 metre, rehabilitation of project affected families was to be completed. As of March 2018, 5,799 families had been rehabilitated and 530 families were yet to be rehabilitated.

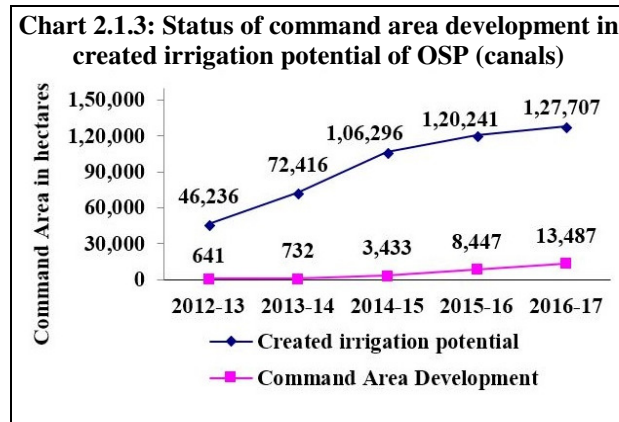
NVDD stated (January 2018) that the complete utilisation of irrigation potential was not possible as OSP dam could not be filled to its full capacity due to law and order situation in submergence area and restriction in construction of distribution network in two km strip of Narmada River. It further stated that the reservoir was now filled up to 193 metre and maximum water would be utilised during the next *rabi* season.

The reply is not acceptable to the extent that NVDD had ignored the slow progress in creation of field channels under CAD works and installation of SCADA system, which would have optimised the utilisation of created irrigation potential. Further, the restriction in construction of distribution network in two km strip of Narmada River affected the creation of additional irrigation potential and not the utilisation of already created irrigation potential.

¹⁷ Net water requirement at canal head

2.1.7.3 Delayed implementation of command area development works

As per the Central Water Commission (CWC) guidelines¹⁸, CAD Plan should be prepared and implemented in such a manner so as to minimise the gap between irrigation potential created and utilised.



Audit scrutiny revealed that the execution of OSP (canals) and CAD works was not done simultaneously, as detailed in **Chart 2.1.3**. While the work of canal system was taken up in 2006-07, the work of construction of water courses and field channels in command area was included in the revised

DPR of OSP (canals) in July 2009. In an affidavit filed (December 2013) before the High Court of Madhya Pradesh, NVDD had submitted the schedule to complete the on-farm development works under CAD by March 2016. However, as of March 2017, CAD works were completed in 13,487 hectare as against created irrigation potential of 1.28 lakh hectare.

NVDD stated (January 2018) that due to less rainfall in the command area and the demand of cultivators, main canal was operating for almost 11 months in every year. The Department had only one month for construction activities. Therefore, it was not possible to implement CAD works as per schedule. The works of CAD would be speeded up as and when the OSP dam was filled up to 193 metre.

The reply is not acceptable, as CAD work was to be executed in the field and it was not directly related to supply of water in the main canal. Further, the unutilised command area, ranging from 52 per cent to 96 per cent was available for CAD works during the years 2012-17. The reply of Department that CAD works would be speeded up with the increase in storage of water in dam, is anomalous, as the demand of cultivator for water does not depend upon storage of water in the dam. Rather, it depends on cropping pattern which would not be different from previous years.

Recommendation

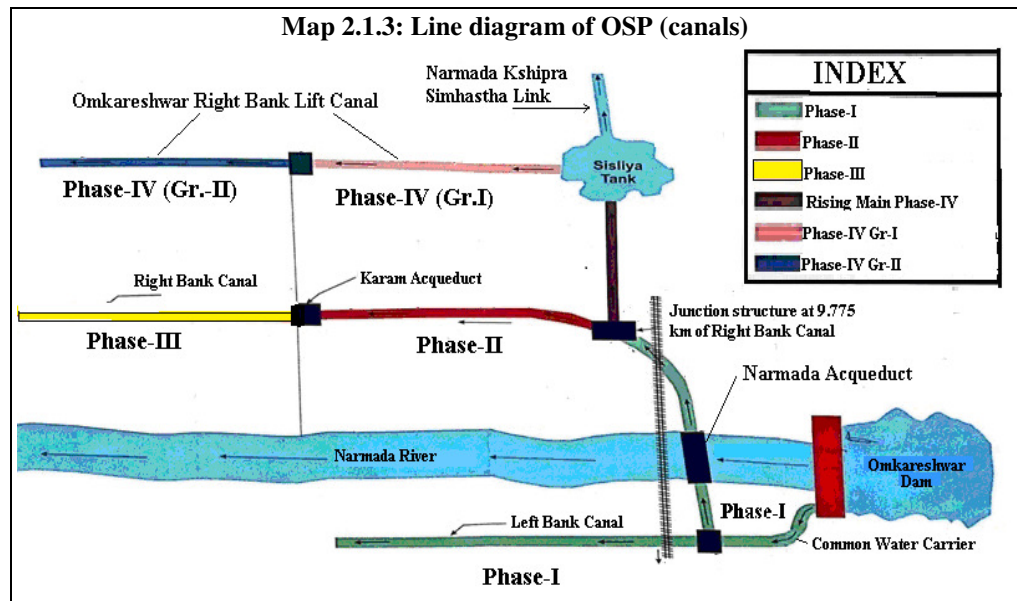
NVDD should ensure expeditious execution of CAD works, particularly in those commands where irrigation potential was created but remained unutilised so that, the benefit of water available in the canals may reach farmers in minimum time.

