

# **CHAPTER-II**

# **PERFORMANCE AUDIT**

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### PERFORMANCE AUDIT

#### DEPARTMENT OF HOUSING

#### 2.1 Role of Karnataka Slum Development Board in improvement and clearance of slums in the State

##### Executive summary

The Karnataka Slum Areas (Improvement and Clearance) Act, 1973 was enacted by the State Government for the improvement and clearance of slums in the State. A performance audit was conducted to evaluate the effectiveness of the role of the Karnataka Slum Development Board in holistic improvement of the notified slums and improving basic municipal services such as water, sanitation, water connection, storm drainage, street lighting, paved side walls and roads for emerging access for improving the living conditions of the slums. The performance audit showed the following:

- The slum policy initiated by the Board during 2011-12 was yet to be approved by the Government despite lapse of more than 2 ½ years.
- Absence of any mechanism for prevention of growth of slums resulted in three fold growth of slums since 2001.
- The Board did not have system to monitor the receipt of Slum Improvement Cess from various Local Bodies and development authorities. Also, Board had not prepared any action plan of works to be implemented out of the cess amount received.
- Absence of comprehensive database/slum profile resulted in non-preparation of comprehensive plan for slum improvement/clearance. The Board also had no norms for identification/prioritisation of slums for improvement.
- The slum improvements taken up under the schemes which provided for holistic development such as BSUP and IHSDP was more effective than schemes under VAMBAY, HUDCO, etc., which provided only for construction of houses.
- The improvement of slums was taken up by the Board belatedly in a partial, intermittent and disintegrated manner, as a result of which the slums continue to retain the slum characteristics for a longer period of time. Of the inspected slums, 77 per cent continue to retain the characteristics of slums even after a lapse of more than 20-40 years of their being notified.
- The Board failed to de-notify and handover the developed slums to the Urban Local Bodies concerned for their upkeep, maintenance and providing civic amenities. Though out of 43,438 houses undertaken for construction in 286 slums under BSUP/IHSDP schemes, 39,115 houses were completed and occupied, the Board failed to de-notify and handover the slums to Urban Local Bodies.
- The Board did not implement the IEC activities in all the slums taken up for improvement.

### 2.1.1 Introduction

The Government of Karnataka notified (November 1974), an Act called the Karnataka Slum Areas (Improvement and Clearance) Act, 1973 (KSA Act). The Act provides for the improvement and clearance of slums in the State. Section 3 of the Act identifies a slum area as

(a) any area that is or is likely to be a source of danger to health, safety or convenience of the public of that area or of its neighbourhood, by reason of the area being low-lying, insanitary, squalid, over-crowded or otherwise; or

(b) the buildings in any area, used or intended to be used for human habitation are in any respect, unfit for human habitation; or by reason of dilapidation, overcrowding, faulty arrangement and design of such buildings, narrowness or faulty arrangement of streets, lack of ventilation, light or sanitation facilities, or any combination of these factors, detrimental to safety, health and morals.

### 2.1.2 Organisational Set-up

In accordance with Section 33 of the KSA Act, 1973 the Karnataka Slum Clearance Board was constituted in July 1975. It was re-designated (November 2010) as Karnataka Slum Development Board (Board). The Board is under the administrative control of the Principal Secretary to Government, Housing Department and headed by the Commissioner. The Board is responsible for identifying and declaring the slum areas as per the Act; to take up environmental improvement, clearance and redevelopment of slums; provide housing and infrastructural facilities to the slum dwellers; to enable slum dwellers to live in hygienic conditions by providing basic amenities such as drinking water, street lights, roads, drains, community bathroom, storm water drain and community halls *etc.*

### 2.1.3 Source and expenditure of funds

The Board carries out its mandate through various schemes announced and funded by the State and Central Government from time to time. In addition, the Board also uses the proceeds of a Slum Improvement Cess levied by the Government of Karnataka for providing basic civic amenities in the slums. The various schemes, the funds available and the activities undertaken by the Board are briefly discussed in **Table 2.1** below.

**Table-2.1: Schemes for slum improvement implemented by the Board**

Name of the scheme	Whether housing/ infrastructure	Period of implementation	Number of houses constructed	Number of slums covered	Total cost (₹ in crore)
Slum Improvement Scheme	Infrastructure facilities	1975-76 onwards	----	NA	207.15
Housing and Urban Development Corporation (HUDCO) Housing	Housing	1983-84 to 2003-04	30,460	302	84.73

Name of the scheme	Whether housing/ infrastructure	Period of implementation	Number of houses constructed	Number of slums covered	Total cost (₹ in crore)
National Slum Development Programme (NSDP)	Infrastructure	1996-97 to 2000-01	----	NA	15.49
Valmiki Ambedkar Awas Yojana (VAMBAY)	Housing	2002-03 to 2007-08	34,538	811	148.50
Nirmal Bharat Abhiyan (NBA)	Community toilet blocks	2002-03 to 2007-08	791 toilet blocks	791	31.64
Slum Upgradation and Development Programme (SUDP)	Infrastructure facilities	2003-04 to 2008-09	----	242 (Phase I) 257 (Phase II)	65.05 71.11
Basic Services for Urban Poor (BSUP)	Housing including infrastructure facilities	2007-08 to 2014-15	26,201* (Proposed) 22,242 (Completed)	114 (Bengaluru and Mysuru cities)	569.41
Integrated Housing and Slum Development Programme (IHSDP)	Housing including infrastructure facilities	2007-08 to 2014-15	17,237 (Proposed) 16,873 (Completed)	172 (34 towns)	355.42
Rajiv Gandhi Awas Yojana (RAY)	Housing and infrastructure	2013-14 onwards	26,845 (Proposed)	128	1,318.63

(Source: Information furnished by the Board)

\* Includes 1,693 dwelling units transferred from BBMP

Government of Karnataka accorded (March 1994) sanction for levy of Slum Improvement Cess for comprehensive improvement of slum areas by providing basic civic amenities. Slum Improvement Cess levied on layout plans and building licenses is collected by the municipal bodies/development authorities concerned and the proceeds of which are credited to a separate account called Slum Development Fund (Fund). The Fund is used for financing comprehensive slum improvement plans in notified slums through a corresponding account operated by the Board.

During the period of review, the funds that were available for use by the Board are brought out in **Table-2.2** below.

**Table-2.2: Statement showing the receipts and expenditure during the period 2009-14**

(₹ in crore)

Name of the scheme	Opening Balance as on 1.4.2009	Grants received during the period 2009-14			Grand total	Expenditure during 2009-14
		Centre	State	Total		
Slum Improvement	0.00	0.00	191.63	191.63	191.63	126.23
IHSDP	67.47	145.72	154.91	300.63	368.10	334.53
BSUP	127.56	201.41	200.90	402.31	529.87	502.24
Slum Improvement Cess*	4.32	0.00	14.62	14.62	18.94	15.49
<b>Total</b>	<b>199.35</b>	<b>347.13</b>	<b>562.06</b>	<b>909.19</b>	<b>1,108.54</b>	<b>978.49</b>

(Source: Information furnished by the Board)

\*During the period 2009-14, 14 to 22 ULBs out of 246 ULBs had remitted ₹ 14.62 crore of cess amount.

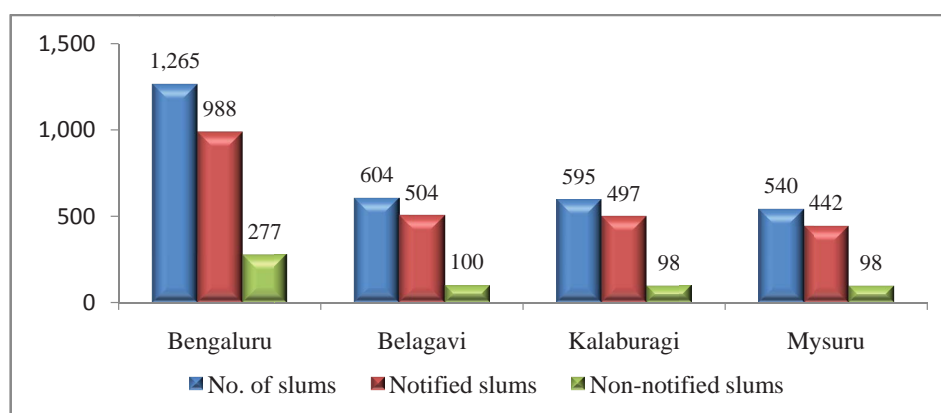
### 2.1.4 Status and growth of slums in Karnataka

As of March 2014, there were 3,004 slums in Karnataka, of which 2,431 slums<sup>5</sup> were notified and 573 slums were not notified covering 7.47 lakh households and a population of 35.27 lakh. Bengaluru Urban district had the largest number of slums (556; 19 per cent) followed by Ballari (188), Shivamogga (187), Tumakuru (182), Kalaburagi (181), Mysuru (137) and Hassan (131).

The number of slums in Karnataka as per census 2001 was 826, which increased to 3,004 in March 2014. The State witnessed three fold growth in the number of slums during these period of 13 years. During the period 2009-14, the number of notified slums increased by 221 of which 149 (67 per cent) pertain to Bengaluru city alone. Of these 149 slums, 134 (90 per cent) were notified during 2010-11 and 2011-12.

The revenue division-wise<sup>6</sup> break up of slums revealed that Bengaluru division had 42 per cent of the slums in the State. Pictorial representation of the division wise data on slums is as indicated in **Chart-1**.

**Chart-1: Revenue division-wise number of slums**



### 2.1.5 Audit objectives

A Performance Audit was conducted with the objective of evaluating the effectiveness of the role of the Board in improvement and clearance of notified slums with specific reference to:

- preparation of a strategic plan for holistic improvement of the slums, prevention of their further growth and de-notification after requisite facilities are provided to improve living conditions in the slums.
- providing requisite housing facilities and basic municipal services to all the slum dwellers in the slums.

<sup>5</sup> Only those slums can be notified which fulfill the prescribed criteria as per KSA Act.

<sup>6</sup> The State is divided into four revenue divisions covering 30 districts.

### 2.1.6 Audit criteria

The criteria for this performance audit was based on the following sources:

- The Karnataka Slum Areas (Improvement and Clearance) Act, 1973 and the rules framed there under.
- The City Development Plans, Scheme project reports and instructions regarding utilisation of the Fund detailing the housing and other basic amenities to be provided in the slums.

### 2.1.7 Audit scope and methodology

The performance audit commenced with an Entry Conference held on 23 January 2014 with the Principal Secretary, Housing Department. Audit was conducted during January to August 2014 covering the period 2009-14 through a test-check of records of the offices of the Board, six<sup>7</sup> out of 10 divisional offices and sub-divisions under the divisional offices test-checked. We followed multi stage random sampling for selection of districts, taluks, towns and slums. Joint inspection of 31 out of 814 slums considered for improvement was conducted with the departmental representatives in 17 cities/towns of 10 districts. Audit findings were discussed with the Principal Secretary, Housing in an Exit Conference held on 24 November 2014.

### 2.1.8 Audit findings

#### 2.1.8.1 Slum Policy

Audit observed that the Government did not have any policy to facilitate planning for inclusive growth and slum free cities, ensuring slum dwellers are entitled to dwelling spaces meeting minimum living condition requirements and providing a framework for re-development of slums on public and private land. The Board replied (September 2014) that a draft Slum Policy was submitted (July 2011) to the Government and the same was still pending with the Government for approval.

#### 2.1.8.2 Prevention of growth of slums

Chapter III (Sections 4 and 5) and Chapter III A (Sections 5A to 5C) of the KSA Act, 1973 provides for prevention of growth of slums and prohibition of un-authorized constructions. The City Development Plans prepared for Bengaluru and Mysuru had also identified the vision of slum free cities.

Audit, however, observed that the Board had not devised any mechanism for the prevention of growth of the slums and making the cities slum free. The State witnessed threefold increase in the number of slums as already indicated in Paragraph 2.1.4.

<sup>7</sup> Bengaluru, Belagavi, Davanagere, Dharwad, Kalaburagi and Mysuru

**Recommendation-1:** The Government should immediately develop a comprehensive slum policy providing a framework for prevention of growth of slums and to realise its vision of slum free cities.

