



**FIFTEENTH KERALA LEGISLATIVE ASSEMBLY**

**COMMITTEE**

**ON**

**PUBLIC UNDERTAKINGS  
(2023-26)**

**FORTY SEVENTH REPORT**

(Presented on 21<sup>st</sup> March,2025)

**SECRETARIAT OF THE KERALA LEGISLATURE  
THIRUVANANTHAPURAM**

**2025**

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**FORTY SEVENTH REPORT**

**On**

**Kerala Water Authority  
&  
Kerala Irrigation Infrastructure Development Corporation Limited**

**(Based on the Reports of the Comptroller and Auditor General of India for  
the years ended ended 31<sup>st</sup> March, 2016 and 2017)**

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**COMMITTEE ON PUBLIC UNDERTAKINGS  
(2023-26)**

**COMPOSITION**

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***Members:***

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***Legislature Secretariat:***

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Shri Venugopal R, Joint Secretary

Shri Anil Kumar B, Deputy Secretary

Shri Mohanan. O, Under Secretary

## **INTRODUCTION**

I, the Chairperson, Committee on Public Undertakings (2023-26) having been authorised by the Committee to present the Report on its behalf, present this 47<sup>th</sup> Report on Kerala Water Authority & Kerala Irrigation Infrastructure Development Corporation Limited based on the reports of the Comptroller and Auditor General of India for the years ended 31<sup>st</sup> March, 2016 and 2017 relating to the Public Sector Undertakings of the State of Kerala.

The aforesaid Reports of the Comptroller and Auditor General of India was laid on the Table of the House on 23.05.2017 and 19.06.2018 respectively. The Report, besides other things in their findings, brought to light some functional irregularities relating to the Kerala Water Authority & Kerala Irrigation Infrastructure Development Corporation Limited. The Committee, in connection with the perusal of the report, took notice of the comparability of the audit paragraphs pertaining to such irregularities and decided to examine them altogether. The consideration of the audit paragraphs included in this report and the examination of the departmental witness in connection there to were made by the Committee on Public Undertakings (2023-2026) at its meetings held on 10.01.2024 & 27.03.2024.

This Report was considered and approved by the Committee (2023-26) at its meeting held on 18.03.2025.

The Committee place on record its appreciation for the assistance rendered to them by the Accountant General (Audit), Kerala in the examination of the Audit paragraphs included in this Report.

The Committee wishes to express thanks to the officials of the Water Resources department of the Secretariat and the Kerala Water Authority & Kerala Irrigation Infrastructure Development Corporation Limited for placing the materials and information solicited in connection with the examination of the subject. The Committee also wishes to thank in particular the Secretaries to Government, Water Resources, and Finance Department and the officials of the Kerala Water Authority & Kerala Irrigation Infrastructure Development Corporation Limited who appeared for evidence and assisted the Committee by placing their views before the Committee.

Thiruvananthapuram,  
21<sup>st</sup> March, 2025.

**E. CHANDRASEKHARAN,**  
*Chairperson,*  
*Committee on Public Undertakings.*

**REPORT  
ON  
KERALA WATER AUTHORITY**

**Audit Paragraph (2016-17)**

**Information System Audit on ‘Enhanced Advanced Billing, Accounting and Collection Utility System’ (eABACUS) in Kerala Water Authority**

**Executive Summary**

Kerala Water Authority is entrusted with the task of providing quality drinking water and sewerage services in an eco-friendly and sustainable manner to the people of the State. Enhanced Advanced Billing, Accounting and Collection Utility System (eABACUS), is a billing, accounting and collection system developed by NIC<sup>1</sup> and put to use in Kerala Water Authority. The deficiencies observed in planning, system design, IT controls and security of eABACUS are given below:

**Deficiencies in system design led to inaccurate mapping of business rules that resulted in non-collection of fees and fine amounting to ₹76.50 lakh**

**(Paragraph 5.12.1.2)**

**Improper designing of database deprived the system from exercising online monitoring controls, which resulted in cash embezzlement of ₹6.42 lakh.**

**(Paragraph 5.12.2)**

**Bypassing segregation of duties exposed the system to the risk of irregularity and adversely affected accountability of transactions.**

**(Paragraph 5.13.1)**

**Failures in access controls exposed the system to the risk of exclusion of consumers from billing cycle.**

**(Paragraph 5.13.2)**

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<sup>1</sup> National Informatics Centre (NIC) has been instrumental in steering e-Government/e-Governance applications in government ministries/departments at the Centre, States, Districts and Blocks.