2.1.7.4 Improper planning for lift irrigation canals

As per DPR of OSP (canals), the water for ORBLC was to be lifted from junction structure at 9.775 km of RBC main canal with discharge of 15 cumec¹⁹ and filled in Sisliya balancing reservoir, as depicted in **Map 2.1.3**.

¹⁸ Guidelines for Environmental Monitoring of Water Resources Projects, issued (1998) by CWC, GoI.

¹⁹ Cubic metre per second (cumec) is the unit of discharge of water.



NVDA proposed (August 2012) the Narmada Kshipra Simhastha Link (NKSL) project as an augmentation of OSP (canals) for providing five cumec water to Kshipra River after lifting it from the Sisliya tank. The objective of NKSL was to provide clean water to devotees in *Simhastha*²⁰ 2016 and to provide water for *nistar*²¹ purposes in Dewas, Indore and Ujjain districts. Administrative approval to NKSL was granted by GoMP in October 2012 and the expenditure on the project was to be debited to OSP (canals).

Audit scrutiny revealed that the demand for water from Sisliya tank was increased due to NKSL project without commensurate increase in the water inflow to the Sisliya tank. As per DPR of OSP (canals), ORBLC was designed for discharge of 15 cumec of water. Thus, there was requirement of 20 cumec water from Sisliya tank²². However, the pumping station, installed (December 2013) at RBC junction structure (at 9.775 km) to discharge water in Sisliya tank, had discharge capacity of only 15 cumec. As a result, there was shortfall in discharge capacity of five cumec to Sisliya tank indicating deficient planning for lift irrigation.

NVDD stated (January 2018) that pumping of water was a continuous process and it was planned to fill the reservoir to full capacity of 10 MCM before the irrigation season. As the capacity of balancing reservoir was sufficient to retain water of 10 MCM and the tank would be filled in planned manner, there would be no problem in regulation of water. NVDD further stated that the maximum water required for irrigation from OSP Phase IV was only in one fortnight of *rabi* season and at that time, the requirement for water in NKSL would also be minimum.

The reply is an afterthought, as CE had also assessed the requirement for increasing the pumping discharge of rising main from 15 cumec to 20 cumec, after this was pointed out by Audit, and requested (June 2017) the contractor to check the system for 20 cumec discharge with the same pipeline with necessary changes in design, if required. CE further informed (May 2018) Audit that the proposal for change in design of pumping arrangement in Sisliya Tank from 15 cumec to 20 cumec was under scrutiny in NVDA.

²⁰ Simhastha (Ujjain Kumbha Mela) is held every 12 years in Ujjain

²¹ Utilisation of water for domestic purposes, i.e., bathing, washing, cattle drinking etc.

²² 15 cumec for ORBLC and five cumec for NKSL

Moreover, even if Sisliya tank is filled to its full capacity, it would be empty within 23 days in the *rabi* season in view of excess discharge in comparison to water inflow. The OSP project proposal (October 1993) had projected the requirement of water for 135 days during *rabi* season. NVDD had further planned two micro irrigation schemes through NKSL which would also require sufficient water during *rabi* season. Thus, the planning for providing water to Sisliya tank was deficient.

2.1.7.5 Avoidable expenditure on land acquisition due to improper planning

The MPWD manual stipulates that data of command area, including chaks²³, should be collected first and thereafter estimates should be prepared. Land plans should be prepared as per these estimates.

As per clause 1.3 of detailed NIT of the turnkey contract, the scope of work included preparation of land acquisition cases by the contractor for submission to Land Acquisition Officer. The cost of permanent land compensation was to be borne by the Government.

The canal work of ORBLC was awarded to two contractors: from 0 km to 51.281 km under Group-I and from 51.281 km to 125 km under Group-II. The entire length (73.972 km) of ORBLC (Group II) main canal was designed as open canal, for which NVDA incurred ₹ 38.18 crore for acquisition of 375.709 hectare of private land during January 2012 to November 2012. The land was acquired based on the land acquisition proposals submitted by the contractor during September 2011 to April 2012.

Audit scrutiny revealed that the chak planning for the command of ORBLC did not precede the land acquisition, as required under the MPWD manual. Subsequently, during the chak planning, the contractor noticed that 3,000 hectare of land could not be brought under command due to lack of required highest ground level (HGL) at off-taking point. In order to bring this area under command, contractor submitted (August 2012) a proposal for conversion of open canal to piped canal. PCC, headed by CE, approved (August 2012) the proposal of contractor for 17.497 km of open canal (from 51.281 km to 68.525 km) and 56.475 km of buried piped canal (from 68.525 km to 125 km).

NVDA had already incurred ₹ 26.33 crore on land acquisition of 243 hectare for the canal length from 68.525 km to 125 km for open canal by the time decision of its conversion to buried canal was taken. The land was acquired for its earlier approved cross section with the provision for service road. Although PCC decided that the cost of any surplus private land would be borne by the contractor, the basis for such a decision was not evident and the quantum of surplus land due to change in requirement was never worked out.

Audit observed that no permanent land acquisition was done for distribution system of ORBLC (Group II), which was *ab initio* designed as a buried piped canal. However, considering the maximum pipe width of 2.4 metre used for the piped main canal of ORBLC and provision of four metre of inspection path²⁴ for entire piped main canal length of 56.475 km, Audit has worked out the requirement of 36 hectare of land for the buried piped main canal of

²³ A chak is that area of land on one side of a canal which would be commanded by a single outlet.