### 2.1.8.3 Lack of maintenance of proper database

Since the Board was responsible for the re-development and rehabilitation of notified slums, the existence of a database containing the details of the slum such as name, ownership of land, date of notification, number of households, population *etc.*, with the Board was a basic requirement. The observations of audit on the maintenance of database are discussed below.

- An analysis of the database maintained by the Board and made available to Audit revealed that the database did not have the requisite basic information. The deficiencies in the database are detailed in **Table-2.3**.

**Table-2.3: Deficiencies noticed in the database**

Details	No. of slums
Without notification number	504
Without notification date	491
Without details of households	148
Without details of population	149
Without details of ownership	40
Without details of extent of land	98
Without details of survey number	899

- In respect of test-checked sub-divisions, the number of slums as per the sub-division did not tally with the number of slums as per the Head Office database as shown in **Table-2.4**.

**Table-2.4: Difference in number of slums**

Name of the City	Number of slums as per Head Office database	Number of slums available with sub-divisions
Vijayapura	43	45
Talikote	07	05
Ballari	62	59
Mandya	25	24
Dharwad	35	33

- Further, the Board had no slum-wise data which is fundamental and crucial to planning and monitoring improvement activities to be taken up. In this context, Audit noticed that the Census Department had compiled data on the infrastructure deficiencies as indicated in **Table -2.5**.

**Table-2.5: Infrastructure deficiencies**

Infrastructure facilities	No. of households ( in lakh)
Not having Pucca Houses	2.72
Having only a single room	2.93
Non-access to water source	1.06
Usage of un-treated water	1.18
No electricity	0.56

Infrastructure facilities	No. of households ( in lakh)
Lack of toilets	2.67
No Underground Drainage (UGD) facility	4.74
No bathroom facility	0.64

The slum-wise information along these lines would help the Board in planning, prioritising and undertaking improvement activities.

- The Board was in possession of details with regard to slums developed under major housing schemes such as HUDCO, VAMBAY, IHSDP and BSUP only. No database was maintained for the infrastructure works carried out in the slums by the Board under the schemes such as NSDP, SUDP, Slum Improvement Scheme, *etc.*
- No details were available regarding the infrastructural works carried out by Local Bodies and other Government departments in the notified slums.
- The Board did not have a beneficiary-wise database in respect of various housing projects to ensure that the benefits were accorded to genuine beneficiaries and to prevent duplication in extension of benefits. The IHSDP and BSUP scheme guidelines prescribed that the beneficiaries were required to be identified at the Draft Project Report stage and bio-metric cards issued to them. The Board was yet to develop a comprehensive database integrating the biometric details of the beneficiaries.
- The Board was required to update the details regarding the slums under its control through regular survey. However, the last survey conducted by the Board was only during 1996. Further, the Commissioner also emphasised (March 2014) on the need for conducting surveys at least once in five years. In the absence of regular updating, the Board undertook the activities in an *ad hoc* manner. The Board replied (September 2014) that after 1996-97, no surveys were conducted for updating the database on regular basis and that the Board had decided to conduct survey once in five years in order to maintain updated and timely information relating to slum and to develop a relational database for capturing and easy retrieval of information relating to slums which included data on slum survey, socio-economic survey data, projects undertaken in various slums, progress of work, monitoring aspects *etc.* The Board informed further that they had already initiated process for improvement of software and had entrusted the work to e-governance department.

#### 2.1.8.4 Planning for the improvement of slums

The Board had not prepared any Strategic Plan involving long, medium and short term action plans for improvement of the notified slums in the State. There was no basis for selection of slums for improvement and no norms were prescribed for identification of the slums for improvement either by the Government or Board through different schemes. Audit observed from its sample that slums notified during 1974 were taken up for improvement only in 2005 after a lapse of 30 years, those notified during 1979 and 1982 were



improved during 2002 and slums notified during 2004 and 2008 were improved during 2013-14 after 6-10 years of notification. Further, the improvements undertaken were also partial, intermittent, disintegrated and incomplete as observed during joint inspection, the findings of which are brought out in the latter part of the report (Para 2.1.8.8).

The Board had also not prepared any action plan for works to be implemented out of the cess amount received. The Board was also not ensuring receipt of all amounts due to the fund. In this context it is pertinent to note that the Board was not aware of the fact as to how much cess was collected and whether the amount so collected was remitted to the Fund. Audit observed that necessary reconciliation of cess amount credited by the Urban Local Bodies (ULBs) was not undertaken as per the Government directions. An amount of ₹ 41 lakh collected during 2009-14 by four<sup>8</sup> ULBs remained unremitted and ₹ 1.86 crore cess collected by Karnataka Industrial Area Development Board and Bangalore Development Authority was still remaining outstanding for remittance as at the end of March 2014. The Board stated (August 2014) that all ULBs were requested to furnish the details of cess collected and remit to the Board and action would be taken to reconcile the accounts after obtaining the details of cess amount and bank accounts.

Scrutiny of the works implemented out of the cess amount revealed that the Board had taken up 37 ineligible works (36 in Bengaluru and one in Mysuru) like construction of temporary sheds, excavation works *etc.*, that were part of implementation of the BSUP scheme and incurred ₹ 2.55 crore on these works. The Board had also not taken up any activities/works in relation to education, health, women and child development programme and social welfare activities under comprehensive development for improvement of slum areas as decided by the Government of Karnataka.

Audit further observed that housing and other improvement works were taken up under IHSDP Scheme in Halahalli Muslim Block slum of Mandya city, which was neither in the Head Office database nor in the sub-division database. This action of the Board highlights the need for maintenance of a proper database and creation of slum profile.

The Board replied (September 2014) that in the absence of database on slums, it was facing difficulties in preparing comprehensive plans for overall improvement of slums in the State.

**Recommendation 2:** The Board should create and maintain a robust and comprehensive database of the slums with slum-wise profile for preparing a strategic plan for long, medium and short term to ensure that the improvement activities taken up including housing are holistic thereby enabling the developed slums to come out of its characteristics and join the mainstream population.

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<sup>8</sup> Kalaburagi Development Authority, Kalaburagi City Corporation, City Municipal Councils – Hosapete and Mandya

**Recommendation 3:** Government should prepare necessary guidelines to be adopted for identification and prioritisation of slums for improvement.

**Recommendation 4:** The Board should co-ordinate with ULBs and development authorities to ensure prompt receipt of cess and prepare action plan for its utilisation.

### 2.1.8.5 Failure of the Board to clear slums through resettlement

The Board undertook improvement of slums either through in-situ development<sup>9</sup> or resettlement<sup>10</sup>. Under the RAY scheme, in-situ upgradation/re-development of slums was the preferred option as it did not lead to loss of livelihood linkages or additional commuting hours leading to loss of income. Slum resettlement was preferred only for untenable slums and was to the extent possible to be within the same ward/zone or the adjoining ward/zone to minimize adverse impact on livelihoods and community assets and access to health and education facilities. However, the resettlement was to ensure holistic improvement and all the basic amenities were to be provided along with housing and other infrastructure facilities.

The Board resorted to in-situ development in 239 slums and resettlement in respect of 47 slums during the implementation of the BSUP and IHSDP Schemes. Audit observed that while the occupancy rate of the slums under in-situ was 90 per cent, occupancy rate under resettlement scheme was 63 per cent, 50 per cent and 45 per cent in Bengaluru city, Mysuru city and other towns respectively as indicated in the **Table-2.6**.

**Table-2.6: Occupancy position of houses in relocated slums**

Name of the city	Bengaluru	Mysuru	Other towns
No. of houses completed	5,465	3,064	3,012
No. of houses occupied	3,440 (63)	1,526 (50)	1,345 (45)
No. of houses not occupied	2,025 (37)	1,538 (50)	1,667 (55)

(Source: Information furnished by the Board)

Note: Figures in bracket indicate percentage

Audit also observed that none of the newly constructed houses were occupied by the slum dwellers of four slums of Bengaluru city, two slums of Mysuru city and four slums of other towns.

Implicit in the option of the resettlement is the clearance of existing slums. However, audit observed that the slums were still existing despite the fact that these were considered untenable and the Board had spent an amount of

<sup>9</sup> “In-situ Slum development” is the process of developing slum areas by providing proper access, dwelling units, open spaces and other basic services to the slum dwellers on the land on which the slums existed.

<sup>10</sup> “Slum Resettlement” is the process of relocation and settlement of slum dwellers from the existing untenable slums to an alternative site with provision of dwelling space, basic civic and infrastructural services.

₹ 86.63<sup>11</sup> crore on the construction of these houses. The Board had also neither analysed the reasons for non-occupancy nor had taken any remedial measures such as pursuing the matter with beneficiaries to occupy the newly built houses with the result that the slum dwellers who were to be resettled continued to remain in the existing places.

**Recommendation 5:** The Board should take urgent action to persuade the slum dwellers to occupy the newly constructed houses so as to prevent unauthorised occupancy and also clear the untenable slums.

#### **2.1.8.6 Denotification and non-handing over of slums by the Board**

As per the provisions of the Act and directions issued (February 1991) by the State Government, on completion of the improvement works and construction of houses in a declared slum, the slums were to be handed over to the municipality/corporation or the city municipal council concerned as the case may be for further maintenance *etc.* BSUP and IHSDP guidelines issued by Ministry of Housing & Urban Poverty Alleviation also called for denotification of slums after completion as the development of slums under these schemes is through whole-slum approach covering provision of land tenure, affordable housing and basic services that is aimed at addressing and alleviating all conditions that characterise a slum.

Out of 26,201 and 17,237 houses undertaken for construction in 114 and 172 slums under BSUP and IHSDP schemes respectively, 22,242 houses under BSUP and 16,873 houses under IHSDP were completed and occupied by the beneficiaries. Further, out of 286 slums, all the works were completed and the houses were occupied in 239 slums.

Audit observed that the Board had not taken any action to de-notify the slums which had been completed with the result that the responsibility for the upkeep and maintenance continues to rest with the Board and not with the local urban authorities.

**Recommendation 6:** The Board should immediately de-notify and handover the improved slums to the ULBs concerned to enable their further upkeep and maintenance.

#### **2.1.8.7 Status of improvement of slums**

Out of 2,431 slums notified, improvement activities including housing were carried out in 814 slums (33 *per cent*). The division-wise analysis of slums taken up for improvement and undeveloped slums revealed that while 35 *per cent* of the slums in Bengaluru division underwent improvement under

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<sup>11</sup>  $(2,025+1,538) = 3,563$  houses\* ₹ 1,80,000/- (lowest unit cost of each house under BSUP)  
= ₹ 64.13 crore  
1667 houses \* ₹ 1,35,000/- (lowest unit cost of each house under IHSDP) = ₹ 22.50 crore  
Net amount = ₹ 64.13 crore + ₹ 22.50 crore = ₹ 86.63 crore

various schemes, only 14 *per cent* of the slums were taken up for improvement in Mysuru division as indicated in the **Table-2.7**.

