# Chapter-II

# Performance Audit

# Department of Urban Development

## 2.1 Karnataka Urban Water Supply and Drainage Board's role in augmentation of Water Supply and Sewerage systems in Urban Karnataka


### Executive Summary

The Karnataka Urban Water Supply and Drainage Board (Board) which is functioning since August 1975 is responsible for capacity creation and augmentation of Water Supply Schemes (WSS) and Under Ground Drainage (UGD) systems in all the Urban Local Bodies (ULBs) under its jurisdiction in the State. Since, inception, the Board has commissioned 531 WSS and 61 UGD systems across the State. A performance audit of the Board's role in augmentation of Water Supply and Sewerage systems in Urban Karnataka during 2011-12 to 2015-16 showed the following:

- Due to absence of long term plan for both WSS and UGD schemes, it was observed from the test-checked projects that while the Board had taken up WSS repeatedly during 2001-02 to 2015-16 in seven ULBs, it was yet to take up WSS in seven ULBs wherein the per capita water supply was less than the minimum standard fixed by the State.
- The Board had executed without ensuring reliability and dependability of source of water in four test-checked WSS. This resulted in expenditure on the projects which did not deliver the objective of giving the desired level of water supply to the beneficiaries.
- While designing the WSS, the Board had not conducted tests to assess quality of the raw water and thus employed inadequate treatment process, which resulted in presence of coliform bacteria in treated water above permissible limits.
- In violation of the Karnataka Public Works Departmental Code, the Board had invited tenders and awarded contracts without ensuring availability of land in seven test-checked schemes. This resulted in inordinate delay in completion of works and under-utilisation of partially completed works besides untreated sewage mixing with and polluting water bodies.
- The Board could not ascertain exact quantity of water treated, supplied and lost in transmission and distribution in 18 out of 21 test-checked WSS due to non-provision for installation of flow meters at various points of the WSS in the estimates.
- In all the 21 test-checked WSS except for one, the Board was not recycling the filter backwash water in order to increase the availability of treated water and decrease the amount of effluent.
- Inordinate delay in commencement and completion of the schemes had resulted in loss of central assistance to the extent of ₹11.05 crore in respect of two test-checked schemes.

- During execution, the Board had deviated from the approved Detailed Project Report (DPR) *viz.*, by installation of higher capacity pump-sets, non-execution of some works approved in DPR and non-execution of distribution network in WSS. These resulted in additional financial burden on the ULBs and also in non-achievement of the intended objectives of the WSS.
- In the test-checked WSS and UGD schemes, maintenance of the projects handed over to the ULBs was inadequate. This resulted in short utilisation and deterioration of the created assets.
- Adoption of incorrect survey data and non-revision of the DPR for WSS to the Mysuru city resulted in a deficient estimate which led to reduction of the area of coverage from 69 Direct Metering Areas (DMAs) to 47 DMAs and curtailment of funding for the project. Also, failure of the Board to ensure installation and calibration of Pressure Control Valves (PCVs) before declaring the DMAs 24x7 defeated the objective of supplying water 24x7 to the 47 DMAs. Non-installation of water meters and deficient billing coverage resulted in high Non-Revenue Water. Thus, despite incurring an expenditure of ₹271.56 crore, the intended objective of supplying water 24x7 to the city of Mysuru was not achieved.

### 2.1.1 Introduction

The increase in the population of Karnataka, urbanisation and rapid industrialisation are putting the limited water resources of the State under stress. In order to develop and manage its limited water resources, the Government of Karnataka (GoK) brought out the State Water Policy, 2002 with emphasis on providing drinking water to both the rural and urban population. As a supplement to the State Water Policy, 2002, GoK formulated the Urban Drinking Water and Sanitation Policy, 2003. The primary objective of the policy was to provide all residents of urban areas of the State with minimum piped water supply and sanitation services at or near their dwellings in partnership with Urban Local Bodies (ULBs), the Karnataka Urban Water Supply and Drainage Board (Board) and Bangalore Water Supply and Sewerage Board.

### 2.1.2 Institutional Arrangement

The Department of Urban Development in partnership with ULBs in the State and the Board provides water supply and sanitation to the urban population of the State except in Bengaluru city. While the GoK is responsible for policy formulation, financing, setting of service standards, ensuring coordination and collaboration among various agencies both at policy and operational level, the Board is responsible for capacity creation and augmentation of Water Supply Schemes (WSS) and Under Ground Drainage (UGD) systems in all the ULBs under its jurisdiction. In addition, the Board provides operation and maintenance services in the ULBs entrusted by the Government. In the remaining ULBs, the local bodies are responsible for operation and maintenance of water supply and sewerage services in accordance with the prescribed Central Public Health Engineering & Environmental Organisation (CPHEEO) standards.

There are 270 ULBs under the jurisdiction of the Board of which 10 are Corporations, 57 are City Municipal Councils (CMCs), 113 are Town Municipal Councils (TMCs) and 90 are Taluk Panchayats (TPs). Since inception upto March 2016, the Board has commissioned 531 WSS and 61 UGD schemes across the State, which include 13 WSS and five UGD schemes commissioned under centrally sponsored schemes[5].

### 2.1.3 Organisational Set-up

The Board was constituted by an Act of Legislature in 1974 and is functioning since August 1975. The main function of the Board is planning and execution of water supply and sanitation schemes in the urban areas of the State except in Bengaluru city. Its main thrust is to secure institutional finance, undertake investigation, design and execute projects and provide technical guidance to the ULBs in the matter of operation and maintenance of these schemes.

The overall control of the Board's activity vests with the Department of Urban Development headed by an Additional Chief Secretary to the Government. The management of the Board is vested with the Board of Directors which comprises of 11 nominated official members and four non-Governmental members, headed by the Chairman. The Managing Director is the Chief Executive Officer who is assisted by five Chief Engineers, a Secretary and a Chief Accounts Officer. At the field level, the operations are undertaken by 19 divisions headed by Executive Engineers and 55 sub-divisions headed by Assistant Executive Engineers.

### 2.1.4 Audit objectives

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

- the project formulation and planning for WSS and UGD schemes were comprehensive, detailed and accurate;
- the schemes were implemented as planned, with due consideration to economy and effectiveness; and
- the monitoring and evaluation mechanism and post implementation maintenance are adequate.

### 2.1.5 Audit Criteria

The performance audit findings were benchmarked against the following:

- Karnataka State Water Policy, 2002;
- Karnataka Urban Drinking Water and Sanitation Policy, 2003;
- Karnataka Urban Water Supply & Drainage Board (KUWS&DB) Act, 1973 and Rules, 1974;

[5] Urban Infrastructure Development Scheme for Small and Medium Towns (UIDSSMT) programme: 12 WSS and five UGD; Jawaharalal Nehru National Urban Renewal Mission (JnNURM) scheme: One WSS; Atal Mission for Rejuvenation and Urban Transformation (AMRUT) programme (tenders are being invited): 18 WSS and 17 UGD

- Central Public Health Engineering & Environmental Organisation (CPHEEO) Manual for Water Supply and Sewerage;
- The Karnataka Transparency in Public Procurement (KTPP) Act and Rules;
- Karnataka Public Works Accounts & Departmental Code (KPWD 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;
- The Karnataka Government (Transaction of Business) Rules, 1977.

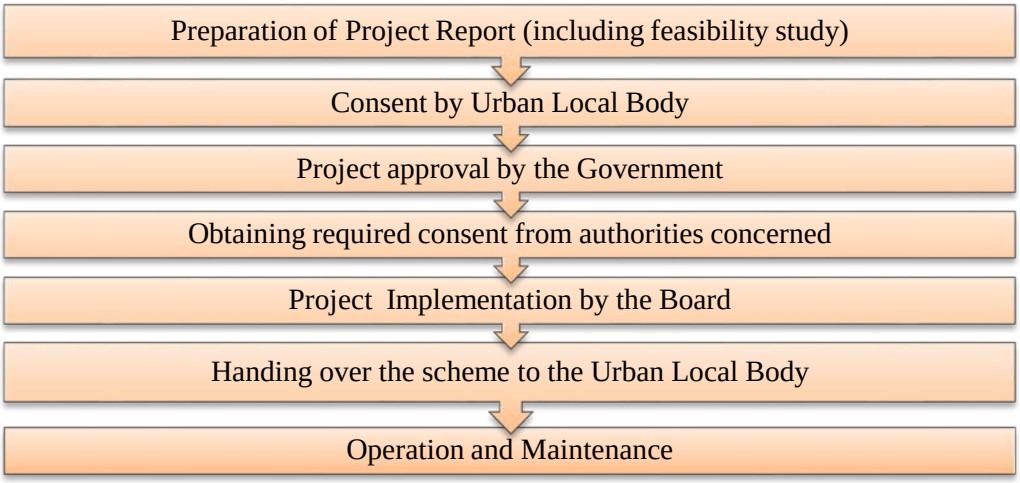
### 2.1.6 Audit Scope and Methodology

The performance audit was conducted during March to August 2016 covering the period 2011-12 to 2015-16 through a test-check of records of the Board's Head Office, five Chief Engineers Offices and eight divisions involved in the development of water supply and sewerage systems. Probability proportional to size without replacement method was adopted for selection of sample of eight out of 19 divisions and 20 completed and 15 ongoing WSS and UGD schemes of the selected eight divisions **(Appendix-2.1)**. Joint inspection of selected schemes was also conducted along with the Board's officers. An entry conference was held on 10 March 2016 in which the audit scope and methodology was shared with Additional Chief Secretary, Urban Development Department, Government of Karnataka. An exit conference was held on 22 December 2016 with the Secretary of the Urban Development Department wherein the audit findings were discussed. The Report takes into account replies furnished by the Board in response to the audit observations communicated to them.