²⁴ As per CWC guidelines (2017) for Planning and Design of Piped Irrigation Network

ORBLC (Group II). Thus, the failure of field engineers to finalise chak planning before land acquisition led to avoidable expenditure of ₹ 22.43 crore on additional land acquisition of 207 hectare for buried piped canal.

NVDD stated (January 2018) that the land acquired for construction of canal in the Phase-IV (Group-II) was as per approved cross section, in which provisions of service road, inspection path, side drain, plantation, etc. had been made. The plantation along main canal was proposed on either side and accordingly the land had been acquired. The plantation and service road were in the scope of agreement and thus, acquisition of land was essential.

The reply is not acceptable, as the land was acquired for approved cross section of open main canal and not for the buried piped canal, which would have required acquisition of 36 hectare of land as against actual land acquisition of 243 hectare. Moreover, the primary purpose of land acquisition was construction of canal and not the plantation and service road, as being justified by NVDD.

Recommendation

NVDD should fix accountability for not following the prescribed procedure under the MPWD manual for determining the quantum of land acquisition, which led to avoidable expenditure on land acquisition for ORBLC.

2.1.8 Contract management

2.1.8.1 Payment to contractors in excess of value of work done

As per clause 23 of the turnkey agreements, the contractor may sub contract part of construction work under intimation to Engineer-in-Charge. Any such intimation shall not relieve the contractor from any liability or obligations under the contract.

Audit scrutiny revealed that the two turnkey contractors²⁵ for the works of Phase-I and Phase-II of the OSP (canals) were permitted to execute works through sub-contractors in view of slow progress of works. PCC in a meeting²⁶ (March 2014) recommended for direct payment to sub-contractors through escrow accounts. The excess payments due to difference between rates of approved payment schedule under turnkey contracts and the rates mutually agreed by contractors and sub-contractors should be adjusted from price escalation payable to contractors. The remaining excess payment was to be treated as loan to the contractors with prevailing rate of interest on commercial loan as applicable in nationalised bank, recovery of which was to be ensured from security deposit/bank guarantees of the contractor kept in the Department. PCC further recommended that the proposed procedure for payment would need confirmation from the competent authority of NVDA.

CE requested (March 2014 and June 2014) NVDA for the approval of the payment procedure recommended by PCC. However, Audit could not ascertain from the records as to what action was taken by NVDA on the requests of CE.

Audit observed, that even though approval of NVDA to PCC's recommendation was not received, SE authorised (March 2014) EEs of

²⁵ Phase-I: M/s Som Datt Pvt. Ltd and Phase-II: M/s Som datt Pvt. Ltd and M/s Karan Development Services (Joint Venture)

²⁶ Attended by CE, SE (Khedighat), EE (Sanawad) and EE (Mandleshwar)

Barwaha and Mandleshwar to open escrow accounts and requested banks to open these accounts. Subsequently, EEs were making payments to these escrow accounts of contractors and sub-contractors. Audit further noticed that the memorandum of understanding (MoU) between contractors and sub-contractors were witnessed by EEs and SE. Thus, Barwaha and Mandleshwar Divisions were directly dealing with sub-contractors who were not party to the contract executed by Government with contractors. The entire procedure of making excess payments to sub-contractors through escrow accounts and treating these excess payments as 'loan' to the contractors was beyond the contractual provisions of turnkey agreements and vitiated the contracts.

Further, as provided under the clause 16.1 of the contract, the employer's representative had no authority to amend the contract. As such, CE, SE or EEs were not empowered to deviate from the terms and conditions for payments under the turnkey agreement. Moreover, such arrangement for payment was also not backed by any supplementary agreement/amendment to existing agreements between Government and contractors. Audit noticed that the contractors had subsequently disputed the levy of interest on excess payments. Thus, the interest of Government had also been jeopardised.

The MPWD manual also does not provide for such 'loan' to contractor, except for the payment of secured advance, mobilisation advance and advances for plant and machinery to contractors in certain specific circumstances. Since payments were made by EEs at the rates mutually agreed between contractors and sub-contractors, which were higher than the rates payable by NVDA to the contractors under the turnkey agreement, this resulted in irregular excess payment of ₹ 60.17 crore, as detailed in **Table 2.1.9**.

Table 2.1.9: Division wise details of excess payments to sub-contractors

(₹ in crore)

Name of Division and Phase of OSP (canal)	Number of sub-contractors	Agreement value of work executed through sub-contractors (as computed by EEs)	Amount paid to sub-contractors	Excess payments
1	2	3	4	5 = 4-3
Barwaha (Phase-I)	35	23.57	46.38	22.81
Mandleshwar (Phase-II)	39	70.87	108.23	37.36
			Total	60.17

(Source: Records of Barwaha and Mandleshwar divisions)

Further scrutiny revealed that EEs of Barwaha and Mandleshwar adjusted ₹ 55.58 crore of excess payments (including interest) against inadmissible price adjustment and security deposit, which resulted in undue benefits to the contractors, as discussed below.

- As per clause 113.2 of the agreements, price adjustment²⁷ shall be applicable only for work that is carried out within the stipulated time or extensions thereof due to reasons which are not attributable to the contractor.

As discussed in para 2.1.7.1, the delays in execution of works of Phase-I and Phase-II were attributable to contractors and Divisions had to employ sub-contractors due to non-achievement of desired progress in works. Therefore, price adjustment was not payable to the contractors. However, EEs

²⁷ Price adjustment is an adjustment in the amount paid to contractor for quarterly increase or decrease in rate of labour, cement, steel and other materials.

made irregular payment of price adjustment of ₹ 20.19 crore for Phase-I and ₹ 44.44 crore for Phase-II since March 2014 onwards. Out of these, price adjustment of ₹ 18.89 crore for Phase-I and ₹ 24.90 crore for Phase-II were adjusted against the excess payment (including interest) for works executed through sub-contractors.