**Table-2.7: Revenue division-wise slums taken up for improvement**

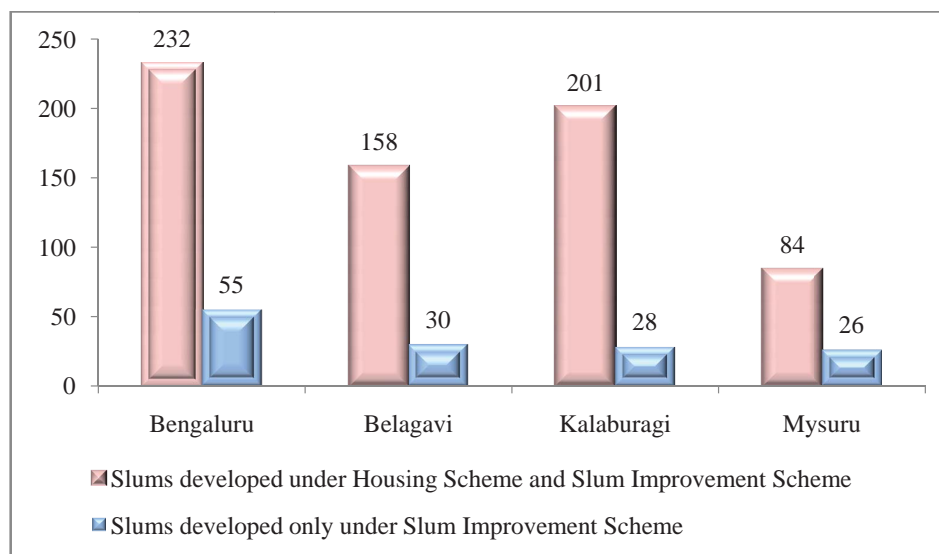
	Total	Bengaluru	Belagavi	Kalaburagi	Mysuru
Number of notified slums	2,431	988	504	497	442
No. of slums taken up for improvement	814	287 (35)	188 (23)	229 (28)	110 (14)
No. of slums not taken up for improvement	1,617	701	316	268	332

(Source: Information furnished by the Board)

Note: Figures in bracket indicate percentage

Further analysis of the slums taken up for improvement revealed that 675 (83 *per cent*) slums were taken up for improvement under two schemes *viz.*, Housing scheme and Slum Improvement scheme. Another 139 (17 *per cent*) slums were taken up for improvement only under Slum Improvement scheme. The division-wise improvement of slums under Housing scheme and Slum Improvement scheme are depicted in **Chart-2** below:

**Chart 2: Revenue division-wise development of slums under Housing scheme and Slum Improvement scheme**



Audit observed that six out of 675 slums were improved under three<sup>12</sup> schemes, 81 slums under two schemes and 588 slums under one scheme. Audit also observed that in 125 slums taken up for improvement, the number of dwelling units constructed was 26,856 as against 15,312 huts which existed at the time of notification. The reasons for construction of more dwelling units than those present at the time of notification could not be verified by Audit due to lack of records.

<sup>12</sup> HUDCO, VAMBAY and BSUP/ISHDP

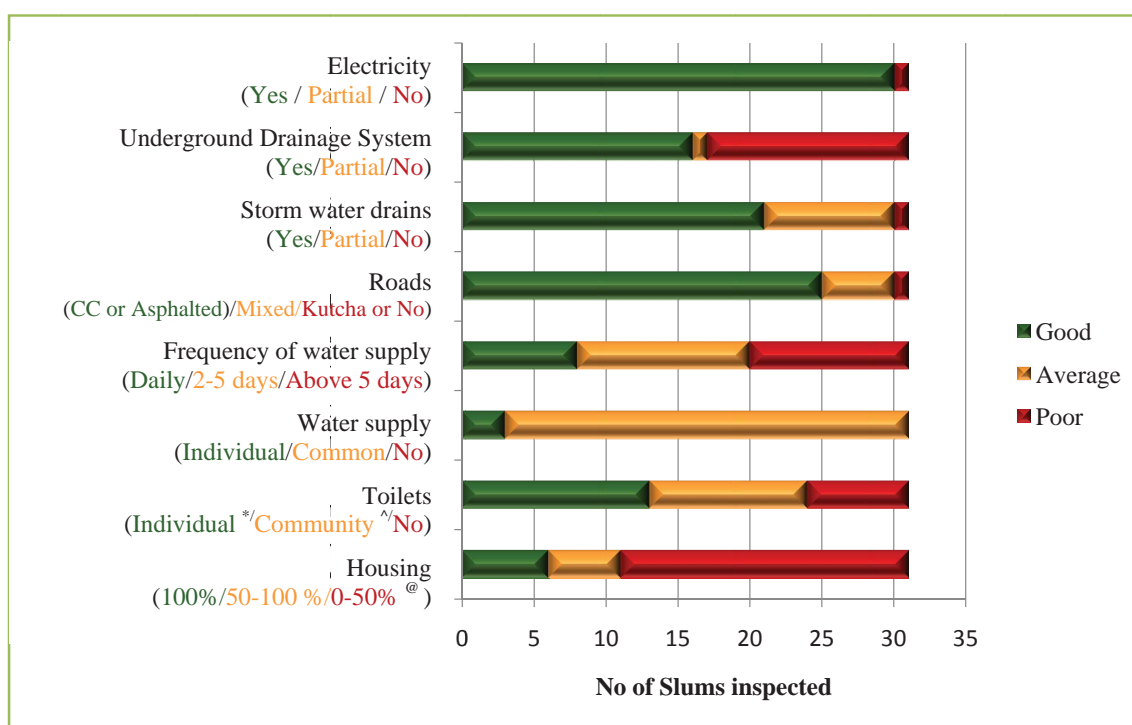
### 2.1.8.8 Findings of the Joint Inspection of slums

The audit team visited 31 slums taken up for improvement in 17 cities/towns of ten districts along with the officials concerned of the Board. During joint inspection, the audit team interacted with few of the slum dwellers to ascertain the status of improvement of slums.

Out of 31 slums considered for improvement, 28 slums were taken up for improvement under Housing schemes and three slums only under slum improvement scheme. During joint inspection, seven slums taken up for improvement were found to be fit for de-notification and to be handed over to the local bodies concerned.

The joint inspection findings regarding status of implementation of various infrastructures are indicated in the **Chart-3** and **Appendix-2.1**. Indicator wise findings are discussed in detail in subsequent paragraphs.

**Chart 3: Extent of improvements made to 31 slums inspected**



@ in three slums, no housing activity was taken up  
 \* in two slums, few of the slum dwellers had constructed toilets on their own  
 ^ in one slum, few of the dwellers had constructed toilets on their own.

**Housing** – House or dwelling unit is the physical structure used, or intended to be used, for human habitation. The Board had constructed houses for the slum dwellers under HUDCO, VAMBAY, BSUP and IHSDP Schemes. While houses constructed under HUDCO and VAMBAY did not have any provision for individual toilets, the houses constructed under the other

schemes included provision for individual toilets. The following are the audit observations:

- All the slum dwellers in the sampled slums were not provided with houses. In 17 slums, the houses constructed were less than 50 *per cent* of the number of huts existing at the time of notification. Further, in seven out of these 17 slums, the houses constructed were less than 10 *per cent*. This indicated that the improvement activities taken up was *ad hoc* and not holistic and the slums continued to retain the characteristics of the slum.
- In five slums, the percentage of houses constructed ranged from 50 to 100 *per cent* and in three slums, the number of houses constructed was 100 *per cent*.
- In three other slums, the number of houses constructed was more than the huts existing at the time of notification.

#### ***Availability of toilet facilities***

Audit observed that:

- Seven of the 31 sampled slums taken up for improvement did not have any kind of toilet facility.
- All the houses in seven slums improved under IHSDP/BSUP Schemes were provided with individual toilets.
- In four slums, where houses were constructed under HUDCO/ VAMBAY Schemes, the dwellers had constructed the toilets on their own.
- In three other slums, few of the dwellers had constructed the toilets by themselves.
- Out of 31 slums, 10 slums were provided with community toilet blocks.

***Water supply*** – All the slums inspected had water supply. The main source of water supply in five slums was borewell and the Municipality/Local Bodies supplied water through common taps/cisterns in 26 slums. The houses in three out of 26 slums had individual pipe connection for water.

As regards the frequency/duration of water supply, audit observed that 26 *per cent* of the slums had daily supply of water, 22 *per cent* of the slums received water supply once in 7-8 days and 13 *per cent* received water supply once in 10-15 days.

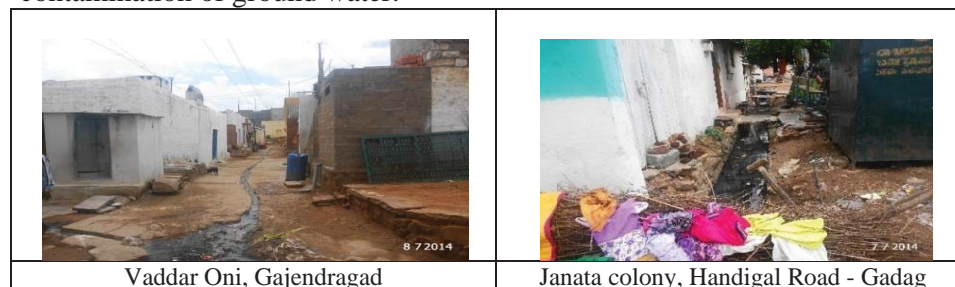
#### ***Roads*** –

- Eighty-one *per cent* of the sampled slums were provided with Cement concrete /asphalted roads.
- Sixteen *per cent* of the slums had a combination of cement concrete roads and kutcha roads.
- One slum (Samagar Oni in Talikoti town) had only kutcha/mud roads.

**Storm/surface water drains** – Twenty-one out of 31 slums (68 per cent) inspected had storm water drains along the entire length of the roads and it was partial in nine slums. Only one slum did not have storm water drainage system. Audit also observed that in 24 slums, the drains were encroached by the dwellers by way of construction of additional rooms, toilets *etc.* The drains were also not maintained properly and waste/garbage dumped resulting in clogging of the drains and consequent water logging leading to hazardous environment.



**Underground Drainage system (UGD)** – Forty-five per cent (14 slums) of the inspected slums taken up for improvement did not have UGD facility resulting in sewage being let into the open (as indicated in the picture) thereby deteriorating the surrounding environment besides leading to contamination of ground water.



**Electricity** – The houses in all inspected slums had electricity connection except one slum (Sanjaygandhi nagar in KGF town).

**Other basic requirements** – During the joint inspection of the slums, the audit team also ascertained the availability of the other basic requirements for the slum dwellers such as Anganwadi Kendra, schools, hospitals, bus stations, parks *etc.* Majority of the slums had access to these facilities within a radius of 1-2 kilometres. The status of the availability of these requirements is depicted in **Table-2.8**.

**Table-2.8: Availability of other basic requirements**




Type of basic requirement	No	Yes (<1.5 km)	Yes (2-3 km)
Anganwadi Kendra	4	11	16
School	1	11	19
Hospital	2	17	12
Bus station	2	18	11
Parks	15	10	6

(Source: Information obtained through joint inspection of slums)

**Community centres** –Subsequent to 2007-08, Government of India, in its schemes viz., BSUP and IHSDP provided for construction of community centres<sup>13</sup> as part of holistic improvement of slums. Audit observed that 29 of the sampled slums (94 per cent) did not have the community centre either in its premises or in the vicinity. Seven of these 29 slums were taken up for improvement under the above schemes indicating lack of holistic approach.

### 2.1.8.9 Comparative analysis of the effectiveness of the various schemes

A comparative analysis of the effectiveness of the various schemes implemented by the Board revealed that schemes which provided for holistic development (housing and other infrastructural facilities) like BSUP and IHSDP were more effective than the schemes like HUDCO and VAMBAY which provided only for construction of houses. Audit observed that in respect of slums which were improved under HUDCO and VAMBAY Schemes, the intervention was sporadic, intermittent and disintegrated as a result of which the slums continued to retain the characteristics of the slum for a longer period of time. Seventy-seven per cent of the inspected slums, which were notified 20-40 years earlier, continued to remain as slums as a result of non-holistic interventions. Few examples of such interventions are as indicated below.

		
Samagar Oni (Talikoti)	Janatha colony side slum (Chalkeri)	Behind New Mutton Market (Raichur)
The slum is having 185 households with a population of 600. Only two houses were constructed under VAMBAY Scheme. The houses did not have individual toilets. The roads in the slum and the approach road (main road) were kutcha roads. The entire town did not have UGD and the sewage was being let into the open. The surroundings of the slum were unhygienic.	The slum had 419 households and a population of 2,238. Only 3 houses were constructed under VAMBAY Scheme while water supply and electrification works were provided under Slum Improvement. One Community toilet block consisting of two bathrooms and five toilets each for men and women was provided under NBA. The entire city did not have underground sewerage system. Approximately 10 per cent of the houses did not have power connection.	The slum had 855 households with a population of 1985. Only 20 houses were constructed by the Board under VAMBAY scheme and infrastructure works were provided under SUDP. The houses in the slum did not have individual toilets. The slum was partially provided with surface water drains which were also clogged with waste resulting in water logging. The slum was not provided with UGD facility.

Audit also observed that seven (23 per cent) of the sampled slums were found to be fit for denotification. Of these, five slums were taken up for improvement under IHSDP Scheme and the other two slums were improved under HUDCO/VAMBAY Schemes.

**Recommendation 7:** The Board should adopt a holistic approach of improvement which is more effective in addressing problems of the slums.

<sup>13</sup> Community centre is a place where people from a particular neighbourhood can meet for social events, education classes or recreational activities.