**Inadequate monitoring of service contract led to non-reversal of the amount of failed transactions and non-refunding of the service charges levied from consumers involving ₹ 8.50 lakh**

**(Paragraph 5.14)**

**Inaccuracies and delay in mapping of business rules exposed the system to wrong processing of transactions involving short collection of sewerage and water charges of ₹450.66 lakh and excess collection of water charges of ₹1.35 lakh.**

**(Paragraphs 5.17.1 to 5.17.3)**

**Weak process controls and mistakes in software led to generation of inaccurate water bills resulting in loss of ₹17.3**

**(Paragraph 5.17.4)**

**Failure in subjecting to standardisation testing exposed the system to major information security flaws.**

**(Paragraph 5.19.3.1)**

## **5.1 Introduction**

State of Kerala with a geographical area of 38,863 square kilometre has a total population of 3.34 crore as per Census of India 2011. There are 77.16 lakh households in Kerala, 23.40 *per cent* of which are using tap water from treated water sources. While 62 *per cent* of households rely on well as their source of drinking water, the remaining 14.60 *per cent* of households use water from other sources like spring, river, canal, lakes, ponds, etc.

Kerala Water Authority (KWA) <sup>2</sup> is entrusted with the task of providing quality drinking water and sewerage services in an eco-friendly and sustainable manner to

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<sup>2</sup> The Kerala Water Authority was constituted by the Government of Kerala on 01 April 1984 under the Kerala Water Supply and Waste Water Ordinance 1984 as a successor to the erstwhile Public Health Engineering Department of the Government of Kerala. The ordinance was replaced by the Kerala Water Supply and Sewerage Act, 1986.

the people of the State using tap water. KWA is responsible for the design, construction, execution, operation and maintenance of water supply schemes and for the collection and disposal of wastewater in the State of Kerala.

KWA has 1,078 water supply schemes (March 2016) with a total installed capacity of 3,367.13 million litres per day. Being a State owned Autonomous Body, KWA obtains water from various sources free of cost for supply to its consumers.

Enhanced Advanced Billing, Accounting and Collection Utility System (eABACUS), is a web based billing, accounting and collection system developed by NIC and put to use in KWA. It covers all the business processes of water charge receipts in Kerala Water Authority such as addition of consumers, management of consumer services, billing and collection of water charges. It handles the billing, collection and monitoring of 16 lakh KWA consumers across Kerala. The system was implemented in nearly 90 *per cent* of offices that are responsible for collection of water charges.

The project was originally conceived based on a decision taken in 1994 and a billing system was developed by NIC and put to use since 1995. The project was extended as a part of Rajiv Gandhi National Rural Water Mission in 2004. The modified web-based system named as ABACUS was completed by 2007 and put to use in pilot phase in Thiruvananthapuram. It was enhanced and renamed as eABACUS in 2010 and the rolling out in other Circles commenced in 2012. Currently, the system maintenance and modifications are done by the in-house team of KWA with the support of National Informatics Centre Services Inc <sup>3</sup> .

## **5.2 Organisational Setup**

The KWA is governed by a Board chaired by the Principal Secretary/Secretary to Government, Water Resources Department, Government of Kerala. The board also includes the Principal Secretaries/Secretaries of the departments of finance, Local Self-Government, Managing Director, Accounts Member, Technical Member, two

<sup>3</sup> National Informatics Centre Services Inc. (NICSI) was established in 1995 as a section-25 company under National Informatics Centre.



Members representing Local Self Government Institutions and one Member belonging to Scheduled Caste or Scheduled Tribe appointed by the Government of Kerala. Managing Director is the Chief Executive of Kerala Water Authority. The headquarters of the KWA is at Thiruvananthapuram. It has three regional offices at Thiruvananthapuram, Kochi and Kozhikode, each headed by a Chief Engineer. IT Unit, which is responsible for the implementation and maintenance of eABACUS, is headed by Chief Engineer (HRD&GL), who reports to the Managing Director. Executive Engineer (IT) and Database Administrator (DBA) coordinates the activities of the IT Unit of KWA.

### **5.3 The objectives of eABACUS**

The main objectives of eABACUS were to

- generate timely and accurate bills;
- prepare reports on billing and collection;
- enable defaulter identification and analysis of collection pattern;
- reduce queuing time at counters through prompt display of accounts and automatic printing of receipts;
- facilitate on-line updation of Consumer Ledger Account;
- enable enforcement of collection by preparation of disconnection notice;and
- to provide the consumers the facility to make payment through any of the KWA counters in the network, payment kiosks, bank transfers and through online mode.