### 2.1.7 Stages in implementation of WSS and UGD schemes

The major stages in implementation of WSS and UGD schemes are detailed in **Chart-2.1.**

**Chart-2.1: Stages in implementation of WSS and UGD schemes**



The process in water supply and providing underground drainage are detailed in Chart-**2.2** and **Chart-2.3** respectively.

**Chart-2.2: Process in Water Supply Scheme (WSS)**

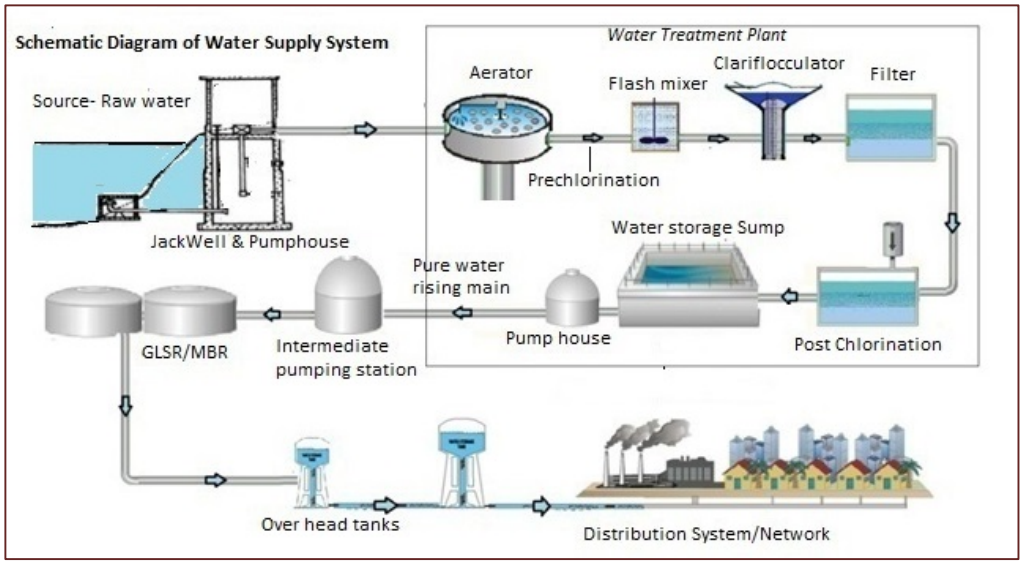
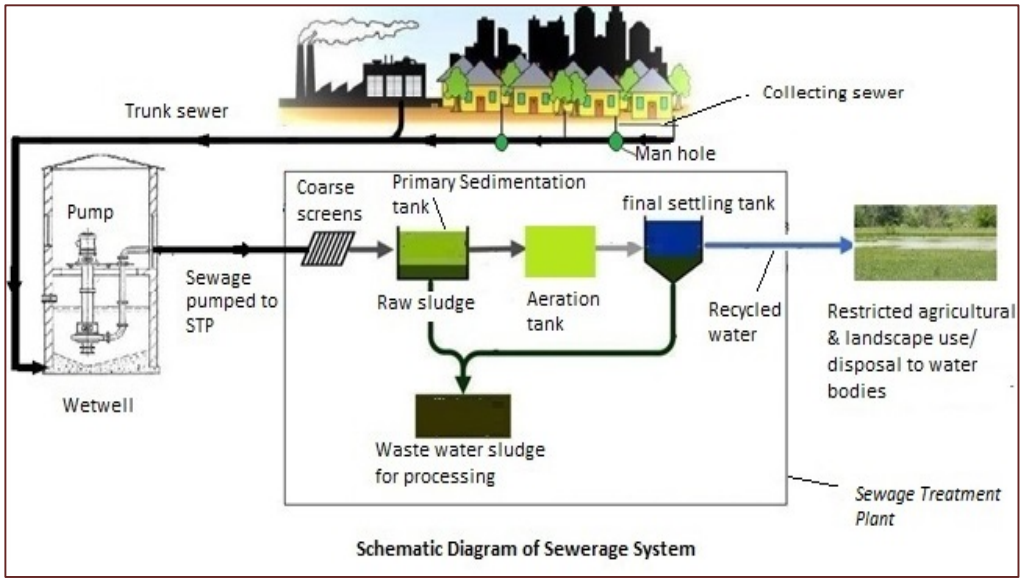



**Chart-2.3: Process in Underground Drainage (UGD) Scheme**




## Audit findings

### 2.1.8 Planning for Water Supply and Underground Drainage Scheme

#### *2.1.8.1 Non-existence of long term plan*

Section 17(1)(a) of the KUWS&DB Act, 1974, stipulates that the schemes for providing water supply and UGD facilities in the urban areas shall be taken up only at the instance of the Government, ULBs or *suo-moto* by the Board. Further, as per the CPHEEO Manual, improvement in water supply services has to be planned as a phased development programme and any near term project

should be such that it would fit into the long-term strategy, which should be consistent with the future overall development plan for the area. The long-term plan has to be prepared for a period of 25 to 30 years.

We, however, observed that the Board did not have any long term plans for both WSS and UGD schemes of the ULBs coming under its jurisdiction.

The Board, while accepting (September 2016) that it did not have a long-term plan stated that it takes up work based on the requisition of the Government/ULB. The reply is not satisfactory as without a long-term plan, the Board's approach to cater to the requirements of the intended beneficiaries is unsystematic and *ad-hoc*. The Board further replied (December 2016) that a Master Plan for providing water supply and UGD system to all the 213 ULBs existing prior to January 2016 under the jurisdiction of the Board has been prepared. However, the Master Plan, which has been prepared in 2016, is deficient as it does not include details like operational expenditure or projections regarding source availability, increase in demand, increase in capital expenditure *etc*. Moreover, the Master Plan has not yet been submitted to Government for approval.

In the absence of a long term plan in the test-checked WSS and UGD schemes, audit could not verify the rationale behind their selection for execution. Further, we observed that WSS in seven ULBs[6] were taken up repeatedly during 2001-02 to 2015-16 within their design period (30 years based on the projected population covered by the WSS) whereas WSS were yet to be taken up in seven[7] ULBs where the per capita water supply was less than the minimum standard fixed by the State. In addition, the Board was required to implement UGD schemes in those ULBs which provided 135 litres per capita per day (lpcd) of water. We, however, observed that the Board was yet to implement UGD schemes in 17[8] such ULBs. The Government replied (January 2017) that an extensive survey of the towns where the per capita availability of water was less than the required minimum standard was conducted and the works would be taken up for execution in a phased manner.

Analysis of two test-checked WSS where the WSS were taken up repeatedly though not required is brought out below:

### *(a) Improvement/augmentation works to existing WSS for Sindagi Town*

The augmentation of the existing WSS to Sindagi Town with Indi Branch Canal (IBC) as source near Yaragal Village was commissioned (October 2002) to supply water at the rate of 113 lpcd for a period up to 2021. All the components

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6 Muddebihal (2001, 2006, 2008), Sindagi (2002, 2010), Hukkeri (1999, 2006, 2013), Sankeshwar (1999, 2006, 2015) and Hubballi-Dharwad (2000, 2007, 2008, 2012), Bailahongal (1995, 2009), Guledgudda (1996, 2009)

7 Kembhavi (35 lpcd), Kartagi, Kudachi (60 lpcd), Mugalakhoda (25 lpcd), Harugeri (35 lpcd) Chicknayakanahalli (35 lpcd), Basavakalyana (18 lpcd)

8 Aluru TP, Arkalgud TP, Channagiri TMC, Dandeli CMC, Holenarasipura TMC, Jamakhandi CMC, Kadur TMC, Karkala TMC, Mundgod TP, Narasimharajapura TP, Sakaleshpur TMC, Siddapura TP, Sindagi TMC, Sirsi CMC, Sringeri TP, Tarikere TMC, Theerthahalli TP

in the existing scheme were working satisfactorily except for frequent leakage in the 315 mm diameter Poly Vinyl Chloride (PVC) rising main from the pump house at impounding reservoir to the aerator at the Water Treatment Plant (WTP). In order to overcome the problem and anticipating creation of UGD system in the town, improvement of the existing WSS from 113 lpcd to 135 lpcd with the same source of IBC was taken up during March 2010. The above scheme was commissioned (April 2013) and handed over to the TMC, Sindagi during October 2015. The total expenditure incurred on this improvement scheme was ₹9.36 crore.