#### **2.1.8.10 Information, Education and Communication (IEC) activities**

Though improvement activities in the slums are undertaken by the Board, the slum dwellers/residents in coordination with the concerned local bodies are also responsible for subsequent maintenance, upkeep and care of the infrastructure. In this direction, it is very important to educate the residents with regard to health, hygiene and proper upkeep of the facilities provided to them.

During joint inspection, Audit observed as under in the slums taken up for improvement:

- residents continued to wash clothes, utensils on the roads, bathe their children on the roads and go into the open to urinate and defecate;
- residents constructed additional rooms/toilets on the surface water drains that were provided along the roads; and
- temporary sheds were built in the setback area (either in the front or back of the houses) provided for the houses thereby preventing entry of natural light besides spoiling the surroundings.

These highlighted the need for conducting IEC activities. Audit observed that IEC activities were undertaken by the Board only in those slums where the IHSDP scheme was implemented as this formed part of the scheme guidelines for which budgetary support was provided. As at the end of July 2014, IEC activities were undertaken in 69 slums of 25 towns out of 172 slums in 34 towns.

While appreciating audit observations, Board stated in its reply (September 2014) that Non-Governmental Organisations were engaged (December 2013) for implementing the IEC activities in selected slums under IHSDP scheme. The Board further stated that it would strive hard to bring about necessary behavioural changes among the deprived slum population to make them self reliant in so far as their health, sanitation and welfare activities are concerned along with providing basic infrastructure, amenities and houses as per Government approved norms.

**Recommendation 8:** The Board should implement the IEC activities in all the slums and not restrict itself to the slums improved under IHSDP.

#### **2.1.9 Conclusion**

Absence of robust and comprehensive database of slums and their improvement led to non-preparation of comprehensive plan for undertaking holistic improvement of slums. Also, the Board had no mechanism for prevention of growth of the declared slums and norms for identification/selection of slums for improvement. The Board also failed to de-notify and hand over the improved slums to the ULBs concerned. The Government was

yet to approve the draft slum policy initiated during 2011-12 even after a lapse of more than two and a half years since its formulation.

The Board took up the improvement works in the notified slums in partial, intermittent and disintegrated manner without resorting to 'whole slum' approach with the result that seventy-seven *per cent* slums taken up for improvement continue to bear the characteristics of slums even after several years of commencement of improvement works. Though majority of the developed slums had storm water drains constructed along the entire length of the roads, the maintenance of the same was very poor. The non-maintenance of the drains has resulted in clogging of the drains with sewage/waste leading to water logging and creation of unhygienic environment. The Board did not implement the IEC activities in all the slums.

Thus, the Board was not completely successful in providing requisite housing facilities and other infrastructure facilities and improving the living conditions of the slums which defeated the basic objective of clearance of slums in the State.

The matter was referred to Government in September 2014; reply was yet to be received (October 2014).

## DEPARTMENT OF URBAN DEVELOPMENT

### 2.2 Water Supply Management by the Bangalore Water Supply and Sewerage Board with special emphasis on Cauvery Water Supply Scheme, Stage IV, Phase II and Greater Bangalore Water Supply Project

#### Executive summary

The Bangalore Water Supply and Sewerage Board (Board) was established (October 1964) for providing water supply and sewerage system to the Bengaluru city. The Board had been implementing various projects for providing water supply to the city. A performance audit of the water supply management by the Board with special emphasis on two projects viz., Cauvery Water Supply Scheme, Stage IV, Phase II and Greater Bangalore Water Supply Project during 2009-14 showed the following:

- The Board had prepared a Water Supply and Conservation Management Plan in 2002, but it was yet to implement many of its recommendations viz., formulation of Drought and Emergency Management Plan which addresses the issue of conservation of water.
- Though the Board initiated action to bridge the gap between demand and supply, it could not match the shortfall mainly due to restrictions on drawal of water from the river Cauvery and also due to rapid growth of population in the city.
- The Board had initiated Distribution Network Improvement Programme and Slum Development component under CWSS Stage IV, Phase II to reduce Unaccounted for Water (UFW). However, delay in commencing the programmes not only resulted in escalation of cost but also non achievement of objective of reducing the UFW.
- Delay in completion of various works of Sewerage Management Plan resulted in sewage being discharged into the storm water drain thereby polluting the ground water.
- The estimates prepared by the Board were unrealistic as they were inflated on account of unnecessary provisions in the estimate and adoption of incorrect rates.
- Further, adoption of inappropriate indices for price adjustment factor, execution of work of different specification and non-compliance with standards resulted in excess payment and also undue benefit to contractor.
- Central Water Testing Laboratory which was understaffed and lacked infrastructure could only partly comply with the testing of water quality as prescribed in CPHEEO manual.

### **2.2.1 Introduction**

The National Water Policy 2002 as well as the State Water Policy, 2002 placed allocation for drinking water as the first priority. It emphasised on expansion of drinking water provision for the entire urban population. As a supplement to the State Water Policy 2002, Government of Karnataka prepared (2002) Urban Drinking Water and Sanitation Policy to illustrate the vision and role of concerned institutions in the water and sewerage sectors. In order to bring about staged development upto 2025 in the Bengaluru Metropolitan Area, the State Government brought out the Water Supply Master Plan, 2002.

### **2.2.2 Organisational Set-up**

The Bangalore Water Supply and Sewerage Board (Board) was established (October 1964) for providing water supply and sewerage system to the Bengaluru city. The Board is headed by Chairman who is assisted by five Chief Engineers for Cauvery, Maintenance, Waste Water Management and Corporate Planning, Quality Assurance and Project along with Chief Administrative Officer-cum-Secretary, Financial Advisor and Chief Accounts Officer. The Officers are supported by technical, administrative and financial staff at various levels.

### **2.2.3 Audit Objectives**

The audit was conducted with the objective of evaluating the effectiveness of the schemes implemented by the Board assessing in particular whether the Board had:

- a Water Supply and Conservation Management Plan which effectively addressed availability of long term regional resources, management, conservation and supply of quality water.
- created and maintained adequate infrastructure consistent with the plan to ensure water supply to all the areas coming under its jurisdiction.
- a Sewerage Management Plan to create adequate infrastructure facilities to treat the sewerage and maintain the facilities effectively.
- a Contract Management system that ensured economy, efficiency and effectiveness for creation of infrastructure for water supply and sewerage treatment.

### **2.2.4 Audit Criteria**

The performance audit findings were benchmarked against the following:

- Bangalore Water Supply and Sewerage Board Act, 1964;
- Central Public Health Engineering and Environmental Organisation Manuals for Water Supply and Sewerage (CPHEEO);

- The Karnataka Transparency in Public Procurements Act and Rules;
- The Karnataka Public Works A and D code (PWD Code);
- Circulars and instructions issued by the Government of Karnataka;
- Terms and conditions of the Contracts and Agreements entered into by the Board with loan sanctioning Authorities and with various contractors/agencies.

### **2.2.5 Audit Scope and Methodology**

The Performance Audit started with an entry conference held on 7 February 2014 with the Chairman, Bangalore Water Supply and Sewerage Board in which audit scope and methodology was explained. The audit was conducted during December 2013 to July 2014 covering the period 2009-14 through test-check of records of the Board's head office and nine divisions. Audit was confined to scrutiny of records relating to implementation of two schemes viz., Cauvery Water Supply Scheme (CWSS) Stage IV, Phase II and Greater Bangalore Water Supply Project (GBWASP). Probability proportional to size sampling without replacement was adopted for selection of 13 out of 33 packages under CWSS Stage IV, Phase II and nine out of 27 packages under GBWASP (**Appendix-2.2**). Audit findings were discussed with the Additional Chief Secretary, Urban Development Department in an Exit Conference held on 13 November 2014. The Report takes into account replies furnished by the Board in response to the audit observations communicated to them.

### **2.2.6 Water Supply and Conservation Management Plan**

The Board under the assistance of Australia-India Development Cooperation (AusAID) prepared (July 2002) a comprehensive, strategic and long term Water Supply Master Plan upto 2025 (Master Plan, 2002) which addressed the issues faced by the Board in effective water supply management viz., Water Supply Planning, Unaccounted for Water (UFW), Non-revenue water (NRW), Water resources, Water supply systems, Demand Management *etc.* Further, the State Government constituted an Expert Committee (November 2010) for identification of sources for sustainable water supply to Greater Bengaluru for next 40 years *i.e.* upto 2050, and it submitted its recommendations to the State Government in August 2013.

#### **2.2.6.1 Demand and shortfall in supply of water**

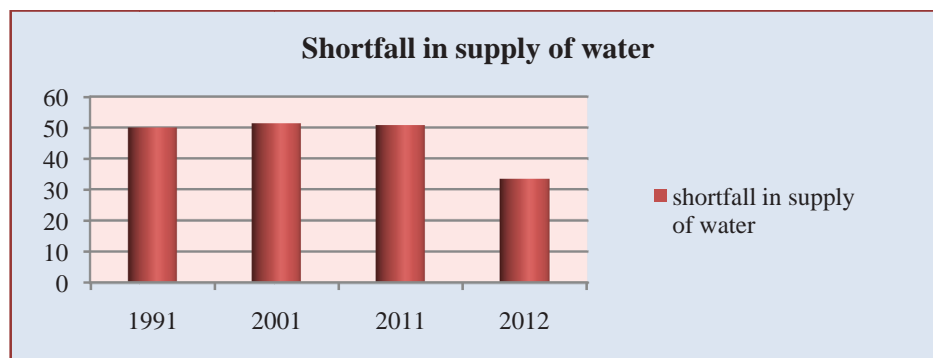
The water supplied by the Board under various schemes since its inception are detailed in **Table-2.9** below:

**Table-2.9: Details of water supplied by the Board since inception**

Year	Population in lakh	Requirement <sup>14</sup> of water in million litres per day (MLD)	Water supply in MLD (all sources)	Action taken by the Board to bridge the shortfall
1971	16.64	NA	165	36" line from TG Halli was commissioned in 1963 to bring in 72 MLD
1981	29.22	NA	300	CWSS 1 <sup>st</sup> stage was commissioned in 1974 to bring 135 MLD
1991	41.30	870.35	435	CWSS 2 <sup>nd</sup> stage was commissioned in 1981 to bring 135 MLD
2001	61.70	1,450.15	705	CWSS 3 <sup>rd</sup> stage was commissioned during 1993 to bring 270 MLD
2011	96.21	1,981.62	975	CWSS 4 <sup>th</sup> stage, I Phase commissioned in 2002 to bring 270 MLD.
			1,075	Supply from Cauvery augmented by 100 MLD from 2009 under JnNURM scheme
			960	Supply from Arkavathi reduced to 50 MLD due to insufficient inflow in the river
2012	100.06	2,071.04	1,460	CWSS 4 <sup>th</sup> stage II Phase commissioned in October 2012 for supply of 500 MLD

(Source: Expert Committee Report and Detailed Project Report on CWSS Stage IV, Phase II)

Though, the Board initiated action to bridge the gap between the demand and supply, it could not cover the shortfall mainly due to restrictions on drawal of water from the river Cauvery and also due to rapid growth of population in the city. The percentage of shortfall in supply of water during 1991-2012 is as depicted in the chart below:



## 2.2.7 Water Supply Schemes

In order to address the issues faced by the Board in effective water supply management, Board initiated two projects which are detailed below:

### 2.2.7.1 CWSS Stage IV, Phase II

Allocation of water from Cauvery river to Bengaluru was 1,469 MLD, against which about 929 MLD was drawn under CWSS Stage I to IV, Phase I. Since the existing water supply system encountered several issues such as inequitable and intermittent water supply (eight to twelve hours on alternative

<sup>14</sup> Based on a norm of 150 litre per capita per day (lpcd) issued by Central Public Health Engineering and Environmental Organisation (CPHEEO), Ministry of Urban Development, Government of India plus 20 per cent for industrial purpose and 15 per cent UFW.

day), high Unaccounted for Water (UFW), supply of 105 lpcd<sup>15</sup> of water against standard of 150 lpcd *etc.*, the Board proposed to utilise the balance 540 MLD raw water from the river under CWSS Stage IV, Phase II which was approved by the Government in June 2005.

The scheme consisted of six water supply components, three distribution components, seven sewage treatment plants and 16 sewer networks. Apart from the above 32 packages, it included the slum development component also. Estimated cost of the project was ₹ 3,383.70 crore.