### **5.4 Hardware and software**

eABACUS was developed in Oracle 11g. The web-based application is hosted in the State Data Centre-2 at Thiruvananthapuram and connectivity to KWA offices is

established through KSWAN<sup>4</sup> along with BSN<sup>5</sup> leased line as last mile connectivity<sup>6</sup>. eABACUS has 10 main modules<sup>7</sup> and 60 sub modules.

### 5.5 eABACUS data and cash flow

In Thiruvananthapuram Corporation, where handheld<sup>8</sup> device is used, billing and route information<sup>9</sup> is ported directly from eABACUS application system. In respect of other offices, reports on billing and route information generated through eABACUS are handed over to the meter readers. The meter readers take the reading and issue water charge bills. Automated bills are generated by the handheld device, where they are used. Wherever handheld device is not used, system generated pre-printed bills are filled in with meter reading and water charges calculated with the help of ready reckoners. Within two days, the meter readings are updated to eABACUS, porting data in the case of handheld devices and entering data in the case of manual readings.

The consumers have the option to make payments from the third working day of receipt of bills up to 30 days without any fine. They can make payments through online mode, through ECS<sup>10</sup>, FRIENDS Centres<sup>11</sup>, Akshaya Centres<sup>12</sup>, post offices or through KWA cash counters. In payments (cash/cheque) made through the above modes except online mode, the money is deposited/transferred to non-operative

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4 Kerala State Wide Area Network (KSWAN) was setup as a backbone of the State Information Infrastructure (SII).

5 Bharat Sanchar Nigam Ltd. is one of the largest and leading public sector units providing comprehensive range of telecom services in India.

6 KSWAN connectivity is provided only up to Block level. Last level connectivity, the connectivity from Block offices to KWA offices, is provided through leased lines.

7 Ledger, New connections, Consumer services, Receipts, Billing, Supervisory functions, Miscellaneous collection, Administrator, Code master, Query and Reports.

8 A handheld device is any computing or electronic device that is compact and portable enough to be held and used in one or both hands.

9 Billing and route information is sequentially numbered consumers based on their geographical habitation/location.

10 Electronic Clearing Service (ECS) is an electronic mode of payment/receipt for transactions that are repetitive and periodic in nature. Essentially, ECS facilitates bulk transfer of money from one bank account to many bank accounts or vice versa

11 FRIENDS (Fast Reliable Instant Efficient Network for Disbursement of Services) Jan Sevana Kendram is a single-window facility where citizens can make government related transactions

12 Akshaya, an innovative project implemented in the State of Kerala, aims at bridging the digital divide, addresses the issues of information and communication technology access and provides basic skill sets. Akshaya centres function as common service centres too.

bank accounts<sup>13</sup> in respect of all the Sub-division offices of KWA. The balances from all the non-operative accounts are transferred daily to the account operated by Finance Manager and Chief Account Officer (FM&CAO) at KWA Headquarters. Payments made through Akshaya Centres are routed through FRIENDS Centres and post offices through the General Post Office, Thiruvananthapuram. Online payments are routed through BillDesk<sup>14</sup>, a payment gateway service provider, and the amount is transferred directly to the account of FM&CAO. In respect of online payments and payments through KWA cash counters, the payment details are automatically updated in the eABACUS (online process). Whereas in respect of other modes of payments, text (CSV<sup>15</sup>) files are transmitted to database wing of KWA, where the eABACUS is updated through manual process. A graphic representation of data and cash flow is shown in Appendix 5.1.

## 5.6 Audit objectives

The audit objectives were to assess

- the extent to which the implementation of eABACUS benefited KWA in improving the system of billing, collection and accounting of water charges and in improving consumer satisfaction;
- the Project and Contract Management; and
- whether IT, general and application, controls and information system security controls in place were adequate.

## 5.7 Audit criteria

- Kerala Water Supply and Sewerage Act 1986,
- Kerala Water Authority (Water Supply) Regulations 1991,
- IT Act, 2000 and IT (Amendment) Act, 2008,

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<sup>13</sup> Non-operative accounts, operated by all Sub-division offices of KWA, can only be credited by Sub-divisions and no amount can be debited by them

<sup>14</sup> BillDesk, a property of Indialdeas.com Ltd. facilitates online bill payment services.

<sup>15</sup> Comma-separated values (CSV) file stores tabular data (numbers and text) in plain text.