- As per clause 108.1 of the agreements, the security deposit (five per cent) deducted from the intermediate payments shall be converted into Bank Guarantee on completion of construction of entire work under the contract. There was no provision for the adjustment of security deposit during the currency of contract.

Audit scrutiny revealed that EEs of Barwaha and Mandleshwar irregularly adjusted ₹ 11.79 crore of excess payment (including interest) to contractors against security deposit²⁸ during the currency of contracts.

NVDD stated (January 2018) that as per the directives of Hon'ble High Court for completion of the work, it was decided to complete the balance works by deployment of sub-contractors under mutually agreed rates between main contractor and sub-contractor. It further stated that PCC took a correct decision with the power given in the agreement looking at the status of balance work at that time. In the case of Barwaha division (Phase-I), most of the difference had been recovered from main contractor except ₹ 15.32 lakh, which would be recovered before finalisation of the contract. In case of Mandleshwar (Phase-II), ₹ 25.75 crore had already been recovered from the work executed by main contractor and escalation due to main contractor.

NVDD further stated that as the extension was granted on grounds of reasons not attributable to contractors, therefore, the escalation was justifiably paid. As regards adjustment of excess payments against security deposits, it was stated that any amount due from the contractor on any account might be recovered from contractor's deposit available with the Department.

The reply is not acceptable, as the deployment of sub-contractors, payment to them at higher rates and treating the excess payment of ₹ 60.17 crore as loan to the contractor was beyond the ambit of the turnkey agreement as well as the MPWD manual. PCC as well as CE were not competent to amend the terms of the contract. In view of this, CE had also sought (August 2017) ex-post facto approval of the payment procedure. However, NVDA returned the proposal (August 2017) to CE with the remarks to provide reasons for seeking ex-post facto approval after three years. NVDA's stand cannot also be accepted. Though NVDA was aware of the entire issue, it yet chose to allow the payment arrangements for sub-contractors to continue without required approval of the Government. NVDA is therefore, complicit in the unauthorised payment procedure.

Further, the grounds on which time extension was granted to both contractors were injudicious and contractors were not eligible for any price adjustment due to delays attributable to them, as detailed in **para 2.1.7.1**. The adjustment of security deposit against 'loan' to contractor was also irregular in view of clause 108.1 of the agreement. As a result of these adjustments, the objective of deduction of security deposit was also defeated since it is meant for

²⁸ Barwaha: ₹ 6.71 crore (Phase-I) and Mandleshwar: ₹ 5.08 crore (phase-II)

protecting the interest of Government during execution of work and during defect liability period.

Thus, the interest burden of the contractors on excess payments was reduced by EEs through irregular adjustment of ₹ 55.58 crore from price adjustments and security deposit during April 2014 to May 2017. After excluding these irregular adjustments and already recovered interest of ₹ 5.64 crore, contractors were liable to pay interest of ₹ 13.15 crore²⁹ till May 2017 on excess payments of ₹ 60.17 crore.

Recommendation

NVDD may review from vigilance angle the entire procedure for payments to sub-contractors without the approval of competent authority. NVDD may also fix accountability for irregular adjustment of security deposit and payment of price adjustment to contractors in violation of terms and conditions of agreements. The excess payments may be recovered from contractors.

2.1.8.2 Irregular payments of price adjustment

Under the provisions of turnkey agreement, the amount paid to the contractor shall be adjusted quarterly for increase or decrease in rate of labour, cement, steel and other materials.

- ***Payment of price adjustment despite imposition of penalty for delays***

As per clause 113.2 of the agreement, price adjustment clause shall be applicable only for works that are carried out within the stipulated time or extensions thereof due to reasons which are not attributable to the contractor.

Audit scrutiny revealed that SE, Dhar had imposed (February 2016) penalty on contractor due to non-achievement of targets in ORBLC (Group-II) during September 2011 to January 2016. As such, no price adjustment was payable to contractor. However, EE Manawar made irregular payment of ₹ 22.49 crore during July 2016 to January 2018 towards price adjustment for the period January 2016 to September 2017. Further, the price adjustment of ₹ 12.31 crore paid between April 2014 (after stipulated period of completion) and December 2015 was also not recovered.

- ***Irregular excess price adjustment for Vertical Turbine pumps***

Under clause 113 of the agreement for ORBLC (Group-I), price adjustment on vertical turbine (VT) pumps was payable to the contractor on the basis of increase or decrease in the average index number of wholesale prices in India (WPI) of electrical machinery.

Audit scrutiny revealed that EE, Dhamnod incorrectly adopted the WPI for electrical pumps while making payment for price adjustment on VT pumps during the period July 2011 to June 2016. However, all VT pumps were installed by the contractor in December 2013. Therefore, no price adjustment was payable on VT pumps for the period January 2014 to June 2016. As a result of adoption of incorrect price indices and irregular payment for price adjustment during January 2014 to June 2016, EE made excess payment of price adjustment amounting to ₹ 1.75 crore on VT pumps.

²⁹ At the rate of 14.50 per cent being applied by EEs Barwaha and Mandleshwar for computation of interest on 'loan' to both contractors

On this being pointed out, EE recovered ₹ 0.73 crore from the contractor for excess price adjustment on incorrect indices. However, the irregular payment of ₹ 1.02 crore for payments of price adjustment beyond the month of installation of VT pumps was not recovered.