#### **2.2.7.2 GBWASP**

In order to provide water supply facilities to the erstwhile seven City Municipal Councils (CMCs) and one Town Municipal Council (TMC) which were brought under the purview of Bruhat Bengaluru Mahanagara Palike (BBMP), State Government accorded (December 2003) administrative approval for implementation of GBWASP.

The project consisted of five works relating to feeder mains and 22 water supply distribution works which were to be implemented in three phases. The estimated cost of the project was ₹ 455.91 crore.

### **2.2.8 Audit findings**

Audit observations on implementation of recommendations in Master Plan, 2002 with special emphasis on the above mentioned two schemes are brought out in succeeding paragraphs.

#### **2.2.8.1 Unaccounted for Water**

UFW<sup>16</sup> is non-accounted water which does not generate any revenue due to physical leakages, faulty metering, unauthorised connections *etc.*, and was important mainly due to the following reasons:

- Major loss of revenue occurred when the UFW level was high which had direct effect on the financial performance of the Board.
- High level of UFW, in turn meant larger volume of water had to be provided by the Board into the serviced areas.

Though the CPHEEO and also the Master Plan, 2002 prescribed 15 *per cent* and 16 *per cent* respectively as the allowable UFW, it ranged between 46.91 to 50.90 *per cent* during the period 2009-14 as shown in **Table-2.10**.

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<sup>15</sup> Litres per capita per day

<sup>16</sup> UFW measurement is based on the total bulk water input less metered domestic industrial and commercial consumption less the assessment for public fountains both revenue and non-revenue earning.

**Table-2.10: Details of UFW for the period 2009-14**

(Quantity in ml)

Year	Water supplied	Quantity of water billed	Unaccounted for Water	Per centage of UFW
2009-10	3,55,242	1,80,965	1,74,277	49.05
2010-11	3,46,635	1,82,370	1,64,265	47.38
2011-12	3,48,105	1,84,571	1,63,534	46.97
2012-13	3,64,560	1,93,530	1,71,030	46.91
2013-14	4,43,964	2,17,951	2,26,013	50.90

(Source: Information furnished by the Board)

It is evident from the above table that level of UFW has increased during 2013-14 which also affects the financial performance of the Board.

The Board had established a Water Audit and Control Team as part of the Maintenance Division. It undertook investigations and remedial work in specific areas using specialised leak detection equipment to identify physical leakages to undertake repairs, illegal connections and regularise them by installing meters or disconnecting the supply and faulty meters that required replacement.

Further, the Board had established a central control room for redressal of complaints from the public. However, no details in respect of action taken on the complaints received, follow up action, feedback mechanism, information on any periodical survey of transmission and distribution lines for detection of leakages, illegal connections *etc.*, were maintained in the control room.

Though, the Board had established the above controls, the UFW through leakage was 38 *per cent* (March 2014). Further, the Board initiated (2005) two important programmes under CWSS Stage IV, Phase II to reduce UFW.

- Improvement of distribution network to reduce water leakage.
- Phasing out of public fountains in selected slums.

**(a) *Distribution network improvement programme***

The Board undertook a distribution network improvement programme on a pilot basis (July 2002) under CWSS Stage IV, Phase I which covered 32,000 service connections in 370 kms of distribution network spread over an area of 30 sq kms. As the result was encouraging, the Board proposed (July 2005) to implement the programme in six divisions in the entire core area of Bengaluru at an estimated cost of ₹ 262.50 crore under CWSS Stage IV, Phase II with an objective to reduce the UFW to 16 *per cent* by the end of 2015 from the 36 *per cent* which existed during 2005.

The Board entered into loan agreement (2005) with Japan International Cooperation Agency (JICA) and the amount estimated for the project Management Improvement Component (including slum development component) was ₹ 74.24 crore. Though, a consultant firm was appointed during March 2007, the Board initiated the tender process for award of the



work only in 2010 and revised the estimate based on the schedule of rates (SR) of 2010-11. The revised estimate for the six packages worked out to ₹ 1,245 crore. The details of work awarded are brought out in **Table-2.11** below:

**Table-2.11: Details of works awarded**

(₹ in crore)

Package	Division covered	Estimated cost	Entrusted amount	Date of entrustment	Expenditure incurred as on March 2014	Remarks
D2b	Bengaluru South	154.17	153.12	July 2012	78.25	Under progress
D1a	Central	155.31	184.33	December 2013	7.47	
D2a	West	294.12	316.79	November 2013	39.06	

(Source: Information furnished by the Board)

Audit, however, observed that delay in taking up the work not only resulted in escalation of cost, but also the Board was unable to take up the balance three packages due to paucity of funds. The Board, however, could not achieve its objective of reducing the UFW. The Board stated in its reply that the delay in taking up the work was due to delay in finalisation of tender procedure.

**(b) Non-achievement of Slum Development Component – extension of services to the poor**

Public fountain is the main water source for the urban poor which is one of the major contributors for the UFW. Bruhat Bengaluru Mahanagara Palike (BBMP) was responsible for payment of water charges supplied to the poor families through public fountains. As of June 2014, the amount due to the Board from the BBMP was ₹ 148.75 crore. In order to reduce the UFW based on the Master Plan, 2002 recommendations and also to ensure safe drinking water to urban poor, the Board conceived a project for phasing out the public fountains in the slums with individual metered connections under CWSS Stage IV, Phase II. The project was to be implemented in 362 notified slums of Bengaluru in three different phases with phase I, II and III consisting of 120, 122 and 120 slums respectively.

Implementation of the scheme was in two stages with social mobilisation component being the first stage and implementation of the civil works being the second stage. Under the social mobilisation component, the Board engaged Non-Governmental Organisations (NGOs) for conducting socio-economic survey to facilitate the implementation of piped water supply scheme in the slums. Though, the Board had envisaged the programme in July 2005, it invited tenders from NGOs for phase I only in January 2010 and the work was awarded (October 2010) at a cost of ₹ 2.95 crore. On the basis of the survey conducted by the NGOs, the Board invited (June 2012) tenders for civil works in 96 slums. However, no bidders responded. Hence, the work was re-tendered (August 2012) and awarded (May 2013) to the lone bidder at a cost of ₹ 48.28 crore which was 42 *per cent* above the estimated cost of ₹ 34.11 crore. The scheduled date of completion was May 2014. However, as of March 2014, expenditure to the tune of ₹ 10.38 crore only was incurred.

Though, the Board had initially planned to implement the project in 362 slums in three phases, based on the survey, it was decided to implement it in 178 slums only. Against this, slum development component was taken up in 96 slums in Phase I. However, due to paucity of funds, implementation of the project was put on hold in respect of 14 slums.

Hence, inordinate delay on the part of the Board in finalisation of the tender procedure and execution not only resulted in cost overrun, but in partial implementation of the project as well. Besides, the objective of reducing the UFW was not achieved.

During Exit Conference, while agreeing that the UFW was on the higher side the Government stated that the UFW would be reduced to 16 *per cent* in the areas where the project under distribution network improvement programme was taken up. The Government further stated that since the project was investment driven, it would take time to implement the project in all the areas. It also stated that they would be initiating the actions such as to provide meters to all the connections under GBWASP scheme, identify and disconnect all unauthorised connections and provide bulk flows meters to all slum feeder lines.

#### ***2.2.8.2 Management of Ground Water***

Master Plan, 2002, study on Ground Water Scenario by Central Ground Water Board as well as the Expert Committee observed that the ground water usage was greater than the present recharge rate and stated that within 15 years, it needed to be reduced to a sustainable level as there was a risk of depleting the resource totally. A general resource strategy for Bengaluru was formulated both by the Master Plan, 2002 as well as Expert Committee which contained protection of groundwater from pollution and using to its sustainable limit where a piped supply was not available, encouragement of rainwater harvesting, conservation and preservation of all the water bodies, use of treated wastewater for irrigation and some other industrial and non-potable purposes as an economic alternative to Cauvery water to be used, create awareness among the water users about scarcity of water and to conserve the same and Drought and Emergency management plans should be developed and introduced as needed.

##### ***(a) Exploitation of Ground Water due to delay in implementation of GBWASP***

The stipulated period of completion of GBWASP project was three years after administrative approval (December 2003). The project also included House Service Connection Component (HSC) for the beneficiaries who had paid beneficiary capital contribution charges to avoid frequent road cutting. Though, the work was entrusted between April 2005 and December 2009, the work was completed during the period June 2008 and December 2013 *i.e.*, after delays ranging from two to 80 months. In spite of directions issued by the Project Steering Committee, the Board did not prepare water supply plan,

project implementation schedule and action plan for the project which accounted for the delay in implementation of the project. Further, the Board had awarded (April 2007) the contract for providing and laying of the feeder mains after a lapse of two years after award of work for providing water supply facilities under Phase I. The work of feeder main was completed between December 2012 and June 2013.

Meanwhile, the State Government accorded (August 2008) sanction for drilling new borewells alongwith energising existing bore wells located in the erstwhile CMC/TMC areas to mitigate the scarcity of water. Accordingly, the Board drilled 1,755 new bore wells and energised 1,734 existing bore wells in four phases during the period June 2008 and August 2011 after incurring an expenditure of ₹ 35.98 crore. Hence, delay in implementation of the project not only resulted in avoidable expenditure of ₹ 35.98 crore, it also resulted in exploitation of ground water. In response, Board stated that drilling of bore wells was required as an alternative source and was a welfare measure to the residents of the area. However, the fact remains that the delay in commissioning the project, resulted in avoidable expenditure of ₹ 35.98 crore.

Further, the State Government in its order had stated (September 2008) that the provision for water supply from the bore wells was temporary and thus, after commissioning of the water supply projects, the use of bore wells was required to be dispensed with, in a phased manner. Audit also observed that the Project Steering Committee had also advised phasing out of water supply through borewell connections during February 2009 and January 2010. However, Audit observed that:

- The Board continued to supply water through borewells even after commissioning of the water supply projects thereby contributing to the depletion of ground water table. The Government stated in the Exit Conference that the project was being commissioned in a phased manner and until Cauvery water was supplied to each household, the bore wells would continue to be operated. The fact, however, remains that ground water was getting depleted due to delay in commissioning of the project.
- As against 6,67,974 properties in the erstwhile CMCs/TMC, HSCs were provided to 1,33,312 properties. Further, out of the HSCs provided, only 87,761 had metered connections. Non-provisioning of HSCs and unmetered connections contributed to increase in UFW/NRW. The Board stated that though Government decided (May 2009) to provide HSC to all the properties in the area irrespective of payment of beneficiary contribution, due to unwillingness of the residents to have metered connections, HSC was not provided. The Board assured that it would make all efforts to meter the balance HSCs. The reply was not justified as the Board has failed to ensure metered connections in all the HSCs and could not collect water charges.

**Recommendation 1:** Board may take effective and time bound steps to minimise non-revenue water by reducing number of unmetered connections to facilitate billing and revenue collection on actual water consumption basis and by expediting the works already identified by the Board and improving leakage detection.

**(b) Rain Water Harvesting Scheme**

Rain water harvesting is simple, economical and eco-friendly technique of preserving water and also an effective way to recharge ground water. In exercise of powers conferred under Section 72A of the Bangalore Water Supply and Sewerage Act, 1964, the State Government notified (May 2011) 31 December 2011 to be the date within which rain water harvesting structure for storage use or for the ground water recharge should be provided by every owner or occupier of a building having sital area of not less than 2400 sq ft or every owner who proposes to construct a building on a sital area of not less than 1200 sq ft as per regulations and guidelines issued by the Board.

Audit observed that as at the end of March 2014, only 49,700 out of 55,000 properties had provided rain water harvesting structure. Further, the Master Plan, 2002 had recommended encouraging rainwater harvesting by the provision of a one off rebate to commercial and industrial establishments that install an approved collection system and storage tanks. It also recommended encouraging rainwater harvesting in houses and buildings with larger roof areas. This rebate was to be related to the estimated volume of water saved. However, the Board had not taken any action to either implement the recommendation of the report or to adopt any other means of ensuring total compliance. The Board assured in the Exit Conference that action would be taken to implement the provision of a one off rebate to commercial and industrial establishments who have implemented rain water harvesting system.