Based on scrutiny of the records, we observed the following:

- The Board has not obtained any assurance for additional quantity of water from the Irrigation Department.
- The existing capacity of WTP (4.54 MLD) was enhanced by adding another 4.54 MLD during the improvement works. The water allocated by the Irrigation Department (March 2001) for WSS to Sindagi was 0.07 Cusecs [0.17 Million Litres per Day (MLD)]. The allocated quantity of water was far less than the designed capacity of the WTP and hence, additional capacity of WTP was not required.
- No proposal had been sent to Government for according administrative approval for implementation of UGD scheme for Sindagi Town. Additional capacity was created in anticipation of such UGD scheme only, proposal for which has not been sent to Government even after two years of completion of the WSS.
- Since the scheme was designed to last till 2021 and was running satisfactorily except for leakage in the pipe, replacement of the defective pipeline would have sufficed.
- During Joint inspection, we observed that the pumping of water at the jack well had been stopped since December 2015 due to non-availability of water at source and water was being supplied from the impounding reservoir and borewells once in 10 days to alternate wards.

Hence, without obtaining assurance of any additional allotment of water and in anticipation of UGD system, the proposal for which has not been even sent, improvement/augmentation works to the existing WSS were undertaken prior to the completion of its design period which was unjustified.

The Board replied (September 2016) that the proposal for UGD scheme had since been submitted to the Government and also Department of Water Resources had been approached for sanction of additional quantity of water.

### *(b) Separate WSS for Hukkeri while the existing scheme was sufficient to meet the requirement*

The existing WSS (commissioned in 1999) for Hukkeri-Sankeshwar towns and 16 en-route villages was designed to supply 19.07 MLD of water from Hidkal reservoir to a prospective population of 1,40,000 (2001) of the said towns and villages. The scheme designed for 16 villages was later extended to 30 villages.

Accordingly, supply was proposed for once in 3-4 days in normal period and once in 5-6 days in summer period.

In order to overcome the above problem, in addition to the existing scheme, two independent WSS for Hukkeri and Sankeshwar were given administrative approval (November 2013) by the State Government and the work was awarded in October 2014. The estimated cost of providing comprehensive WSS for Hukkeri town with Hidkal reservoir as source was ₹26.17 crore. The work is still under progress.

An examination of the records indicate that a separate WSS for Hukkeri town was unnecessary in view of the following:

- The existing capacity of the WSS for Hukkeri-Sankeshwar along with 30 en-route villages was 19.07 MLD. After implementation of independent WSS for Sankeshwar town, the entire 19.07 MLD of water would be available for Hukkeri and the 30 en-route villages. The requirement of water for Hukkeri and 30 en-route villages are given in **Table-2.1.**

**Table-2.1: Requirement of water for Hukkeri and en-route villages**

| User | Projected population (2045) | Water requirement in 2045 (MLD) | Cumulative requirement in 2045 (MLD) | Existing Scheme (MLD) |
|---|---|---|---|---|
| Hukkeri | 36,300 | 6.76 @ 135 lpcd | 15.78 | 19.07 |
| 30 Villages | 1,64,112 | 9.02 @ 55 lpcd | | |

(Source: Information furnished by Board)

As can be seen from the table the capacity of the existing WSS is more than sufficient to cater to the future needs of Hukkeri town and the 30 en-route villages.

Hence, a separate WSS for Hukkeri town was unnecessary and expenditure of ₹13.38 crore towards infrastructure of intake works, jackwell, raw water rising mains, WTP and clear water mains was avoidable.

In the above two cases, it was seen that due to the lack of a long term plan, the Board was executing schemes repeatedly within the design period of the existing schemes, whereas it could have utilised the resources to augment facilities in ULBs where the per capita water supply was less than required.

The Government replied (January 2017) that the above two schemes were executed as they were found necessary to cater to the increased water demand. Further, it stated that though Board executes schemes on the basis of service level benchmarking of ULBs, few schemes are implemented based on the ground situations and also cabinet decisions.

**Recommendation-1:** ***The Board should prepare its own long term plan in consultation with Government/respective ULBs in order to prioritise proposals and utilise resources optimally.***

### *2.1.8.2 Approval of WSS and UGD Scheme*

After entrustment of the scheme by the Government/ULBs under Section 17 of the KUWS&DB Act, 1973, in accordance with Section 20 and 21 of the KUWS&DB Act, 1973, the Board forwards the feasibility report to the local authority who examines the report with reference to the cost to be incurred and its financial capacity to meet the same. If the local authority decides to get the scheme implemented, it passes a resolution in this regard. On receipt of the resolution, the Board examines in general, the feasibility of implementing the scheme and in particular the financial capacity of the local authority concerned. On such examination, if the Board is satisfied about the feasibility of the scheme, it forwards the project report to the Government for according administrative approval. The Government should approve the scheme within three months.

We, however, noticed that during 2011-12 to 2015-16, against 112 proposals of WSS and UGD schemes submitted to the Government for its approval as of October 2016, Government had accorded administrative approval for only 28 schemes. The records, however, did not indicate that the Board had re-submitted these pending projects to the Government.

The Government while confirming the audit observation (January 2017) stated that the balance schemes were returned back due to non-availability of funds.

### *2.1.8.3 Lapses in preparation of Project Report*

As per CPHEEO Manual, a Project Report [9] deals with all aspects of pre-investment planning and establishes the need as well as feasibility of projects technically, financially, socially, environmentally *etc*. It includes detailed information on the project area and the need for the project, population pattern, economic and social conditions, available water resources, existing water and sanitation system, long term plan and details of proposed project. Hence, preparation of the project report requires collection of information on all aspects of the project.

Review of project reports of the test-checked WSS and UGD schemes showed lapses in the preparation of the project report, which are discussed in the subsequent paragraphs.

#### *(a) Reliability and dependability of source not ensured*

The CPHEEO Manual stipulates correct assessment of the capacity of the water source to decide on its reliability and dependability for the water supply project. Further, it states that computation of minimum and maximum discharge should be assessed in order to determine safe yield[10] of the water or otherwise. The Ministry of Urban Development, Government of India (GoI) (May 1999) in its

[9] The Board adopts Detailed Project Report in synonym with Project Report. The Project Reports are to be prepared in three stages *viz*., Identification Report, Pre-feasibility Report and Feasibility Report.

[10] Safe yield or dependable yield of water source is the amount of water that can be drawn without adverse ecological impact.

guidelines also reiterated that 95 *per cent* dependability and reliability of raw water sources must be established by the concerned State department so as to ensure long term sustainability of the project throughout the prescribed design period.

We, however, observed that DPRs prepared by the Board in respect of test-checked schemes (both State as well as Centrally sponsored except JnNURM) did not address the issue of availability of water or sharing of water sources with other users *etc*. Safe yield tests to assess the capacity and reliability of the water source were also not conducted in any of the test-checked schemes (except JnNURM).

The Government replied (January 2017) that WSS are proposed only on the basis of the results of tests conducted to ensure reliability and dependability of source. However, from the records produced to audit, it was observed that the same had not been done and thus, the schemes were not functioning or functioning only for part of the year.

The audit findings on the consequences of not ensuring the reliability and dependability of the water sources in the test-checked WSS are brought out below:

- ***Mudhol, Mahalingapura and Bailahongal WSS***

While the ULB of Mahalingapura was dependent on ground water with borewell as the source for drinking water, ULBs of Mudhol and Bailahongal were dependent on existing WSS, which were insufficient. The water supply projects were conceived with the objective of providing 135 lpcd of water to each town. The observations on these projects are brought out in **Table-2.2.**

**Table-2.2: WSS for Mudhol, Mahalingapura and Bailahongal**

| WSS (Date of commission) | Source of water | Observations | Status of WTP | Reply of the Board |
|---|---|---|---|---|
| Mudhol (September 2014) | Jaliberi Multipurpose barrage in Ghataprabha river. | Assurance of water not obtained from Minor Irrigation Department. | Not functioning since December 2015 due to non-availability of water. | The Board replied (September 2016) that proposal for linking the existing impounding reservoirs to new WTP had been sent in the remodeling scheme in order to solve the issue of non-availability of water. |
| Mahalingapura (January 2013) | Dhabaleswar barrage in Ghataprabha River. | Minor Irrigation Department had informed the Board that requirement could not be met from the barrage and suggested to request Major Irrigation Department to release water from Hidkal reservoir to meet emergency requirement. The Board, however, had not made any arrangements in this regard. Thus, though ₹12.71 crore was incurred on the project, it continued to provide water through borewells. | Continued to provide water through borewells once in 10 to 15 days. | The Board replied (September 2016) that it had sought (2005) for allocation of water from Minor Irrigation Department. However, no assurance had been obtained before start of the project. The reply is not tenable since more than a decade has elapsed and the Board has not made any further correspondence with the Department nor has any additional allotment been assured by them. |

| WSS (Date of commission) | Source of water | Observations | Status of WTP | Reply of the Board |
|---|---|---|---|---|
| Bailahongal (September 2014) | Upstream of proposed Reinforced Concrete Cement (RCC) barrage in Malaprabha river | The Board had constructed WTP in 2014. However, even after two years of its construction, the RCC barrage in Malaprabha river proposed by the Irrigation Department was only in construction stage. This resulted in non-availability of water at source. | Due to non-availability of water at source, the ULB could not supply the committed water (135 lpcd) and at present the water was being supplied at 75 lpcd on alternate days. | The TMC of the said town confirmed that the proposed RCC barrage to be constructed by the Irrigation Department was essential for providing water to the said town. The Board stated that the proposed barrage is under construction and on completion, the water problem at source would be solved. |

Thus, these projects were executed without ensuring adequate water availability and obtaining the assurance to draw water. This resulted in expenditure on the projects, which did not deliver on their objective of providing the adequate water supply to the beneficiaries.