In the exit conference (January 2018), the ACS stated that the matter would be examined and the excess payment, if any, beyond the month of installation would be recovered from the contractor.

Recommendation

NVDD may recover the excess payments to contractors and examine the irregular payment of price adjustment to contractors from a vigilance angle.

2.1.8.3 Non recovery of cost of work executed by the Department

As per the scope of turnkey contract, all the works, including payment of compensation to farmers for loss due to construction work, cleaning of canal and pole shifting were to be executed by the contractor.

Audit scrutiny revealed that EE, Barwaha incurred (February 2014 to August 2016) ₹ 1.28 crore on payment to farmers and for executing the works of pole shifting and cleaning of canal through other contractors. These works were within the scope of the turnkey contract for OSP (canals) Phase-I. Thus, EE incurred unauthorised expenditure of ₹ 1.28 crore.

NVDD stated (January 2018) that an amount of ₹ nine lakh had been recovered from the contractor and balance amount of ₹ 1.19 crore would be recovered before finalisation of work.

2.1.8.4 Irregular conversion of Security Deposit

As per clause 108.1 of the agreements, security deposit (SD) (five *per cent*) deducted from the intermediate payments shall be converted into Bank Guarantee (BG) on completion of construction of entire work under the contract. BG shall remain valid beyond 90 days of completion of defect liability period of one year.

Audit scrutiny revealed that Mandleshwar and Manawar Divisions released (November 2008 to February 2017) SD of ₹ 34.52 crore to contractors in lieu of bank guarantees before completion of the entire works under Phase-II, Phase-III and Phase-IV (Group II). Thus, irregular conversion of SD into bank guarantee resulted in extending undue financial benefit to the contractors.

NVDD stated (January 2018) that the SD was converted into BG as per clause 108.1 of the agreement. The SD converted into BG would be released after successful completion of canal system and expiry of defect liability period.

The reply is not acceptable, as SD was to be converted into BG only after completion of works.

Recommendation

NVDD may examine irregular refund of security deposit against bank guarantee from a vigilance angle.

2.1.8.5 Payments made to contractors in advance

As per clause 106 of the agreement, payments to the contractor shall be effected as per provision of the payment schedule in Appendix F of the agreement. The component shown in Appendix F shall be further divided into

appropriate sub-components and their stages for the purpose of payment. CE was to approve sub-components in Detailed Payment Schedule (DPS), which would form part of agreement.

Audit scrutiny revealed that for Phase-I canal works, Barwaha Division paid ₹ 5.22 crore to the contractor in excess of payments due as per Appendix F of the agreement, as detailed in **Table 2.1.10**.

Table 2.1.10: Statement of irregular payments beyond Appendix F of agreement
(₹ in crore)

Component of work	Item of works	Amount payable as per Appendix F	Amount Paid	Excess paid
Common Water Carrier	Survey, earthwork and structures	46.10	46.70	0.60
LBC Direct Minors (27 numbers)	Survey, earthwork and structures	6.78	8.49	1.71
RBC Main Canal	Survey, earthwork and structures	23.23	26.14	2.91

(Source: Appendix F of agreement and records of Barwaha division)

NVDD replied (January 2018) that the payment to the contractor was within the limit of tender cost.

The reply is not acceptable, as payment was not regulated as per Appendix F of the contract and the excess payment under the components Common Water Carrier, LBC Direct Minors and RBC Main Canal would be adjusted only after completion of entire work.

- DPS for earthwork, lining and structures in Phase-III under Manawar Division provided for payment of 95 per cent of the rate to the contractor until the design section is achieved.

Audit scrutiny revealed that design section of direct minors was not achieved due to non-construction of dowels. No reason for non-construction of dowel was available on record. However, the EE deviated from the DPS and paid full amounts for earthwork, lining and structures of direct minors. This resulted in excess payment of ₹ 1.08 crore³⁰ as compared to amount eligible as per DPS.

NVDD stated that no extra payment would be made to the turnkey agency beyond the contract amount.

The reply is not acceptable, as full payments were made for earthwork, lining and structures without construction of dowels, in violation of the DPS conditions.

Recommendation

NVDD may fix accountability for irregular payments to contractors in violation of payment schedule under the agreements and examine these irregular payments from a vigilance angle.

2.1.8.6 Inadequate recovery of mobilisation and equipment advances

As per clause 113.6 of the contract agreement, the employer will make the interest free mobilisation and equipment advance against an unconditional BG for the amounts equal to the advance payment. Recovery of mobilisation advance and equipment advance was to be made at the rate not less than seven per cent of all interim payments. Full recovery of mobilisation and equipment advance was to be effected before payment of 80 per cent contract value or before completion of 80 per cent of initial contract period, whichever is earlier.

³⁰ Amount paid: ₹ 21.55 crore – Eligible amount ₹ 20.47 crore

Audit scrutiny revealed that recovery of mobilisation and equipment advances was not effected at the rate of minimum seven *per cent* in 14 running account bills of two works of canals³¹ under Dhamnood and Manawar Divisions. In these 14 intermediate payments, the rate of recovery was ranging between zero *per cent* to 6.24 *per cent*. The reason for short recovery was not available on record. As a result of short recovery, the recovery of ₹ 1.17 crore of mobilisation advance was deferred by six months in Dhamnood Division and the recovery of ₹ 1.08 crore of equipment advance was deferred by three months in Manawar Division.

NVDD stated (January 2018) that the recovery had been done before the completion of 80 *per cent* of total time period, including extended period of the contract.

The reply is not acceptable, as the recovery of advance was not effected at the rate of at least seven *per cent* from each bill as required under the agreement which resulted in undue benefit to contractors.