**Recommendation 2:** In order to protect the depleting ground water levels, the Board needs to implement rainwater harvesting as per recommendations of Master Plan, 2002.

**(c) Sewerage Management Plan**

As per para 3.2.4 of the CPHEEO manual on sewerage, 80 *per cent* of the water supplied gets converted as sewage. Hence, on commissioning (October 2012) CWSS Stage IV, Phase II, against Board supply of 1,355 MLD of water, 1,084 MLD of sewage was generated. However, the existing capacity of the Sewage Treatment Plants (STPs) was only 721 MLD which was inadequate. Further, it was observed that only 549 MLD of waste water was treated against capacity of 721 MLD installed. The under-utilisation was attributed to silting and collapse of sewers due to corrosion which resulted in waste water being discharged in open storm water drains instead of STPs.

In order to overcome the problem, the Board took up (2005-06) the sewerage component under CWSS Stage IV, Phase II scheme. The scheme consisted of installing 11 STPs of 403 MLD capacity, eight intermediate sewage pumping stations (ISPs), five terminal sewage pumping stations (TSPs) along with replacement of damaged and hydraulically inadequate pipelines.

While the Government specified (June 2005) 2005-12 as period for implementation of the scheme, the contract agreement signed (March 2007) with the Project Management Consultant stipulated the scheme to be completed by 31 March 2013 which included defect liability period of one year and the loan agreement was signed during March 2006. The progress of the work undertaken is brought out in **Table-2.12** below:

**Table-2.12: Progress of sewerage component as at the end of March 2014**

Name of the work	Total no of works proposed	No of works undertaken	Date of award	Date of completion	Expenditure incurred (₹ in crore)	Balance works yet to be taken
Construction of STPs	11	09	October 2012 - March 2014	Under progress	85.08	02
Construction of ISPs	08	05	December 2012- January 2014			03
Construction of TSPs	05	00	-	-	-	05
Rehabilitation of existing sewers	10	10	September/October 2012	Under progress	114.64	00

(Source: Information furnished by the Board)

Audit observed that out of 24 works awarded, while 19 works were awarded during October 2012, balance 10 works were awarded during last quarter of 2012. The stipulated period of completion ranged between 12 to 30 months. Monthly progress report of March 2014 revealed that 10 works relating to rehabilitation of existing sewers were yet to be completed even though the date of completion was stipulated as October 2013. Delay in completion of various works resulted in the sewage being discharged into storm water drainage.

**Recommendation 3:** Board requires to expedite the works taken up under the sewerage component in order to utilise the full capacity of STPs installed and also to treat the full capacity of sewerage generated.

**(d) Implementation of other recommendations**

In order to create awareness among the public about the scarcity of water and its conservation, the Board opened a theme park at Jayanagar, Bengaluru about the rain water harvesting scheme. However, the Board had not formulated Drought and Emergency Management Plan which addresses the issue of better conservation of water. Also, efforts on the part of the Board to implement other recommendations of Master Plan 2002 viz., conservation and preservation of ponds/lakes, laying of dual pipeline for supply of water for potable and non-potable purposes separately etc., were not forthcoming. In the Exit Conference, Government stated that arrangements for 'dual piping system' were being made for newly constructed highrise buildings. Further,

it was also stated that efforts would be made to preserve the ponds and lakes for conservation of water.

**Recommendation-4** : Government may formulate Drought and Emergency Management Plan in view of restriction of drawal of water from the river Cauvery.

### 2.2.8.3 Contract Management

Scrutiny of records relating to contract management in respect of two schemes revealed the lapses in preparation of estimates, deficiencies in tender, non-compliance with standards prescribed, price variation *etc.*, which are brought out in subsequent paragraphs.

#### (a) Lapses in preparation of estimates

Estimates are prepared after detailed survey, investigation and structural design/drawings. It also contains quantities of different items of work concerned whose rates are deduced from the current SR which enable the authorities to work out approximate cost of work, cost of tender documents, class of contractors required to execute work, funding of project *etc.* As per PWD code, the estimates should be as realistic as possible.

On scrutiny of the estimates with respect to two schemes CWSS Stage IV, Phase II and GBWASP, it was observed that the Board had adopted incorrect rates and had made unnecessary provisions *etc.*, which had resulted in unrealistic estimates. The observations in this regard are brought out in subsequent paragraphs.

- **Adoption of manual means instead of mechanical means for excavation**

In the absence of any particular item in Board's SR, estimates are prepared on the basis of norms prescribed in PWD SR, Karnataka Urban Water Supply and Drainage Board (KUWS&DB) SR *etc.* The SR of the Board for earth excavation specified rate of ₹ 81 per cum without specifying the type of means, manual or mechanical by which it was to be executed. The Board had adopted the above rate for earth excavation in its estimate and while inviting tenders, it had specified mechanical means for earth excavation for which it did not have specific rate in its own SR. The rate for earth work through mechanical means was between ₹ 28 to ₹ 38 per cum as per PWD SR. Audit observed that the work carried out was a mix of mechanical and manual means as specified in the tender document. However, the payment was made without distinguishing between the two methods. Thus, by adopting inappropriate rates, Board had inflated its estimate by ₹ 29.20 crore. This resulted in settling of higher rates for excavation works with contractors and excess payment of ₹ 30.30 crore (**Appendix-2.3**).

The Board stated (July 2014) in its reply that the tender document had specified that all excavation works had to be carried out through mechanical means unless the work involved was required to be carried out by manual

method. Hence, there was no contradiction between tender specification and work executed. The reply was not acceptable as the contractors quoted their rates as against the inflated estimates resulting in excess payment to the contractors.

- **Additions to estimate to account taxes payable by the contractor**

The estimate pertaining to the five works (W5a to W5e) of CWSS IV Stage, II Phase was revised as the original estimate did not include taxes payable by contractor. The additions were Work Contract Tax @ four per cent, Service Tax @ 4.13 per cent, Labour Welfare Cess @ one per cent and Insurance @ 0.5 per cent. This resulted in revising the estimate by ₹ 81 crore. Since the standard rate analysis provides for an addition of 10 per cent as contractor's overheads, additions to cover the tax liabilities of contractors lacked justification. This resulted in the estimate being inflated, the details of which are indicated in the **Table-2.13**.

**Table-2.13: Details of additions of contractor's overheads**

(₹ in crore)

Sl. No.	Name of the Package	Original estimated amount	Revised estimate	Amount added towards taxes, cess etc.
1	W5a – Fabrication and Laying Clear Water Mains from T K halli to J K Doddi	103.99	121.38	10.40
2	W5b – Fabrication and Laying Clear Water Mains from J K Doddi to Harohalli	122.20	142.04	12.19
3	W5c – Fabrication and Laying Clear Water Mains from Harohalli to Vajarahalli	131.89	152.72	13.12
4	W5d – Procurement, Fabrication and Laying of Clear Water Mains from Vajarahalli to GKVK II on the west of Bengaluru	233.65	280.30	24.40
5	W5e – Procurement, Fabrication and Laying of Clear Water Mains from Vajarahalli to HBR on the east of Bengaluru	199.62	242.60	21.09
	<b>Total</b>			<b>81.20</b>

(Source: Information furnished by the Board)

Thus, accountability of the official for floating estimates resulting in loss to the Board needs to be fixed.

However, the Board stated (November 2014) that the overhead of 10 per cent included in the SR was not sufficient to account for contractor's taxes, insurance liabilities and corporate overheads. The reply was not acceptable as the said overhead was not included while revising estimates in other works W1, W2, W3, W6a & W6b which were awarded under the scheme.

- **Incorrect rate adopted for waterbound macadam**

The estimate prepared for two works (W5d and W5e) of CWSS Stage IV, Phase II included ₹ 1,085 per sq mtr for laying waterbound macadam (wbm). This worked out to ₹ 4,340<sup>17</sup> per cum. However, the SR rate for the said

<sup>17</sup> 1 sq mtr of area with assuming 250 mm thickness wbm = 0.250 cum wbm. Hence, ₹ 1085/sq mtr = 1085/0.250 = ₹ 4340/cum

work was ₹ 1,158 per cum. The quantity of work to be executed in the two works was 7,801.50 cum. Hence, adoption of higher rate resulted in inflating the estimate by ₹ 2.48 crore leading to undue benefit to the contractor for which responsibility needs to be fixed.

- ***Non-adoption of SR rates***

As a best practice, the Board was required to consider SR during preparation of estimates and in absence of rates for any items, Board was to adopt SR rates of either PWD or KUWS&DB.

While preparing estimates for works under GBWASP, Phase I and II, the Board, however adopted DGS&D rates and Board's store issue rate respectively in respect of DI pipes even though SR of the Board was available. Analysis of the rates revealed that the Board had adopted rates which were higher than the rate prescribed in Board's SR. This resulted in boosting up of estimates by ₹ 19.61 crore (**Appendix-2.4**) which was indicative of favour shown to the contractors and loss to the Board.

The Board in its reply stated (November 2014) that at the time of preparation of estimate, the rates of DGS&D/stores issue rate for material component was considered to have a realistic rate. The reply was not acceptable as the Board had adopted DGS&D rate during the Phase I, stores issue rate during Phase II and SR rate for material during Phase III which indicates the inconsistency of the Board in adopting the rates.

**Recommendation-5:** Board may refer to SRs of other departments of Karnataka Government and review its schedule of rates so that estimates prepared are realistic.

**(b) *Deficiencies in tender***

The CWSS Stage IV, Phase II contracts were based on FIDIC conditions of contract, while the GBWASP were governed by standard contract conditions of Government of Karnataka. The FIDIC conditions had discouraged changing the specification of works after the opening of financial bids. The Government of Karnataka had stipulated certain periods to be allowed to the prospective bidders to submit their tenders. Scrutiny of contracts against these conditions revealed the following:

- ***Incorrect assessment of requirement***

The work of construction, operation and maintenance of 550 MLD water treatment plant at TK Halli under the CWSS Stage IV, Phase II –W2 was awarded to lowest tenderer during March 2010 after negotiations. Estimated cost of the work was ₹ 145 crore. During negotiation (July 2009), Chief Engineer addressed L1 the possibility of Value Engineering optimisation in clarifier bypass channel, filters and DG set. The L1 indicated lowering of hydraulic retention time in clarifier bypass channel by 10 minutes,



elimination of redundant filter units and lowering of capacity of DG set. Apart from the above, the L1 proposed for reduction in size of Chlorine storage building. Agreement was entered (November 2009) into with L1 after accepting value engineering optimisation in respect of clarifier bypass channel, filters and standby DG set only with discount of ₹ 5.25 crore. The Board forwarded (September 2010) the contract agreement to JICA for concurrence. However, JICA objected (March 2010) to the reduction as it violated procurement guidelines which prohibited changes in technical specification or financial aspects after opening of the bids and directed to revise the contract to original quoted price.

Thus, failure on the part of the Board to assess its requirement correctly and also to propose changes to technical specification, if required, at the time of pre-bid queries, resulted in Board incurring avoidable expenditure of ₹ 5.25 crore.

Board replied during Exit Conference that they would recover the amount in question.

- ***Non adherence to the provision of KTPP Act/Rules***

The Karnataka Transparency in Public Procurement Act (KTPP), 1999 and KTTTP Rules, 2000 under Section 17 prescribe 60 days for submission of tenders in excess of ₹ Two crore. However, while inviting tenders for providing water supply HSCs under GBWASP in four zones the Board reduced the period with the approval of Chairman to 30 days citing reasons such as the works were of simple type which contained fewer specification, assessment of cost of material/labour would require less time, HSC was to be provided immediately *etc.*

Further, the Board invited (August 2010) tenders for the Eastern zone only against which only two bidders submitted their quotations. The work was entrusted (January 2011) to the lowest bidder after negotiations (19 per cent above amount put to tender) with stipulated date of completion being January 2012. Hence, by relaxing the tender submission time, the Board lost benefit of competitive bidding due to lack of participation of bidders, which would have resulted in receipt of less rates.

The Board stated (November 2014) in reply that in order to complete the work before commissioning of CWSS Stage IV, Phase II short term tender was invited. The reply was not acceptable, as work with respect to only one zone was taken up which was yet to be completed, though CWSS Stage IV, Phase II had already been completed.