The Government replied (January 2017) that in respect of Mudhol WSS and Mahalingapura WSS, apart from the identified source, it has Hidkal dam on the upstream of the project site which hold sufficient storage of water for the need of the said two towns. The reply is not acceptable as water is being provided through bore wells. Further, in respect of Bailahongal and other two schemes, it was stated that dried up river bed and drastic reduction in water supply was main reason for shortfall. The reply is not acceptable as the WSS should be designed after considering least of average flow so that the minimum water supply is ensured even in distress conditions.

- ***Chikkaballapur and 10 en-route villages***

With the aim of providing 100 lpcd water to Chikkaballapur, a WSS was implemented (November 2012) with Jakkalamadagu reservoir as source. The total capacity of the reservoir is 4,390 million litres (ML) of water. Of this, 3,000 ML is allocated to Chikkaballapur city and 1,390 ML to Doddaballapur city. With the existing allocation for Chikkaballapur city, the maximum water that could be drawn for the city would be 5.75 MLD[11] of water.

We observed that as per the DPR of the WSS submitted (August 2007) to the Government, the requirement of water at the rate of 100 lpcd to Chikkaballapur city at the time of execution (2009) itself was 7.18 MLD[12], which was more than the water available as per allocation. Thus, the WSS could not even meet the requirements of the present population.

The Government replied (January 2017) that as per the approved DPR, the storage requirement is considered for seven months only and hence Chikkaballapur and the en-route villages could be supplied 14.28 MLD for a period of seven months. Further, it stated that in order to overcome the shortage of water, 17 borewells were dug and at present water nearing 100 lpcd was

[11] Water available per day = 3000 ML (1-0.3*)/365 = 5.75 MLD
* Loss towards evaporation, percolation and dead storage

[12] MLD-Million litres per day

provided. The reply is not acceptable since as per the approved DPR, total water demand works out to 11.70 MLD for the intermediate year (2024). Even after considering the availability of water at Jakkalamadagu reservoir only for seven months, quantity of water available per day works out to 10 MLD only which is less than the intermediate yearly demand.

**Recommendation-2:** ***The Board should establish reliability and dependability of water source during conception of the project to ensure long-term sustainability.***

### *(b) Non-consideration of quality of raw water*

The method of treatment of raw water to be employed, as per CPHEEO Manual, depends on the nature of raw water constituents and the desired standards of water quality. Conventional treatment including pre-chlorination, aeration, coagulation-flocculation (rapid mixing and slow stirring) and sedimentation, rapid gravity filtration and post-chlorination are adopted for highly polluted surface waters laden with algae or other micro-organisms. Further, as per the CPHEEO recommended guidelines for bacteriological quality of drinking water, total coliform bacteria must not be detectable in the treated water entering the distribution system.

We observed that the Board had designed WSS without conducting tests for raw water. Hence, audit requested the Karnataka State Pollution Control Board (KSPCB) to conduct tests of raw as well as treated water in respect of selected schemes to check for the presence of coliform bacteria. In six test-checked WSS, the test reports confirmed presence of coliform bacteria in raw water as well as treated water which is detailed in **Table-2.3.**

**Table-2.3: Results of test conducted by Karnataka State Pollution Control Board on raw water**

| Name of WSS | Raw water drawn from | Total coliforms present (mg/l) | | Whether treatment included pre-chlorination | Whether treatment included post-chlorination |
|---|---|---|---|---|---|
| | | Before treatment | After treatment | | |
| Muddebihal | Krishna River, Devoor village | 1,600 | 510 | No | Yes |
| Sindagi | Indi branch canal, Yeragal village | 250 | 45 | No | Yes |
| Vijayapura | Krishna river backwater of Almatti dam, Kolhar | 1,800 | 1,800 | Though sanctioned estimate had provision, no pre or post chlorination plant was established | |
| Mudhol | Ghataprabha river, Jaliberi barrage | 500 | 50 | No | Yes |
| Mahalingapura | Ghataprabha river, Dhabaleswar barrage | 140 | 30 | No | Yes |
| Bailahongal | Malaprabha river, Backwater of RenukaSagar dam | 3,500 | 14 | No | Yes |

(Source: Information furnished by the Karnataka State Pollution Control Board)

The CPHEEO Manual recommended pre-chlorination, filtration and post-chlorination treatment for unprotected surface water with faecal contamination. From the table, it is evident that coliform bacteria were present prior to treatment as well as post treatment. Thus, failure to test quality of raw water and inadequate treatment process, the quality of treated water supplied was poor and not in conformity with CPHEEO guidelines.

The Board replied (September 2016) that action would be taken to intimate the concerned ULBs to carry out requisite chlorination and water testing. The reply

is only partially acceptable as the Board had not even established a chlorination plant at Vijayapura inspite of its inclusion in the estimate.

The Government replied (January 2017) that it was not mandatory to conduct chlorination at source. It also stated that the water samples were tested in reputed laboratories and no bacterial mass was detected. The reply is, however, not acceptable since the presence of coliform bacteria in treated water is not permissible and KSPCB, the competent authority to verify the water quality, has given test reports showing presence of coliform bacteria in the treated water. Further, though the pre-chlorination is not mandatory, same should be included or excluded from treatment process after due consideration of the raw water quality.

**Recommendation-3:** ***The Board may ensure testing of raw water and appropriate treatment so that the treated water meets the required quality standards.***

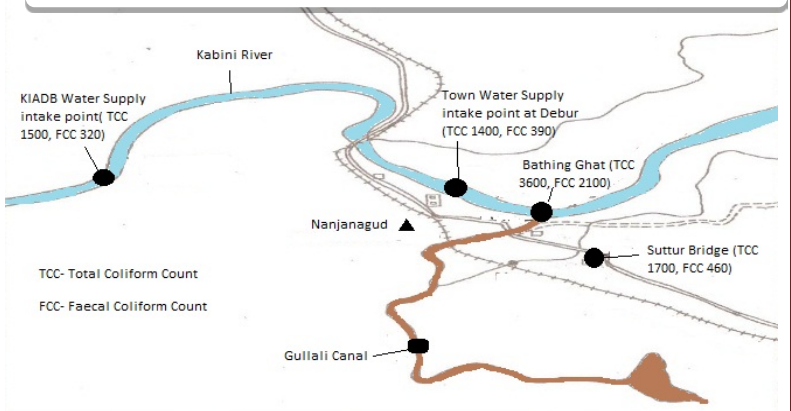
### *(c) Allotting and commencing works without ensuring availability of land*

The KPWD Code stipulates that no work shall be taken up or tenders invited for a work without ensuring availability of land and other requisites such as sanctions from appropriate authorities, design and drawings and provision of funds.

In contravention of the above, the Board had invited tenders and awarded contracts for WSS and UGD schemes without ensuring availability of land. This resulted in delay in completion of works and under utilisation of assets besides adverse effect of untreated sewage mixing with water sources. The details and audit observations on the seven test-checked schemes (one WSS and six UGD schemes) are brought out in **Table-2.4**:

**Table-2.4: Test-checked cases of WSS and UGD schemes taken up without ensuring availability of land**

| Scheme (WSS/UGD) | Audit observations | Reply of the Board |
|---|---|---|
| **(i) WSS to Kolar, Bangarpet, Malur and 45 enroute villages**<br>Date of entrustment: January 2009<br>Due date for completion: September 2010<br>Status: Yet to be completed | Sites for three overhead tanks (OHTs) handed over with delay and yet to be handed over for one OHT.<br>Land acquisition yet to be completed for WTP | No specific reply |
| **(ii) Kolar Stage-II UGD**<br>Date of entrustment: October 2007<br>Due date for completion: September 2008<br>Status: Yet to be completed except STP | Necessary permissions from NHAI and Railways were sought only after the award of work.<br>Price Variation of ₹42.67 lakh paid to contractor. | The Board attributed the delay to authorities concerned for not providing the permission in time. This is not acceptable as the Board had approached them after commencement of work. |

| Scheme (WSS/UGD) | Audit observations | Reply of the Board |
|---|---|---|
| **(iii) Deodurga UGD**<br>Date of entrustment: July 2009<br>Due date for completion: February 2011<br>Status: Yet to be completed. | Site for STP yet to be acquired. Thus, entire sewage was let out into the open drains.<br>  <br> | The Board stated that it went ahead with the execution of work even though it did not have possession of land due to pressure from public and local representatives.<br>Reply is not tenable as the Board violated the KPWD Code with resultant delay and non-completion of work. |
| **(iv) Nanjangud UGD**<br>Date of entrustment: October 2007<br>Due date for completion: March 2009<br>Status: Yet to be completed<br>  <br> | UGD network was almost complete, however, sewer line of 75 metres could not be laid for want of clearance from Railways.<br>Land for construction of STP was handed over in September 2015.<br>We observed damage to the manholes and overflowing of sewage from the pits in the yet to be commissioned sewer network.<br>Untreated Sewage was flowing directly into the Kabini river through Gullali Canal and polluting the river water. We ascertained extent of Faecal Coliform Count at point of Gullali canal joining Kabini river to be abnormally high at 2100 Most Probable Number (MPN) per 100 ml. | The Board stated (September 2016) that even though they were aware of the non-availability of land for STP, the UGD network for Nanjangud was taken up to avoid price escalation. The reply is not acceptable as both the works were required to be dovetailed. Further, non-maintenance of the work already completed resulted in deterioration and may require additional expenditure on rectification. |
| | Locations of samples taken across river Kabini with results of KSPCB test reports<br>  <br> | |
| **(v) Chikkamagalur UGD**<br>Date of entrustment: August 2012<br>Due date for completion: November 2013<br>Status: Yet to be completed | Construction of septic tank and wet well yet to be taken up due to non-availability of land. Even though the work of construction of the STP was in progress, due to non-handing over of the site for wet well, the coverage of sewerage network was doubtful. | The Board stated (September 2016) that the work has not yet commenced due to non-availability of site. |

| Scheme (WSS/UGD) | Audit observations | Reply of the Board |
|---|---|---|
| **(vi) Channapatna UGD**<br>Date of entrustment: November 2007<br>Due date for completion: May 2009<br>Status: Contract foreclosed | Due to non-availability of land for wet wells and sites for UGD network, work remained incomplete and the contract was foreclosed (December 2015) rendering an expenditure of ₹8.11 crore unfruitful.<br>Waste water from households was let out into open drains and farmers were diverting raw sewage for cultivation. | The Board stated (September 2016) that the UGD network would be commissioned once the land for construction of wells and STP is handed over to them. |
| **(vii) Channarayapatna UGD**<br>Date of entrustment: August 2008<br>Due date for completion: February 2010<br>Status: Contract foreclosed.<br>  <br> | Though 19 *per cent* of the sewer lines were not executed, the scheme was handed over to the ULB for maintenance. There was blocking of sewage network due to missing links. Untreated sewage was also entering and polluting nearby lakes and farmers were diverting the sewage water for cultivation during summer.<br>Also, we observed that price adjustment (increase) of ₹43.77 lakh for the works executed during the extended period of 883 days was approved. | The Board stated (September 2016) that the ULB was responsible for the delay in handing over of the land, which resulted in payment of price adjustment.<br>The reply was not tenable- for the reason that awarding of work prior to availability of land was irregular as per KPWD Code and the Board was aware of the incomplete status of the project prior to handing over the project to the ULB. |

Thus, the Board in all the above cases, had invited tenders and awarded contracts without ascertaining availability of land and had also not obtained requisite sanction from the appropriate authorities. This resulted in cost overrun and damages to partially completed works and also defeated the objective of providing desired water supply and sanitation to urban areas.

The Government replied (January 2017) that in order to avoid cost and time over run, the Board had consciously decided to execute UGD works even though it was aware of non-availability of land. The reply is not acceptable since for proper functioning of UGD scheme both network and as well STP is required to be dovetailed. Further, due to non-maintenance of work already completed, it required additional expenditure for rectification. In addition due to non-setting up of STP/wet wells, the ground water, surface water as well as surrounding environment are also polluted.

**Recommendation-4:** ***In order to avoid time and cost overrun and underutilisation of assets, the Board should ensure availability of land and obtain necessary sanctions/permissions from authorities concerned before tendering and awarding contracts.***

### *(d) Financial analysis of projects not conducted*

The CPHEEO Manual envisages that the DPR should bring out the financial burden imposed by a WSS project in the form of annual recurring cost and payment towards loan and interest (debt servicing) that has to be met from the operational revenue which could be realised from sale of water. As per the

Manual, the financial statement showing annual revenue and operational cost for 10 years period beginning with the year when project will be operational should be prepared. Also, section 20(3) of the KUWS&DB Act, 1973 states that the Board shall examine in general, the feasibility of implementation of the scheme in all aspects and in particular the financial capacity of the local authority concerned.

We, however, observed that the required financial analysis was not done in 14 out of 21 selected WSS.

The Government replied (January 2017) that most of the WSS as well as UGD schemes are implemented with share from ULBs not exceeding 25 *per cent* of the total project cost, which are met out of State Finance Commission (SFC) Grants. The reply is, however, silent on the annual recurring cost which is to be met out of the operational revenue.

### *(e) Defects in preparation of estimates*

- ***Inflation of estimates - excess drawal of Grants /loans***

The GoK releases grants and allows the Board to raise loans on behalf of the ULBs on the basis of approved estimated cost. Boosting of estimate in any form would result in excess drawal of loan either by the Board or by the State Government as the additional capital cost of any project is met out of open market borrowings of the Government and additional interest burden thereon.

As per KPWD Code, provision for price escalation shall be made at the rate of five *per cent* of the estimated cost. However, it was noticed that provision for escalation charges was made in excess of this prescribed limit while preparing the estimates. The excess provision in this regard works out to ₹8.56 crore in respect of seven WSS and two UGD schemes detailed in **Appendix-2.2**. While accepting the audit observation, the Board stated that in future, provision for escalation at the rate of five *per cent* as stipulated in the KPWD Code would be made.

- ***Non-provision for installation of flow meters in Jackwell, WTP etc., in the estimates***

In order to monitor water leakages, unauthorised tapping and distribution and transmission losses, the CPHEEO Manual specifies installation of flow meters at various points of the WSS. Necessary provision should, therefore, be made in DPRs/estimates for the installation of flow meters.

We observed that out of 21 test-checked WSS, adequate provision for installation of flow meters in Jackwell, WTP and Bulk points had been made in the DPR in only three WSS[13]. In the absence of flow meters, the exact quantity of water treated, supplied and lost in transmission and distribution was not ascertained by the Board. The Government accepted the audit comment and

[13] WSS to Mysuru with Kabini River as source, WSS to Arsikere and WSS to Belur

stated (January 2017) that provision for installation of flow meters would be made in future projects.

**Recommendation-5:** ***The Board may provide for installation of flow meters at requisite places in all its WSS in order to monitor leakages, unauthorised tapping and transmission and distribution losses.***

### *2.1.8.4 Lapses in designing- Non-utilisation of Filter Backwash water*

Filter Backwash water is the water used to clean the filter beds in WTP, which is then usually disposed of as waste water. As per the standards of the Central Pollution Control Board, the quantity of filter backwash water is normally about five *per cent* of the designed capacity of WTP. As a water conservation measure, WTPs can recycle filter backwash water so that backwash water is recovered and becomes reusable, thereby increasing the amount of treated water available and decreasing the amount of effluent.

**Backwash water recycled into Aerator in Hubballi-Dharwad WSS**


On joint inspection of the 21 selected WSS, we observed that only in case of the Hubballi-Dharwad WSS, backwash water from the filter bed was channelised and allowed to settle into a settling pond of 60 Lakh litres capacity after which it was pumped into the WTP for further treatment. Approximately 27 lakh litres (30 lakh litres less 10 *per cent* wastage) of water which is sufficient to cater to the needs of 20,000 population per day at the rate of 135 lpcd is conserved due to such recycling. The expenditure incurred on creation of this facility was ₹32.16 lakh only.

However, in all other test-checked WSS, backwash water was discharged into drain without recycling. Audit calculated the wastage of backwash water (**Appendix-2.3**) in respect of these schemes and observed that approximately 90,72,000 litres of water per day was going into drains which could be recycled with nominal expenditure as has been done in Hubballi-Dharwad WSS. The quantity so wasted was sufficient to cater to the needs of 67,200 persons at the rate of 135 lpcd.

The Government replied (January 2017) that in future upcoming projects, provision for utilising the backwash water would be considered based on the cost-benefit analysis.

**Recommendation-6:** ***The Board may incorporate scientific recycling of filter backwash water in its WTPs, wherever feasible.***

## 2.1.9 Execution of projects

### *2.1.9.1 Inordinate delay in commencement and completion of schemes*

The CPHEEO Manual specifies that WSS and UGD schemes be designed to meet the requirements over a thirty years period after their completion. The time lag between design and completion of the project should also be taken into account, which should not exceed two to five years in respect of WSS and three to six years in respect of UGD schemes, depending on the size of the project.