2.1.8.7 Issue of completion certificate despite incomplete works

The completion certificate for Phase-IV Group-I of OSP (canals) was issued in July 2017. Audit scrutiny revealed that Superintending Engineer, Dhar issued the completion certificate despite various incomplete works, which included incomplete works of SCADA system, incomplete testing of distribution network pipes and upgradation of High Tension (HT) line. SCADA system was to be installed for ensuring equitable distribution of water in 844 chaks. Pressurised flow control metering Devices (PFCMD), a part of SCADA, was to be installed in each chak. However, only 602 numbers (out of 844) of PFCMD were installed as of July 2017.

NVDD stated (January 2018) that SCADA had been installed at pump house (Pumping Station zero) and Sisliya tank, which was functioning at present. As regards functioning of the SCADA system in distribution network, the PFCMD boxes had been installed with SCADA system.

The reply is not acceptable, as the SCADA system was not operational in entire chaks due to installation of less number of PFCMD which affected the utilisation of created irrigation potential and equitable distribution of water. Thus, the completion certificate was issued without fulfilment of entire contractual obligation by contractor.

2.1.8.8 Non execution of plantation along canals

The turnkey agreements stipulate that the contractor shall plant shade giving trees at an interval of 30 metre on both sides all along the main canal and distributaries, arrange cattle guards for all the plants, provide necessary manure, water them daily and sustain them. If any trees are damaged or lost, the contractors shall replace with new plants and shall maintain these plants till defect liability period of the contract. The contract price quoted by the contractor shall include all these items. An amount of ₹ 10.74 crore was earmarked in DPR (2009) for plantation work.

Audit scrutiny revealed that plantations were not executed by contractors in any of the phases of OSP (canals) despite completion of 90 *per cent* of canals. EEs did not ensure plantation works by turnkey contractors, despite the

³¹ Phase-IV (Group I) and Phase-IV (Group II)

direction (March 2014) of SE, Khedighat to ensure plantation as per agreement clause. Further, SE, Dhar had issued completion certificate for Phase IV (Group I) without plantation by the contractor along ORBLC main canal.

NVDD stated (January 2018) that work of plantation was taken up earlier and could not be completed because of construction works. However, some plantation in Common Water Carrier and main canals were completed, where the reaches were available. Plantation had been started now and would be completed before finalisation of work.

The reply is not acceptable, as the execution of this item of work was not recorded in the Measurement Book and no other documentary evidence was provided in support of plantation along Common Water Carrier and main canals.

Recommendation

NVDD should ensure plantation by contractors all along the main canals and distributaries, which should also be recorded in the measurement book. NVDD should fix accountability for issuing completion certificate for Phase-IV (Group I) without fulfilment of entire contractual obligation by the contractor.

2.1.8.9 Incorrect estimation of dimension of pipe led to extra cost

Paragraph 2.006 of the MPWD manual stipulates that for every work a properly detailed estimate must be prepared for the sanction of the competent authority. IS code 3589: 2001 stipulates that thickness of two-metre diameter pipe shall be 16 millimetre.

Audit noticed that the CE, LNP, Indore accorded (August 2012) the technical sanction for fabrication, laying and joining of rising main pipe line with two metre diameter pipe with thickness of 14 millimetre. This was not in line with provisions of IS code 3589: 2001, as thickness of pipe for two metre diameter should be 16 millimetre. Further scrutiny revealed that the CE, LNP, Indore approved the drawing of the contractor providing for reduced dimension of pipes of 1.80 metre diameter with thickness of 14 millimetre.

Thus, detailed estimates, which was approved in the technical sanction, were made with higher dimension of pipe, but it was reduced at the execution stage while approving the drawing of the contractor without corresponding reduction in the contracted cost. This resulted in undue financial benefit of ₹ 20.72 crore on execution of work in 46,921 metre length, as detailed in **Appendix 2.2**.

The NVDD stated (January 2018) that the tender was floated with estimated cost of ₹ 432 crore whereas final contract value was ₹ 396.39 crore. Thus, cost reduction of ₹ 35.61 crore due to lesser diameter of pipe was already available with the Department. Being a turnkey contract, the bidder was free to submit his design and drawings as per specifications.

The reply is not acceptable, as cost reduction due to competitive bidding cannot be referenced with particular reduction in diameter of pipe. Further, CE had erred in providing two-metre diameter and 14 mm thickness of the pipe in the Technical Sanction, since diameter of pipe in the estimate did not correspond to the thickness of pipe as per IS 3589: 2001. Inclusion of extra

diameter of pipe resulted in undue benefit to contractor at execution stage by way of savings on quantity of steel.

2.1.9 Monitoring and quality control

2.1.9.1 Substandard execution of works

As per the turnkey agreements, works were to be executed as per provisions of relevant Indian Standard (IS) Codes. Paragraph 8.5 of IS: 10430 (2000) stipulated requirement of cement concrete coping at the top of lining to check the ingress of rain water behind the lining of the side slopes of the canals. The width of coping at the top should not be less than 225 millimetre for discharge up to three cumec, 350 millimetre for discharge more than three cumec and 550 millimetre for discharge more than 10 cumec. Further, as per irrigation specifications issued by Water Resources Department, the width of coping should not be less than 350 millimetre.

Audit scrutiny revealed that the works of coping of canal lining were executed in OSP (canals) with lesser width of 300 mm in cases where discharge was more than three cumec, which was less than the width provided in the agreement. This resulted in substandard execution of canal works, besides undue benefit of ₹ 3.08 crore to the contractor due to execution of coping in lesser width, as detailed in **Appendix 2.3**.