- (c) ***Non compliance with the standards prescribed***

The various components of pipeline works under CWSS Stage IV, Phase II and GBWASP were required to be designed and executed in accordance with relevant CPHEEO, Indian Standards and Railway Standards. In addition, the

project roads had to be built according to Indian Road Congress codes and Ministry of Road Transport and Highways (MORTH) specifications. The deviations observed by Audit are detailed below.

- ***Excess excavation provided for pipeline trenches***

The work of laying of pipelines laid under the ground involved excavation of trenches. As per the CPHEEO manual, the width of the trench to be excavated for laying pipes should be in accordance with Indian Standards IS-4127 and the standard prescribed width to be equal to the diameter of the pipe plus 400mm for trenches with depth above 1.20 mtrs.

Scrutiny of records showed that in six works (W1, W5a to W5e), the Board provided width for excavation as 'diameter of the pipe plus 1,000 mm' which was in contradiction to the standards specified. This resulted in excess excavation leading to excess expenditure of ₹ 7.38 crore as detailed in **Appendix-2.5** and **Appendix-2.6** requiring responsibility to be fixed.

The Board replied (November 2014) that the minimum width mentioned in the code could vary keeping in view the safety, space required for laying, jointing *etc.* Board also stated that as the pipe size was considerably high, it required careful handling and laying to avoid damage to the pipe. Board, further stated that field welding involved circumferential welding, for which, the said space of 200mm on either side of the pipe was insufficient. The reply was not tenable as machinery was used for laying and handling the pipes with high degree of precision.

- ***Adoption of Wet Mix Macadam (WMM) instead of Water Bound Macadam (WBM)***

The three works (W1, W5a and W5b) of CWSS Stage IV, Phase II included road works which involved formation of 160 mm thick WBM. The details of the works are brought out in the **Table-2.14** below:

**Table-2.14: Details of road works in W1, W5a and W5b**

Name of work	Period of execution	Quantity of work in cum	Rate for WBM as per agreement (in ₹)		Rate for WMM in cum as per the SR(in ₹)	Tender premium (in %)	Rate payable for WMM (in ₹)	Excess payment (₹ in crore)
			in sq mtr	in cum				
W1	2012-13	8,429.00	501	3,131	982	33.70	1,312.93	1.53
W5a	2009-10	12,822.40	220	1,375	981	23.70	1,213.59	0.21
W5b	2009-10	13,445.92	400	2,500	981	23.63	1,212.81	1.73
<b>Total</b>								<b>3.47</b>

(Source: Information furnished by the Board)

The inspection reports of the consultants as well of Chief Engineer showed that the contractor had used WMM instead of WBM. However, payment for the work was made for WBM. This resulted in excess payment to the tune of ₹ 3.47 crore.

The Board stated (June 2014) in its reply that though WBM and WMM were different, they served the same purpose and hence, the WMM was adopted by providing prime coat with slow setting bituminous emulsion and tack coat as per MORTH specification without any extra financial implication and additional cost. The reply was not acceptable as there existed an excess payment of ₹ 1.53 crore even after considering the cost of prime coat as well as tack coat.

- *Provision for excess thickness of bituminous macadam road works resulted in wasteful expenditure*

The Board had provided for laying of bituminous macadam of 60 mm thickness over the 225 mm WBM in the two works (W5a and W5c) of CWSS Stage IV, Phase II. Details of quantity executed and payment made are indicated in the **Table-2.15** below:

**Table-2.15: Details of bituminous macadam laid**

Name of the work	Rate per sq mtr	Quantity executed (in sq mtr)	Quantity that should have been executed as per IRC 37 (in sq mtr)	Excess quantity executed (in sq mtr)	Excess expenditure (₹ in crore)
W5c	185	93,790.98	78,159.00	15,631.98	0.29
W5a	400	74,144.30	61,789.67	12,357.63	0.49

(Source: Information furnished by the Board)

However, as per IRC 37, the bituminous surface to be provided over WBM of thickness 225 mm was of 50 mm thickness. Hence, by providing bituminous of thickness 60 mm, Board incurred a wasteful expenditure of ₹ 78 lakh.

The Board replied (June 2014) that 60 mm thickness of bituminous was provided in view of possibility of movement of heavy vehicles. The reply was not acceptable as the strength of the road depended on the combination of sub base, base, binder and surface course. If a thickness of 60 mm bituminous binder was provided, then the corresponding base course and sub-base course should have been of thickness 250 mm and 335 mm respectively. However, it is observed that while the base course was of 225 mm thickness, the sub-base course was of 165 mm thickness only which was sufficient for 50 mm bituminous.

- *Adoption of incorrect ‘C’ value*

The CPHEEO Manual in para 6.2.2 observed that despite technological advancement and improved method of manufacturing, current practice of adopting conservative co-efficients of roughness (C values) resulted in under-utilisation of pipe materials. Further, it also stated that AC concrete and cement mortar/epoxy lined metallic pipes did not show any significant reduction in their carrying capacity with age and therefore suggested that design C values should not be substantially different from those adopted for new pipes. Hence, it recommended the Hazzen William Co-efficient ‘C’ for

both new conduit materials and for design purpose in respect of cement mortar or epoxy lined mild steel pipe of diameter above 1,200 mm and upto 1,200 mm to be 145 and 140 respectively.

Under CWSS Stage IV, Phase II, the Board, however, had adopted a C value of 120 for the work of providing and laying of raw water transmission main, clear water transmission main and city trunk main. Since, the C value was one of the contributing factors in determining the size<sup>18</sup> of the pipe line, reduction in value of C automatically led to increase in diameter of pipe when other parameters remained constant.

Hence, non-adoption of C values as prescribed in CPHEEO manual resulted in providing higher diameter of pipe and also avoidable expenditure of ₹ 81.50 crore, keeping all other parameters same as designed by the Board (**Appendix-2.7**) for which responsibility may be fixed.

The Board replied (July 2014) that theoretically, cement mortar lined large sized steel pipes should have C value of 145 or more as stipulated by the above said manual which was also verified by microscopic measurement of roughness conducted by Indian Institute of Science. However, it stated that in-situ observations on cross country pipelines rarely indicated an effective C value of more than 130. This was due to additional minor losses at joints due to lack of pockets in pipelines *etc.*, and in this context, Board stated that the C value of 120 was taken.

The reply was not acceptable as the tests and field observations made by the consultants (May 2008) were on old pipes where the carrying capacity slightly gets reduced during course of time. Further, as the design capacity of the pipes was for 540 MLD, the actual quantum of water required to carry was only 500 MLD. Thus, there existed a cushion of 40 MLD to discount for the possible reduction in carrying capacity over period of time.

**(d) Price variation**

The contracts for CWSS Stage IV, Phase II included in them a price variation clause which envisaged compensation to the contractors for the fluctuation in the cost of inputs to the work. The formula was devised and embedded in the contracts to facilitate the calculation of amount of compensation. Scrutiny of these formulae and calculations by audit revealed the following cases of excess payments as compensation of price rise.

<sup>18</sup> Hazzen William formula is used for calculating the diameter and velocity of flow in case of pressure conduits.  $Q = 1.29 \cdot 10^{-5} C d^{2.63} S^{0.54}$  where Q is the discharge in cum/hr, d is the diameter of pipe, S is the slope of hydraulic grade line and C Hazzen William co-efficient.

- ***Excess payment on account of adoption of inappropriate indices for calculation of price adjustment factor***

The Board had entered (February 2009) into a contract with M/s Steel Authority of India Limited for supply of MS Plates for three works (W5a, W5b and W5c) of CWSS Stage IV, Phase II. Under the special conditions of contract, the prices payable to the supplier were subject to adjustment to reflect changes in the cost of labour and material components. For this, indices for goods supplied from within the purchaser's country and for goods supplied from outside the purchaser's country were indicated separately.

It was observed that the Board had calculated price variations for material component for all the interim payments adopting indices applicable for the goods supplied from outside the purchaser's country. However, while calculating the price variation for labour component, the price indices for goods supplied from within the purchaser's country was adopted. Since M/s. SAIL had quoted its rates for goods supplied from within the purchaser's country, the Board had to adopt indices pertaining to it for calculation of price adjustment towards material. Thus, adoption of inappropriate indices by the Board resulted in excess payment of ₹ 18.85 crore (**Appendix-2.8**), which calls for fixing responsibility in the case.

The Board stated (June 2014) in its reply that the material component consisted of 30 per cent of coal, 30 per cent of metallic materials and 15 per cent of electricity and weighted average of these components is considered to arrive at price index of material component. It further stated that this analogy was common to both goods purchased from outside the country and within the country. The reply was not acceptable as the contract clause clearly included a condition to adopt price indices of Reserve Bank of India (RBI) for goods supplied within the purchaser's country which was accepted by both the parties.

- ***Adoption of inappropriate indices in respect of material component for calculating price adjustment***

The Board awarded ten different works (W1, W2, W3, W5a to W5e, W6a and W6b) to different contract agencies. The contract included a sub clause on 'adjustment of changes in costs' wherein the contractor was entitled for payment or liable for recovery towards changes in the cost of labour, material and fuel and power on the interim amounts paid to him during the course of contract period. The indices to be adopted for calculation were on the price index published by RBI for each item.

Scrutiny of contract with respect to all the works showed that in W1 contract, the Board had stipulated that the material portion would be adjusted as per fluctuations in the indices published by RBI for each material used. Further, in respect of all other nine works, the Board stipulated that the material portion would be adjusted as per the fluctuations in the indices for 'all commodities' which included majority of the items apart from cement, steel,

electrical machinery, machinery and machine tools, non-metallic minerals *etc.*, actually used on the work. However, reason for the variation in adopting different indices in different works was not on record.

The whole-sale average price indices published by RBI contained indices for the commodities<sup>19</sup> as well for “All Commodities”<sup>20</sup>. The weight of actual materials useable on the respective packages considered in the All Commodities ranged from 1.59 *per cent* to 12.87 *per cent* which made evident their poor representation in all commodities.

Thus, prescribing inappropriate item of indices instead of the relevant material indices for material portion to calculate price adjustments by the Board resulted in excess payment of ₹ 150.40 crore to the contractors as detailed in **Appendix-2.9**.

The Board stated (November 2014) in its reply that under these contracts various materials were used such as Aggregates, Sand, Cement, Reinforcement Steel, Wood, Steel for pipelines, Valves, Welding materials, Polythene Sheets *etc.* Hence, price index of RBI for “All Commodities” was appropriate for material component. The reply was not acceptable as only the chief commodities that go into the work have to be considered for price variation and other minor materials whose cost is negligible are to be ignored for simplicity in calculation of price variation amount.

**(e) Other irregularities in execution**

The execution of work of CWSS Stage IV, Phase II involved huge quantities of earth excavation, pipe fabrication, pipe support systems, reinforced concrete structures, laying of roads, *etc.* Scrutiny of estimates, contracts and their performance revealed the following other irregularities which are detailed in succeeding paragraphs.

- **Mismatch between excavated quantity and backfilling**

Review of bills of quantities and running account bills of six works (W1 and W5a to W5e) of CWSS Stage IV, Phase II revealed that earth excavation for trenches was carried out in all soils, ordinary rock and hard rock and also there existed item of work for backfilling<sup>21</sup>. In fact, the excavated quantity should match with sum of volume of pipe plus quantity of backfilling. However, it was observed that excavated quantity (19,31,476.07 cum) exceeded sum of pipe volume and backfilling (15,92,634.98 cum) by

<sup>19</sup> Cement, Steel Electrical Machinery, Machinery & Machine Tools, and Other Non metallic Minerals.

<sup>20</sup> Food Articles, Non-Food Articles, Plastic Articles, Wood and Wooden articles, manufactured goods, Rubber and Rubber products, Machineries, Minerals, Vehicles and many more items including Cement Steel and Non-metallic Minerals.

<sup>21</sup> Refilling after positioning and securing pipelines in the excavated trenches is called backfilling.

3,38,841.09 cum. Thus, over measurements were recorded for excavation which led to excess payment of ₹ 9.91 crore to contractor (**Appendix-2.10**).

The Board replied (June 2014) that the quantum of backfilling was worked out after considering the deductions towards the pipe volume, bedding materials wherever applicable, concrete items with respect to thrust block, anchor blocks, valves cisterns. The Board stated that deducting only volume of pipes from the excavated quantity would, therefore, not match with the backfilling quantity. The reply was not acceptable as the excavation for thrust block, anchor block, valve cistern *etc.*, stood separately in the running account bills and has not been considered for calculating earth excavation.