We observed that in the test-checked WSS, there was inordinate delay in execution of the WSS completed during 2011-12 to 2015-16. The delay beyond the scheduled date of completion ranged between 224 days to 2,878 days (almost eight years) as shown in **Appendix-2.4.** The reasons recorded included delay in awarding of contract, delay in handing over the site of construction, delay in approval of drawings and designs, frequent change in scope of the works *etc*.

While according approval (June 2010) for the Action Plan of the Board for the year 2010-11, GoK had clearly stated that in future proposals, action plan should be framed to complete all the schemes within three years and 1/3$^{rd}$ of estimated cost should be provided for in the budget. We observed that the Board's budget in the succeeding years was not according to the above said instructions and as a result, there was short release of funds, which led to delays in implementation of the projects.

In addition, as per the KPWD code, the administrative approval or technical sanction ordinarily ceases to operate after a period of five years from the date upon which such approval or sanction is accorded and the competent authority is required to revive the sanction in case of works, which are in progress beyond five years. Thus, in respect of schemes where the administrative approval had lapsed, fresh approval is required. We observed that the Board had incurred ₹184.17 crore on 37 ongoing schemes even though the administrative approval had expired during 2009-10 to 2015-16. Records furnished did not indicate fresh sanctions for these schemes, hence the expenditure incurred was irregular.

We also observed that GoI revised (August 2015) its share in UIDSSMT schemes from 80 *per cent* to 50 *per cent* and also stated that only the incomplete projects, sanctioned prior to 31 March 2012, in which 50 *per cent* or more additional central assistance had been already released and physical progress was 50 *per cent* or more as on 31 March 2014, would be eligible for further central assistance under the newly launched scheme AMRUT. However, due to delay in commencement of the works, the expenditure in respect of two schemes availing central assistance, WSS to Mulbagilu and UGD for Savadatti, was less than 50 *per cent* of the central assistance as on 31 March 2014. This resulted in the projects being rendered ineligible for further central assistance to the extent of ₹11.05 crore.

The Government replied (January 2017) that loss of central assistance was due to delay in implementation of the project and non-availability of land was stated as the reason for delay. The reply is not tenable since the Board has not adhered

to the KPWD Code, which stipulates that no work shall be taken up without ensuring availability of land.

#### *2.1.9.2 Deviation from the approved DPR during execution*

The competent authority should approve any deviations from the approved DPR and such deviations should be backed with adequate recorded justification. We noticed deviations from the approved DPR during execution which was not approved by the competent authorities. Instances of deviations from approved DPR are brought out in the succeeding paragraphs.

#### *(a) Installation of higher capacity pumpsets*

In a WSS, pumping machinery are used for lifting of water from source to WTPs and the capacity of pumping machinery is to be arrived at considering the quantity of water to be pumped. Provision for supply and installation of pump sets at Jackwell and WTP of varying capacity was made in the DPR of the three WSS detailed in the **Table-2.5.** However, we observed that the pump sets and allied accessories of higher capacity than that in the DPR were installed during execution. Further, it was observed that though higher capacity pump sets were installed, the original discharge of water remained unchanged rendering the excess expenditure on pump sets of higher capacity unfruitful.

**Table-2.5: Extra power charges due to enhancement of capacity of pump sets**

(₹ in lakh)

| Name of the WSS | Capacity of pump sets in DPR | | Capacity of pump sets installed | | Extra power charges per annum |
|---|---|---|---|---|---|
| | Jack well | WTP | Jack well | WTP | |
| Mahalingapura | 90 HP | 30 HP | 140 HP | 50 HP | 20.72 |
| Chikkodi | 140 HP | 110 HP | 250 HP | 200 HP | 38.94 |
| Shikaripura | 200 HP | - | 240 HP | - | 9.00 |
| **Total** | | | | | **68.66** |

(Source: Information furnished by the Board)

Higher capacity pump sets consume more power and are also associated with higher operation and maintenance costs. The extra power consumption due to enhanced capacity of the pumps in the three projects works out to ₹68.66 lakh per annum. Since the WSS are maintained by the ULBs, the extra power charges result in additional financial burden on the ULBs.

The Government replied (January 2017) the following:

- In respect of Mahalingapura WSS and Chikkodi WSS, the capacity of pumpsets was revised due to change in location of site.
- In respect of Shikaripura WSS, pumps of higher capacity were installed due to frequent power failures.

The reply is not acceptable for the following reasons:

- Based on the revised data furnished by the Board, audit recalculated the pump sets requirement for Mahalingapura WSS and Chikkodi WSS as 100 HP and 170 HP at jackwell and 43 HP and 110 HP at WTP respectively. Thus, the

capacity of pump sets installed was still higher than required. Hence, there continued to be extra expenditure towards power charges which amounted to ₹57.53 lakh per annum.

- The Shikaripura WSS has been provided with 11 KV capacity feeder line for providing un-interrupted power supply as part of the WSS work itself.

### *(b) Non-execution of works approved in DPR*

In order to enhance the water supply to Belur town from 100 lpcd to 135 lpcd, a WSS was taken up and commissioned during August 2015.

On scrutiny of the records, we observed that some of the works specified in the DPR and detailed below were not executed despite provision of funds. This contributed to non-achievement of the target of providing 135 lpcd to the town.

- The work of repairs and renewal of existing 4.54 MLD WTP was not included in the tender for civil works and hence not executed. As a result, problems such as leakages in the WTP, non-functional laboratory, dysfunctional aerator, dilapidated OHT for backwash and chlorination not being done, were not remedied.
- Though construction of flash mixer was included in the DPR, it was not executed. As a result, the coagulant was being mixed with the water manually. The Board stated (September 2016) that the work was not executed as the ULB had included the said work in its annual estimates. The reply is not acceptable because there was no such correspondence with the ULB on record and no further action taken by the Board to construct a flash mixer.

The Government replied (January 2017) that all the discrepancies had been set right and the units were functioning.

### *(c) Non-execution of distribution network in WSS*

The KPWD code stipulates that the authority granted by a sanction to an estimate/DPR must on all occasions be looked upon as strictly limited to the precise objects for which the estimate/DPR was intended.

In four[14] test-checked WSS executed and commissioned by the Board, though there was a provision for providing distribution network to the entire town in the new DPR, we observed that even after more than two years since commissioning of the scheme, the work relating to distribution network had not been put to tender.

We also observed that due to non-execution of distribution networks, adequate water supply could not be provided to Chikkodi, Bailahongal and Mudhol towns. While the WSS for both Chikkodi and Bailahongal towns were designed to supply water at the rate of 135 lpcd, the actual water supply was 118 lpcd and 75 lpcd respectively. Similarly, the WSS to Mudhol town was designed to supply water at the rate of 100 lpcd against which the water supply was only 70 lpcd. The Board stated (September 2016) that due to paucity of funds and also

[14] Guledguddda town-Provision: ₹7.58 crore, Mudhol town-Provision: ₹3.92 crore, Chikkodi town-Provision: ₹3.62 crore, Bailahongal town-Provision: ₹2.84 crore

to cover the escalation, distribution network was not executed or only partially executed.

The Government also stated (January 2017) that due to paucity of funds the distribution network and WSS was not taken up. However, it was silent on the issue of deviations from DPR without its approval.

### 2.1.10 Operation and Maintenance

After execution of WSS, Operation and Maintenance (O&M) assumes great significance as poor operation and maintenance practices are largely responsible for decreased performance or early failure of projects and loss to public assets.

As per CPHEEO manual, it is necessary to examine the capabilities of the organisation that would be entrusted with the responsibility of operating the scheme after it is commissioned. It also states that the designated organisation must fulfill the requirement in respect of personnel and financial and management procedures so that effective and efficient performance is achieved. CPHEEO Manual also prescribes that the issues which are likely to adversely affect the operations of the project, should be outlined and definitive recommendations should be made in the Project report.

In accordance with Article 243(w) of the Constitution of India read with the 12th Schedule of the Constitution, ULBs are responsible for water supply and sewerage services from water catchments areas to waste water treatment plants. Accordingly, Government directed (July 2012) the Board to hand over all the completed schemes to the ULBs concerned. Section 17 of the KUWS&DB Act, 1973, however, allows the Board to take up O&M of the WSS and UGD schemes upon the directions of the Government.

Currently, the Board is entrusted with O&M of 11 WSS (**Appendix-2.5**). In addition, the Board was maintaining 10[15] WSS upto bulk point and one UGD scheme (Ballari) without entrustment by Government.

Out of the 20 test-checked completed WSS and UGD schemes, one scheme has been duly entrusted to and is thus maintained by the Board, three schemes are being maintained by the Board without entrustment, 14 schemes were handed over to the ULBs, and two schemes were in the defect liability period[16]as on March 2016. We conducted joint inspections in all the 20 test-checked completed WSS and UGD schemes to study and compare the operations and maintenance of the schemes, maintained by the Board, either through entrustment or without entrustment, and those maintained by the respective ULBs. During joint inspection of WSS, we observed the following.

[15] Gadag-Betageri, Mundargi, Guledagudda, Hagaribommanahalli-Kottur-Kudalgi, Melukote, Ilkal- Hungund-Kustagi, Hukkeri-Sankeshwar, Bidar, Ilwala and Shikaripura

[16] One year from the date of commissioning of the WSS and UGD Scheme, the contractor is required to maintain at his own cost.