NVDD stated (January 2018) that the width of coping was decided based on the strata available at site and the same width was shown in the cross section appended with the tender document and accordingly the coping width was taken as 300 millimetre during construction. Therefore, no financial benefit was given to the turnkey contractor.

The reply is not acceptable, as the agreement provided for execution of works as per IS codes, which stipulates for coping based on discharge of the canal and not on the available strata at site.

2.1.9.2 Inadequate quality control for cement concrete works and earthwork

As per clause 89 of the agreement, the Engineer-in-charge shall give notice to the contractor for any defect. The contractor shall correct the defects within defect correction period at no cost to employer. The defect correction period is 14 days from the date of receipt of notice by the contractor from the Engineer-in-Charge to correct any defects in the work.

Audit scrutiny revealed following:



View of seepage from Karam aqueduct (Phase-II)
(Status as on June 2017)

- As per prescribed norms under IS: 456 (2000), the compressive strength (after 28 days) of M-15 cement concrete (CC) should be 150 kg/cm². In Mandleshwar division, the compressive strength (after 28 days) of M-15 CC lining³², drainage siphons³³, super passage³⁴ and Karam aqueduct ranged from 48.30 to 149.49

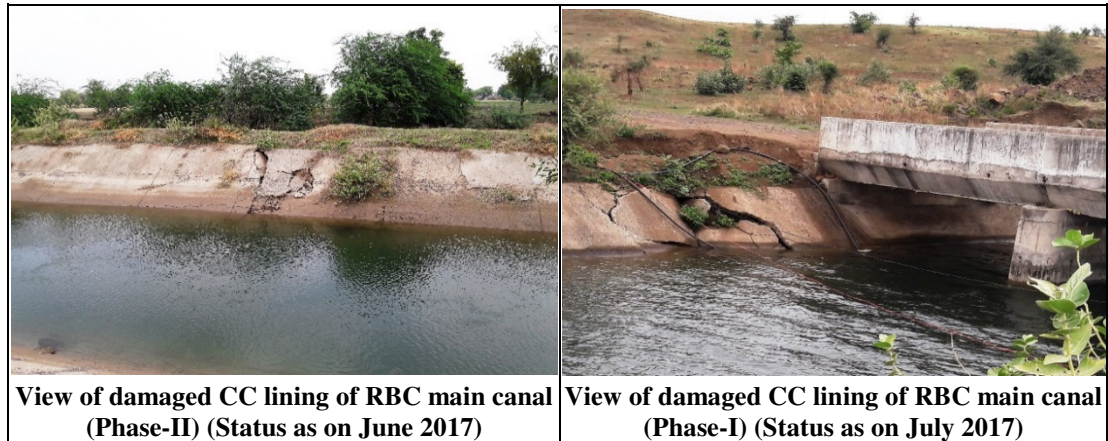
³² RD 36,310 metre to RD 36,260 metre and RD 53,000 metre of RBC

³³ RD 25,485 metre and RD 25,200 metre of RBC

³⁴ RD 49,410 metre

kg/cm². Similarly, in Barwaha Division³⁵, it was 114.76 kg/cm² and 107.21 kg/cm² in two test reports. Thus, the comprehensive strength of CC lining and other hydraulic structures was below the prescribed norms in test checked cases. Audit noticed (June 2017) seepage from Karam aqueduct during the site visit of canals.

- During joint physical verifications of canals, damages and cracks were found at various reaches of main canals of RBC and LBC, as shown in the picture.



View of damaged CC lining of RBC main canal (Phase-II) (Status as on June 2017)

View of damaged CC lining of RBC main canal (Phase-I) (Status as on July 2017)

This was also indicative of inadequate monitoring of construction of canals, as CE, SE, EE and Sub-Divisional Officers (SDOs) were fully responsible for quality control over hydraulic structures as per the MPWD Manual Vol-II. The Engineer-in-charge did also not take any corrective action for rectification of defects.

NVDD stated (January 2018) that all the works are up to the mark, all the test reports were ok, and any defect observed would be rectified in time. At present work was in progress so all the damages and cracks found at various reaches of main canals of RBC and LBC would be got repaired before finalisation of canal work.

The reply is not acceptable, as test results of compressive strength of cement concrete were not as per IS Code in case of reported canal lining and hydraulic structure which may have potentially serious implication.

- As per para 3.5 of IS 13916: 1994, pipe zone areas were to be filled with sound granular soil to a minimum 300 mm above the top of the pipe and secondary backfill having minimum depth of 300 mm.

In Dhamnod division, ₹ 3.32 crore was paid to the contractor for back filling of 3.43 lakh metre of pipes. Audit scrutiny revealed that the payments were made to the contractor by measuring the execution of works (back filling of trenches) in running metre. Thus, field engineers did not measure the volume of executed quantity of granular soil and secondary backfilling. This was in violation of clause 106.10 of the agreement, which provided that all hidden measurement was to be recorded and got 100 *per cent* checked by competent authority before payment.

NVDD stated (January 2018) that back filling over pipes had been done and measurements were taken on basis of payment schedule item. The backfilling over the pipes had been done as per the specifications and up to the mark.

³⁵ RD 1,625 metre and RD 1,650 metre CC lining of common water carrier

The reply is not acceptable, as thickness of backfilling was not measured and recorded in Measurement Book to ensure execution of the works as per IS code.

Recommendation

NVDD should ensure that all the defective canal works are corrected urgently so that it does not affect the strength of canals and related hydraulic structures.