- ***Excavation of hard rock by blasting***

The broad scope of the work W1 of CWSS Stage IV, Phase II included construction of raw water channel for a length of about 700 metre from Shiva Balance Reservoir (SBR) including canal intake at SBR, supplying, fabricating and laying of 3,000 mm dia gravity main pipeline of 6.3 km from SBR to Netkal Balancing Reservoir (NBR), supplying, fabricating and laying of 2,600 mm dia ID Steel raw water gravity main of 9.5 km from NBR to water treatment plant at TK Halli. The work involved excavation work for pipe line trenches, open channel as well as canal intake and the excavation involved excavation in soil, soft rock and hard rock. The specification in the bill of quantities included hard rock excavation through chiselling and mechanical breaker and the payment was also for manual means.

The scrutiny of records however revealed that as per the standard basic specification clause 3.8.1 of the contract, the contractor was free to excavate rock by blasting and the Executive Engineer of the Board had given permission (September 2010) to the contractor to excavate rock by blasting. Thus, the Board had extended undue benefit to the contractor to an extent of ₹ 7.16 crore (**Appendix-2.11**).

The Board replied (June 2014) that though the contractor was given permission for blasting, he was denied permission by Karnataka Power Corporation Limited. The reply was not acceptable as the inspection reports of the consultant indicated that the excavation was carried out by blasting. Further, the safety concerns owing to negligence on the part of the contractor while carrying out blasting operations were raised in the inspection reports. Board stated in reply (November 2014), that 42,470.55 cum of excavation was through control blasting and the excess payment of ₹ 1.11 crore made in this regard was proposed for recovery.

- ***Execution of road works by using bituminous macadam***

IRC manual para 4.2.3.1 specifies standards for road work. As per the standard, bituminous macadam is the binder course to be provided between base course and surface course. Scrutiny of the estimate and bills of quantities of three works (W1, W5a and W5b) of CWSS Stage IV, Phase II

showed that the Board had provided the following specification for the binder course:

‘Supplying and spreading 25 mm and 40 mm metal up to 80 mm thick rolling with power roller weighing not less than 10 tonnes, spraying bitumen of grade S35/S65 @ 5.50ks/m<sup>2</sup> spreading 12 mm chips, crushing, rolling and finishing the work with a second coat of asphalt of grade S35/S65 *etc*’. Against the estimated price of ₹ 406/sq mtr, the contracted price was ₹ 429/sq mtr.

Audit observed that against the above technical specification, during execution, bituminous macadam was provided. Though, the rate for 50 mm bituminous macadam using 80/100 bituminous grade as per SR 2009-10 worked out to ₹ 275.36/ sq mtr (₹ 4,119 /cum plus tender premium of 33.70 *per cent* was ₹ 5,507.10 / cum), payment was made at ₹ 429/sq mtr. Hence, Board incurred an excess expenditure of ₹ 2.49 crore in the three works as detailed in **Table-2.16** below:

**Table-2.16: Details of extra expenditure incurred**

(₹ in crore)

Name of the work	Quantity of work (in sq mtr)	Payment made as per contract price	Amount for bituminous macadam	Excess expenditure
W1	63,200.00	2.71	1.74	0.97
W5a	74,144.30	2.97	2.04	0.93
W5b	77,406.00	2.72	2.13	0.59
<b>Total</b>		<b>8.40</b>	<b>5.91</b>	<b>2.49</b>

(Source: Information furnished by the Board)

The Board stated (June 2014) in its reply that the specification in the Bill of Quantity (BOQ) was of old and conventional method. Further, it stated that the method adopted for execution was more reliable and advanced since it was faster and stronger than the conventional method. The reply was not acceptable as bitumen of grade S35/65 was superior. Moreover, the Board had not received any rebate for the said work.

- **Use of Fe 415 instead of Fe 500 Steel**

The six works (W1, W5a to W5e) of CWSS Stage IV, Phase II alongwith fabrication and laying of pipeline involved substantial quantity of reinforcement cement concrete work for different structures such as saddle support, anchor thrust block *etc*. The different grades of steel used as reinforcing bars in the RCC were Fe415, Fe500 *etc*. The Board while preparing estimates for the above work had used PWD SR 2008-09 and the said SR had adopted price of Fe500. Hence, the rate of Fe500 was loaded into the estimates of the Board. It was, however, observed that the Board in its technical specification had mentioned Fe415 and the contractor though had used Fe415 steel in the said works, had quoted rates of PWD SR 2008-09 which was of Fe500 steel.

Since the strength of one MT of Fe500 steel was equal to 1.20MT of Fe415 steel, in place of 1.20MT of Fe415, it would be enough to use one MT of



Fe500 steel. Thus, there would have been 16.66 *per cent* of savings in steel had Fe500 steel been used. Hence, failure of the Board to use Fe500 steel even after loading it in estimate and also the BOQ resulted in excess payment of ₹ 8.69 crore to the contractor. (**Appendix-2.12**).

The Board stated (June 2014) in reply that the rates considered as per SR was only for estimate and the rates quoted by the contractor were as per specification given in the technical specification. Further, it also stated that SR 2008-09 specified TMT steel without any confirmation regarding the grade of steel and hence could not be construed that SR included the rate of Fe500. The reply was not acceptable as the contractor had quoted the rates of SR 2008-09 and the said SR considered rate of Fe500 for TMT steel as per order dated July 2008.

#### **2.2.8.4 Quality Control**

##### **(a) Quality of Water**

The Master Plan, 2002 prepared with the assistance of AusAID had not dealt with the quality of water which was an integral part of the Water Supply Management. The Board was expected to ensure that water supplied to the residents was potable and conformed to the standards prescribed by the CPHEEO. In this regard, it had set up one Central Water Testing Laboratory. The inadequacies in monitoring of quality of water are detailed below:

- The zonal maintenance divisions of the Board were required to investigate the reasons for contamination, in case water samples drawn by the laboratory were found to be non-potable. Scrutiny of records maintained in the laboratory revealed that the number of unsatisfactory samples was on the increasing trend. While the percentage of unsatisfactory samples was 2.12 during 2010, it had increased to 2.21 *per cent* at the end of 2013. It was, however, observed that no action taken reports were received from the concerned maintenance divisions. The Board replied (November 2014) that action would be initiated to obtain the action taken reports henceforth.
- Chapter 15 of the CPHEEO Manual as well as the IS:10500 prescribed the requirement, methods and frequency of sampling and tests for quality of drinking water. Further, as per section 4 of IS:10500, drinking water had to comply with the requirements given in table 1 to 5. The contract agreement of construction of 540 MLD WTP under the CWSS Stage IV, Phase II included test of quality of treated water as per CPHEEO standards. Review of the records of the laboratory established by the agency revealed that tests for substances like poly chlorinated biphenyls, bromoform, dibromo chloro methane, bromo dichloro methane, chloroform, pesticide residue and radio activity were not carried out by the agency.
- Analysis of water as per the manual of CPHEEO included physical, chemical and bacteriological examination. Review of the records of the

laboratory of the Board revealed that tests for manganese, copper, zinc, aluminium were not conducted even though the required equipment was available in the laboratory. Further, tests for toxic substances viz., mercury, selenium, chromium, cyanide, phenolics, pesticides, hydrocarbons and radio activity were not conducted as the required equipments did not exist in the laboratory. The Board stated that action would be taken to conduct the required tests.

- The CPHEEO manual prescribed minimum staff strength of two water analysts, three laboratory technicians and three sample takers required for testing volumes of water more than 7.5 MLD. However, the Board had established only one laboratory which had two water analysts and three laboratory assistants for testing 1,355 MLD of water. It was observed that the testing was done randomly without ensuring coverage of the 30 sub-divisions and 100 service stations at regular intervals. The Board stated (May 2014) that the staffing pattern would be worked out.
- Though, administrative approval was accorded (July 2011) for upgrading the laboratory which included civil works, interiors, procurement of equipments etc., work was yet to be taken up (August 2014) which resulted in ineffective water quality monitoring and testing.
- Manual of operation and maintenance of the water supply systems issued by CPHEEO covered inspection of water system at the source point, transmission mains, treatment plants, storage reservoirs and distribution systems under sanitary inspection. This was a fact finding review to uncover deficiencies and inadequacies that could lead to contamination of water. However, the Board did not have any system of sanitary inspection of all the water supply system created. The Board stated (July 2014) in reply that water was treated at water treatment plant, the reservoirs were also periodically scoured and chlorine boosted and there were very rare cases of contamination. Further, it was also stated that periodical inspection was carried out by the Engineers in their respective jurisdiction and in case of complaint, action was being taken to find out the cause and rectify the same permanently.

**Recommendation-6:** Board is required to adhere to the requirements as prescribed in the CPHEEO Manual with regard to quality testing of water by upgrading the existing laboratory.

**(b) Quality of Material**

Based on the recommendations of the Standing Committee for procurement reform action plan, the State Government issued (February 2005) important instructions which stated that third party inspection should be mandatory for all the works contract of estimated value more than ₹ Two crore. It also instructed to employ quality supervision consultant who was required to inspect the work periodically, submit reports along with prescribed checklist.

The review of the records by Audit revealed that in respect of 18 works awarded during 2008-10, the Board had not appointed any quality supervision consultant or third party inspectors though the estimated cost of each work was above ₹ Two crore. Instead, Board had engaged its own engineers along with manufacturer's representative to inspect the quality of materials brought by the contractors, which was not in order. Thus, quality of the material was not ensured.

#### **2.2.8.5 Operations and Maintenance**

Manual on Operations and Maintenance of Water Supply Systems issued by CPHEEO prescribed for preparation of comprehensive Operations and Maintenance Plan and Manual by all agencies which were entrusted with water supply. Further, the plan so prepared was to be periodically reviewed and modified based on the technological advancements. It also prescribed preparation of Preventive Maintenance Schedule which should contain maintenance of pipelines, servicing of valves/expansion joints, maintenance of valve chambers, maintenance of tools/consumables, etc.

It was, however, observed that neither a plan nor manual on Operations and Maintenance was prepared by the Board. The circulars issued to the maintenance divisions for monitoring valve operations was treated as Operations and Maintenance Plan. Further, the Board did not provide any details on the Preventive Maintenance Schedule.

The scrutiny of budgetary allocation and actual expenditure during 2009-14 in respect of Operations and Maintenance revealed that there were huge savings which ranged from 27 per cent to 51 per cent. The Board stated (July 2014) in its reply that due to paucity of funds, it was unable to take up new maintenance works but rather concentrated on regular maintenance such as plugging of leakages, works of emergency nature, etc.

The Board, however had excessive arrears in revenue which had increased from ₹ 281.18 crore in 2009-10 to ₹ 342.45 crore in 2013-14. This indicated inefficiency in revenue collection. It was also observed that Board had not revised its water tariff since 2005 even though Karnataka Electricity Board had revised its tariff time and again and the Board had revenue deficit since 2005-06 onwards. The Board stated (March 2014) in its reply that a proposal for revision of water tariff has been submitted to the Government for consideration. The reply was not acceptable as the Board is empowered to revise its tariff without reference to the Government.

#### **2.2.9 Conclusion**

Though, the Board had prepared a Water Supply and Conservation Management Plan in 2002, it was yet to implement many of its recommendations namely formulation of Drought and Emergency Management Plan, preservation of ponds/lakes, laying of dual pipelines for

supply of water for potable and non-potable purposes *etc.*, which addresses the issue of conservation of water. Further, the Board has been struggling to keep pace with the rapid urbanisation of the city and the water supply infrastructure created by the Board has failed to match the demand. Delay in commencing projects for combating UFW resulted in increase of UFW thereby increasing loss of revenue.

Central Water Testing Laboratory which was understaffed and lacked infrastructure could only partly comply with the standards prescribed in CPHEEO manual with respect to ground water quality. Not only were the capacities of the STPs inadequate, but they also remained underutilised.

The estimates prepared by the Board were unrealistic as these were inflated on account of unnecessary provision in the estimate, incorrect rates adopted, wrong items used *etc.* Adoption of inappropriate indices for price adjustment factor, execution of work of different specification *etc.*, resulted in excess payment to contractors.

The matter was referred to Government in September 2014; reply yet to be received (October 2014).