#### *2.1.10.1 Schemes entrusted to be maintained by the Board*

The WSS for Vijayapura city was implemented with the objective of providing water at the rate of 135 lpcd. It was observed that 70 *per cent* of the population of the city was covered for supply of water at the rate of 135 lpcd. While eight wards were supplied water 24x7, the Board was covering the remaining 27 wards in phases. We further observed that out of 70 *per cent* coverage, 15 *per cent* had metered connections. Even with 15 *per cent* of metered connections, the revenue generation was more than the annual expenditure on O&M. Non-revenue[17] water in the 24x7 wards ranged between 3.40 *per cent* and 18.30 *per cent* of water supply against a targeted maximum of 15 *per cent* which was laudable. We also observed that water quality tests were being conducted at both the WTP and distribution network. Also, records such as leakage register, complaint redressal mechanism, log books at WTP and head works, lab registers, Demand Collection and Balance register were being maintained. Further, the Board followed all the norms for maintenance of the WSS.

#### *2.1.10.2 Schemes maintained by the Board without entrustment*

##### *(a) WSS for Shikaripura town*

Shikaripura town has both an old WSS commissioned during 1988 and a new WSS commissioned during 2010. While the Board was maintaining head works and WTP of both old and new WSS, the distribution networks were managed by the TMC. We observed the following:

- The old WTP was in poor condition and required repair and remodeling.
- Aerator of the old WTP had been disbanded and hence the entire quantity of water from the source was fed for aeration into the new WTP which did not have sufficient capacity to handle the load of both the WTPs.
- Laboratories were not functioning due to lack of instruments.
- Chlorine cylinders were stored in open spaces posing safety hazard as the WTP lacked a separate storage shed.
- Minimum staff required to run WSS was not deployed.

Thus adequate infrastructure was not put in place by the Board to ensure the quality of water supplied to the consumer.

##### *(b) UGD for Ballari*

The Board was maintaining a UGD scheme for Ballari town since 2007-08 without entrustment. During joint inspection, we observed that the DG sets installed in the two STPs of the town had not been operated for the past three years on account of non-release of funds by the ULBs concerned. As a result, untreated sewage water was being discharged into open drain without treatment during power failure.

[17] Non-revenue water is the bulk water supplied less the metered water consumption and water used by revenue producing public fountains only.

The Board replied (September 2016) that since the work was not entrusted to them, the ULB was to provide funds to maintain the WSS and UGD scheme. The reply is not acceptable, as the Board had not sent any proposal to the Government for funds even though it was maintaining the WSS and UGD scheme. The Government replied (January 2017) that efforts are being made to take over the O&M on regular basis.

#### *2.1.10.3 Schemes maintained by ULBs*

Nine WSS and four UGD of the 20 test-checked completed schemes are being maintained by the ULBs.

#### *(a) Water Supply Schemes*

- In seven test-checked WSS, only 20-58 *per cent* households were covered by a house service connection.
- Consequent upon construction of new WTPs, existing WTPs of Muddebihal (2024) and Belur (2031) were not being used, even though their design period had not expired.
- In three WSS (Guledgudda, Muddebihal and Yelburga), the laboratories were lying idle due to non-availability of technicians.
- CPHEEO manual prescribes safe handling practices with respect to chlorine gas cylinders. Chlorine gas is a powerful irritant to lungs and eyes, hence chlorine cylinders should be stored upright and the storage area should be clean, ventilated and free from dampness. In six WTPs, it was observed that there was no separate storage place and chlorine cylinders were kept in open spaces, cylinders were placed horizontally, containers were not fitted with safety caps or hooks, corrosive substances were stored in the vicinity, no neutralisation system was provided *etc*.
- In WSS for Muddebihal and Chikkodi, it was observed that though two pumpsets were available, only one was functioning. Due to non-availability of spare parts, the standby pump had been dysfunctional for the last three months. Hence, in the event of a breakdown, there would be no pumpset available in the WTP.
- In seven WSS detailed in **Appendix-2.6**, it was noticed that there was shortage of staff in all categories *viz*., Operators, Fitters, Electricians, Mechanics, Watchmen *etc*.
- The CPHEEO Manual prescribed laboratory examination of water both at the WTP and also at the distribution system to ensure that drinking water was in conformity with the standards. We observed that no such laboratories were established at the distribution point and hence could not ensure the quality of water supplied to the consumers.

The Board stated (September 2016) the following:

- ULBs had failed to maintain the WSS even after handing over of the projects.
- The laboratories where they existed, were not functioning due to lack of technicians. In other places, there was no provision in the estimate to

establish laboratory for testing water at WTP or at the distribution system. Hence, it was not executed.

The Board's reply is not satisfactory because the CPHEEO Manual prescribed laboratory examination of water both at the WTP and at the distribution system and therefore the Board should have ensured that the estimates included provision for establishing laboratories.

The Government replied (January 2017) that ULBs have been directed to comply with the audit observations.

### *(b) Underground Drainage Schemes*

In compliance to Government's direction (July 2012), the Board had issued a circular instructing its officers to consider the completed schemes which were yet to be taken over by the ULBs as 'deemed to be handed over'. We observed that in four[18]test-checked UGD schemes, ULBs had failed to maintain such deemed handed over projects resulting in deterioration of assets created apart from untreated sewerage directly entering into water bodies. Joint inspection findings of these UGD schemes are brought out in **Appendix-2.7.**

Further, from the joint inspection of test-checked WSS and UGD schemes, it was observed that the maintenance of the projects handed over to ULBs was inadequate. This resulted in short utilisation and deterioration of the created assets.

The Board stated (September 2016) the ULBs had failed to maintain the same after handing over of the projects. The Government replied (January 2017) that the Board trains the ULB staff prior to handing over of the project and is also available to extend any logistical support. The reply is not satisfactory as the financial capacity of the ULBs with regard to maintenance of O&M of the UGD schemes was not assessed by the Board while analysing the feasibility of the schemes or before declaring the schemes as 'deemed handed over'.

**Recommendation-7:** ***Board should examine and highlight in the project report the capabilities of ULBs regarding O&M so that Government may consider entrustment of such schemes to the Board until the ULBs are capable of maintaining the WSS and UGDs.***

**Recommendation-8:** ***The Board should ensure that there is a provision in the estimates to establish laboratory for testing water at WTP as well as at the distribution system.***

## 2.1.11 Case Study of Water Supply Scheme to Mysuru City

In order to improve the water supply to Mysuru city, two projects had been taken up under JnNURM with financial assistance in the ratio of 80:10:10 from GoI, GoK and ULB. The objective of the two projects was to ensure augmentation of water supply from the Kabini river and to remodel the water supply distribution network and manage it through an integrated management

[18] UGD for Kolar city (Phase II), Bhadravathi town, Ramanagara and Channarayapatna

system to ensure 24x7 water supply to the entire city of Mysuru, covering all the 69 Direct Metering Areas (DMAs). The details of the projects are given in **Table-2.6.**

**Table-2.6: Details of WSS to Mysuru City**

(₹ in crore)

| Scheme | Date of approval | | Estimated cost | Awarded to | Entrustment date | Period of completion | Expenditure incurred |
|---|---|---|---|---|---|---|---|
| | GoI | GoK | | | | | |
| Augmentation of Water Source to Mysuru city from Kabini River | December 2006 | June 2009 | 108.81 | M/s.GKC, Hyderabad | September 2009 | 2012 | 95.71 |
| Remodeling of water supply distribution network, automation and integrated management system for Mysuru city | December 2006 with condition that on completion, the project should achieve 24x7 water supply | March 2007 | 194.54 | M/s.JUSCO | November 2008 | November 2014 extended upto May 2015 | 271.56 |

(Source: Information furnished by Board)

The scope of the work in the first project included intake structure, rising main, WTP, feeder main, Master Balancing Reservoir (MBR), pumping station and allied works. In the second project, work included providing and laying feeder mains, construction of OHT, providing IMIS, transforming intermittent water supply system to 24x7 and Supervisory Control and Data Acquisition (SCADA).

#### *2.1.11.1 Augmentation of Water Source to Mysuru city from Kabini River*

The scheme for augmentation of water source for Mysuru city from Kabini River included construction of three MBRs at JP Nagar, Datagalli and Vijayanagara with storage capacity of 3 MLD, 3 MLD and 13 MLD respectively.

The CPHEEO Manual recommends design of the MBR to meet the requirement of 1/3$^{rd}$ intermediate year demand. However, the storage capacity (19 MLD) of all the three MBRs was worked out in the DPR with 1/3$^{rd}$ of ultimate year demand (18.14 MLD) even though the CPHEEO had suggested (September 2006) to the Board that they revise the design in conformity with the CPHEEO manual. The estimated cost for JnNURM funding prepared by the Board considered the cost of MBRs with only 1/3$^{rd}$ of the intermediate year demand (12.09 MLD) with the balance amount to be contributed by the Mysore Urban Development Authority (MUDA). Though the Board had written (February 2008) to the MUDA in this regard, no records were available to indicate whether MUDA had agreed to it. Thus, construction of the MBRs considering ultimate year demand resulted in creation of excessive storage capacity of 14.97 MLD with avoidable expenditure of ₹4.46 crore.