2.1.10 Crop production in the command of OSP (canals)

Detailed project report of OSP (canals) envisaged production of 11.96 lakh tonne of food grains (2.80 lakh tonne of *rabi* crops and 9.16 lakh tonne *kharif* crops) in the command area after completion of the project. Audit scrutiny of production of eight crops³⁶ in the command area of OSP (canals) revealed that the production of these crops increased from 6.54 lakh tonne in 2012-13 to 12.73 lakh tonne in 2016-17. The increase in production was mainly due to increase in sowing area by 22 *per cent* and increase in the productivity (average produce per hectare) of wheat (by 32 *per cent*), maize (by 40 *per cent*) and gram (by 100 *per cent*). However, the productivity of five other crops remained less as detailed in **Table 2.1.11**.

Table 2.1.11: Productivity of crops in the command area of OSP (canals)

Name of crop	Productivity (in tonne per hectare)		
	As per DPR	Actual during 2012-13	Actual during 2016-17
Paddy	4.00	0.79	1.13
Peas	1.50	0.49	0.56
Groundnut	3.50	1.11	1.44
Cotton	2.50	1.09	1.88
Sugarcane	60.00	29.36	45.02

(Sources: Detailed project report of OSP (canals) and data provided by Farmer Welfare and Agriculture Development Department)

2.1.11 Supply of drinking water from OSP (canals)

One of the objectives of the project was to provide 75 MCM drinking water to the habitations in command area of Phase-II, Phase-III and Phase-IV of OSP (canals). Provision of ₹ 13.88 crore was made in the DPR of OSP (canals) for construction of intake wells and laying of pipelines for delivery of water to the habitations. Audit scrutiny revealed that the drinking water was not being supplied from canals to the identified villages in the command area of Phase II, Phase III and Phase IV of OSP (canals).

CE stated (July 2018) that there was no demand from Gram Panchayat/ Nagar Palika/ Public Health Engineering Department to provide drinking water to villages, but that the facility for drinking water could be provided on receipt of demand.

The reply is not acceptable, as the DPR specifically provides for construction of intake wells and laying of pipelines for supply of drinking water from canals, which however, NVDA failed to implement. The question of demand would arise only after the facilities were provided.

³⁶ *Rabi* crop (Wheat, Gram, Peas and Sugarcane) and *Kharif* crop (Paddy, Maize, Groundnut and Cotton)

2.1.12 Summary of conclusions

- OSP (canals), which envisaged for irrigation in 1.47 lakh hectare by March 2014, remained incomplete due to delays in land acquisition, poor progress in execution of works by contractors and inadequate monitoring. Penalties were not imposed/recovered from contractors for slow progress attributable to them. NVDA also did not initiate action to terminate any of the contracts for slow progress and to retender the works.
- CAD works were not taken up simultaneously with the construction of canal works. There was 52 per cent shortfall in utilisation of 1.28 lakh hectare of created irrigation potential due to delays in CAD works and incomplete distribution network, besides deficient availability of water in Omkareshwar Dam.
- Planning for lift irrigation canals was deficient. There was shortfall in discharge capacity of five cumec water at Sisliya tank, which had to feed water to ORBLC and NKSL. Land acquisition for piped main canal of ORBLC before chak planning led to avoidable excess expenditure. Audit also noticed instances of deficient contract management, such as excess payment to contractors, irregular payment of price adjustments and irregular refund of security deposit against bank guarantee.
- Quality control of canal works was also inadequate. Copping, which checks the ingress of water below canal linings, was substandard. Audit noticed cases where test results for compressive strength of cement concrete lining and other hydraulic structures were below the prescribed norms. Damages and cracks in the canal lining were also noticed. However, no action was taken for the rectification of these substandard works.

2.1.13 Summary of recommendations

- *NVDD should review all cases of delays in OSP (canals) to fix the accountability of contractors and penalty may be imposed as per provisions of turnkey agreements. NVDD should also review the cases of delay to fix accountability on the CE and EE for not enforcing penalty on delays, as per the contract and orders of superior officers respectively. NVDD should also ensure that progress of works under each turnkey contract are adequately monitored by field engineers so as to complete the entire canal system within the revised target for completion of OSP (canals).*
- *NVDD should ensure expeditious execution of CAD works, particularly in those commands where irrigation potential was created but remained unutilised so that, the benefit of water available in the canals may reach farmers in minimum time.*

- *NVDD should fix accountability for not following the prescribed procedure under the MPWD manual for determining the quantum of land acquisition, which led to avoidable expenditure on land acquisition for ORBLC.*
- *NVDD may review from vigilance angle the entire procedure for payments to sub-contractors without the approval of competent authority. NVDD may also fix accountability for irregular adjustment of security deposit and payment of price adjustment to contractors in violation of terms and conditions of agreements. The excess payment may be recovered from contractors.*
- *NVDD may recover the excess payments to contractors and examine the irregular payment of price adjustment to contractors from a vigilance angle.*
- *NVDD may examine irregular refund of security deposit against bank guarantee from a vigilance angle.*
- *NVDD may fix accountability for irregular payments to contractors in violation of payment schedule under the agreements and examine these irregular payments from a vigilance angle.*
- *NVDD should ensure plantation by contractors all along the main canals and distributaries, which should also be recorded in the measurement book. NVDD should fix accountability for issuing completion certificate for Phase-IV (Group I) without fulfilment of entire contractual obligation by the contractor.*
- *NVDD should ensure that all the defective canal works are corrected urgently so that it does not affect the strength of canals and related hydraulic structures.*