During joint inspection (February 2016), we observed that none of the three MBRs were being used. In reply, the Government (January 2017) stated that due to non-completion of pumping station and due to no demand (housing sites yet to be allotted by MUDA), the MBRs at Vijayanagara and Datagalli respectively could not be put to use. No explanation was given by the Board for non-utilisation of the MBR at JP Nagar.

### *2.1.11.2 Remodeling of water supply distribution network and automation and integrated management system for Mysuru city*

The Board entrusted (November 2005) the preparation of a DPR for remodeling of water supply distribution network and automation and integrated management system for Mysuru city to M/s STUP Consultants Private Limited for intermittent water supply scheme. The DPR submitted to GoI was approved with the condition that it should achieve 24x7 water supply. In order to achieve 24x7 water supply, the Board entrusted (March 2008) preparation of Request for Proposal to M/s.Jalkam Solutions Consultants who submitted an estimate of ₹345 crore for the same. The audit observations with regard to the said work are as follows:

- The work of execution as well as O&M was awarded (November 2008) to M/s JUSCO (contractor) whose terms and conditions required the contractor to conduct a survey of house connections during the preparatory phase. As per his survey (December 2009), Mysuru city had 1,74,951 connections as against the 1,30,000 connections projected by the Board, which the contractor brought to the notice of the MCC. We observed that the MCC had already informed the Board about this discrepancy and requested modification of the agreement based on the correct data. Despite the MCC's request, the Board adopted its own incorrect survey data while entering into the agreement with the contractor. Final approval for the correct survey data (contractor's survey data) was accorded by the MCC only in September 2013 after a delay of more than three years. The Government replied (January 2017) that the customer survey was verified and certification issued by the MCC only during September 2013 and modification to the agreement at that stage was not possible due to financial constraints. The reply is not acceptable as the Board was aware that its data was incorrect before signing the agreement with the contractor.

  As a result of the incorrect data used, the approved project cost of ₹194.54 crore which was for a lesser number of connections fell short of the requirements for the project. The Board therefore decided (June 2013) to reduce the coverage area from 69 DMAs to 47 DMAs. Meanwhile, the contractor had continued to execute the work as proposed in the original contract for all the 69 DMAs in Mysuru city. As a result, the contractor claimed an additional ₹20.34 crore for work in those DMAs which were excluded from coverage after the Board's decision to reduce the coverage area. The Government replied (January 2017) that the contractor had executed rehabilitation work in 47 DMAs only and the claim was towards additional works *viz.*, design and engineering, additional survey and additional stay in the project. The reply confirms that incorrect adoption of survey data resulted in contractor claiming additional ₹20.34 crore.

- Since the original estimate of ₹194.54 crore was insufficient to cover all the 69 DMAs with 24x7 water supply, the Board was required to submit revised DPR for approval from GoI. We, however, observed that the Board had failed to seek fresh approval for the modified action plan pertaining to the 47 DMAs. Thus, the GoI as well as GoK curtailed (February 2014) the sanctioned estimate from ₹194.54 crore to ₹179.17 crore. The Government replied (January 2017) that reduction in cost was mainly due to reduction in

scope of work on account of non-availability of land. The reply is not acceptable since GoI while reducing the estimate to cover 47 DMAs stated that it had noticed difference in work taken up as against approved DPR. Also, as per the clarification issued by CPHEEO (October 2012), the Board was required to submit revised DPR for approval which was not considered by the Board.

- As per the guidance note issued by GoI, installation and calibration of Pressure Control Valves (PCVs) and Altitude Flow Control Valves (ACVs) is a mandatory requirement for a DMA to be declared 24x7. We, however, observed that out of the 47 DMAs covered, 10 DMAs were declared 24x7 despite non-installation of PCV/ACV and non-calibration of PCVs. Also, it was observed that consumer meters were yet to be connected in these 10 DMAs.

  In the balance 37 DMAs, consumer meters and bulk flow meters were yet to be connected. It was also observed that water balancing required for ensuring adequate pressure for 24x7 water supply was not done in 15 DMAs. In addition, we observed that even after completion of the project, water was supplied through the old distribution networks in five DMAs and through borewells in 10 DMAs. Hence, the objective of providing 24x7 water supply was not achieved in the 47 DMAs covered.

- Against 1,32,985 consumers covered under the project, bills were issued to 86,083 (65 *per cent*) consumers only. Also, though one of the pre-conditions for approval of the project was reduction in non-revenue water (NRW) to 15 *per cent*, the NRW ranged between 25.69 to 37.01 *per cent*.

  The Government replied (January 2017) that the DMAs were declared 24x7 if adequate pressure was available both at the bulk points and at the distribution points based on the certificate issued by contractor. The reply is not acceptable as the CPHEEO guidelines for 24x7 require installation and calibration of PCV and ACV. Further, Government stated that contractor had started refixing meters, installed bulk flow meter and commissioned the pumping machines.

Thus, adoption of incorrect survey data and non-revision of the DPR resulted in a deficient estimate which led to reduction of the area of coverage from 69 DMAs to 47 DMAs and curtailment of funding for the project. Failure of the Board to ensure installation and calibration of PCVs before declaring the DMAs 24x7 defeated the objective of supplying water 24x7 to the covered DMAs. Non-installation of water meters and deficient billing coverage resulted in high NRW. Thus, despite incurring an expenditure of ₹271.56 crore[19], the intended objective of supplying water 24x7 to the city of Mysuru was not achieved.

### 2.1.12 Monitoring and Evaluation

Activities of the Board *i.e.,* implementation and operations and maintenance of WSS & UGD schemes are monitored through Monthly Programme Implementation Calendar by the Government, organisational review meetings by Managing Director, weekly review meetings by Chief Engineers and various

[19] Cost of the project ₹229.94 crore and provision towards O&M ₹41.62 crore

other status reports and periodical returns from the field offices. We observed that inspite of these monitoring mechanisms, issues such as time and cost overruns and delays in seeking necessary clearances have continued to persist, indicating that the monitoring was not yielding the desired results.

The CPHEEO Manual suggests conduct of energy audits to reduce energy cost up to 10 *per cent* depending on the nature of installation and scope for measures for energy conservation. The Ministry of Water Resources, in its general guidelines for Water Audit and Water conservation also stresses on water audit as an effective management tool for minimising losses and optimising use and conservation of water. We observed that the Board, had not conducted any Energy Audit or Water Audit in any of the WSS maintained by it.

In respect of maintenance of WSS entrusted to the Board, the Board had to receive water charges from ULBs for its expenditure on maintenance. It was observed that there was no mechanism in the Board to ensure realisation of outstanding dues of water charges receivable from the ULBs. Though the Board devised a policy (2014-15) to charge interest on outstanding dues, no confirmation was obtained from the ULBs in this regard.

The Government replied (January 2017) that the Board had brought to the notice of the government about the outstanding dues from the ULBs and had requested it to settle them out of SFC grants payable to ULBs.

### 2.1.13 Conclusion

The Board is responsible for executing projects for capacity creation and augmentation of WSS and UGD systems in all the ULBs under its jurisdiction. However, it does not have any long term plan to ensure that the near term projects fit into the plan and are consistent with the future overall development plan for the area.

The DPRs of WSS prepared by the Board did not adequately address the issue of availability of water and sharing of water sources with other users. Also, in some test-checked cases, the safe yield test to assess the capacity of the source was not conducted. As a result, due to non-availability of sufficient water at the source, assets created in some of the projects remained unutilised and some projects functioned only for part of the year. Even though the KPWD code stipulated that no work should be taken up or tenders invited without ensuring availability of land, the Board in contravention of the code, had invited and awarded contracts for WSS and UGD schemes without ensuring availability of land. As a result, instances of non-construction of STPs due to non-availability of sites led to non-utilisation of assets such as sewer networks.

In Hubballi-Dharwad, a recycling facility for backwash water had been set up which was sufficient to cater to the needs of 20,000 persons per day. Exploring the feasibility of setting up such recycling facilities in other WTPs, after appropriate cost-benefit analysis, would be a valuable step towards water conservation.

Operation and maintenance of WSS entrusted to the Board was comparatively better than those handed over to the ULBs. Hence the assets created were under-utilised by the ULBs.

With regard to the WSS in Mysuru city, adoption of incorrect survey data and non-revision of the DPR resulted in a deficient estimate which led to reduction of the area of coverage from 69 DMAs to 47 DMAs and curtailment of funding for the project. Also, failure of the Board to ensure installation and calibration of PCVs before declaring the DMAs 24x7 defeated the objective of supplying water 24x7 to the 47 DMAs. Non-installation of water meters and deficient billing coverage resulted in high NRW. Thus, despite incurring an expenditure of ₹271.56 crore, the intended objective of supplying water 24x7 to the city of Mysuru was not achieved.