- Information Technology (IT) Policy, 2012 of Government of Kerala,
- State Government Orders,
- Water Tariff Order,
- Circulars issued by KWA Board, and
- Citizen Charter

### **5.8 Scope of audit**

IT Audit of Computerised Billing and Revenue Collection System in Kerala Water Authority was included in the Report of the Comptroller and Auditor General of India for the year ended 31 March 2006<sup>16</sup> . However, the report was discussed by the Committee on Public Undertakings of the State only on 02 August 2017. The recommendations of the Committee are awaited. The system underwent several modifications and was converted to a web-based application with a new name eABACUS. Audit assessed the performance of eABACUS for the period from 2012-13 to 2016-17.

### **5.9 Audit methodology**

Audit was conducted during July to November 2017 in all the three regions, namely Thiruvananthapuram, Kochi and Kozhikode. An entry conference was held (24 July 2017) with the Secretary to Government, Water Resources Department, Government of Kerala. In addition to KWA Headquarters, the audit team visited 48 selected offices<sup>17</sup> and scrutinised daily transaction records and Demand Collection

<sup>16</sup> Chapter II of Audit Report – Government of Kerala (Civil) – for the year ended 31 March 2006 – Volume II.

<sup>17</sup> Ten Divisions (Kochi (PH), Aluva, Kozhikode, Vatakara, Thodupuzha, Muvattupuzha, Pathanamthitta, Thiruvalla, Thiruvananthapuram North and Attingal); eighteen Sub Divisions (Kaloor, Pallimukku, Angamali, Aluva, Malaparamba, Kozhikode (Distribution), Vatakara, Painav, Thodupuzha, Kothamangalam, Muvattupuzha, Pathanamthitta, Mallappally, Thiruvalla, Kowdiar, Pongummoodu, Varkala and Attingal); and twenty Revenue Collection Centres (Kaloor, Pallimukku, Angamali, Aluva, Koduvally, Kozhikode (Distribution), Purameri, Vatakara, Painav, Thodupuzha, Kothamangalam, Muvattupuzha, Konni, Pathanamthitta, Mallappally, Thiruvalla, Kowdiar, Pongummoodu, Varkala and Attingal) from five (Thiruvananthapuram, Thiruvalla, Kochi, Muvattupuzha and Kozhikode) out of twelve Circles (Alappuzha, Kannur, Kochi, Kollam, Kottayam, Kozhikode, Malappuram, Muvattupuzha, Palakkad, Thiruvalla, Thiruvananthapuram and Thrissur) were chosen using probability proportional to size sampling without replacement method for conducting substantive testing of results of data analysis, operations and application of general IT

Balance Statements. Audit checked the system controls for ensuring the accurate processing and integrity of data, front-end tool, online system and interviewed end-users. eABACUS backup data, obtained from KWA, was restored in an audit server and the entire data for the period from 2012-13 to 2016-17 was analysed in audit using CAATs<sup>18</sup>. Substantive testing of the results of data analysis was done in the above stated field offices with the available records. Depending on the number of billing cases relating to each office, the number of items tested ranged from five percent to 20 per cent, chosen at random and written confirmation of the respective heads of offices on the accuracy of the results of data analysis obtained.

Draft report was furnished (December 2017) to the Government. An exit conference was held (15 December 2017) with Additional Secretary, Water Resources Department, Government of Kerala, wherein the audit findings were discussed. Views of the Government and their replies are suitably incorporated in the report.

## **5.10 Acknowledgement**

Audit acknowledges the co-operation extended by the Secretary to Government, Water Resources Department, Government of Kerala, the Managing Director of KWA, Heads of Offices and staff members of the offices visited by Audit.

## **Audit Findings**

### **IT General Controls**

#### **5.11 IT Governance**

##### **5.11.1 Absence of IT Strategy and Planning**

Information Technology Strategy represents the mutual alignment between IT strategy and business strategic objectives. The strategy should consider the existing IT infrastructure and architecture, investments, delivery model, resourcing including staffing, and lay out a strategy that integrates these into a common approach to

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controls.

<sup>18</sup> Computer-assisted audit techniques. The tools used were KNIME, IDEA, Tableau and MS Access/Excel.

support the business objectives. Budget allocation and expenditure under information technology head of KWA during the period from 2012-13 to 2016-17 is as shown in **Table 5.1**.

**Table 5.1: Budget allocation and expenditure under IT head during the period from 2012-13 to 2016-17**

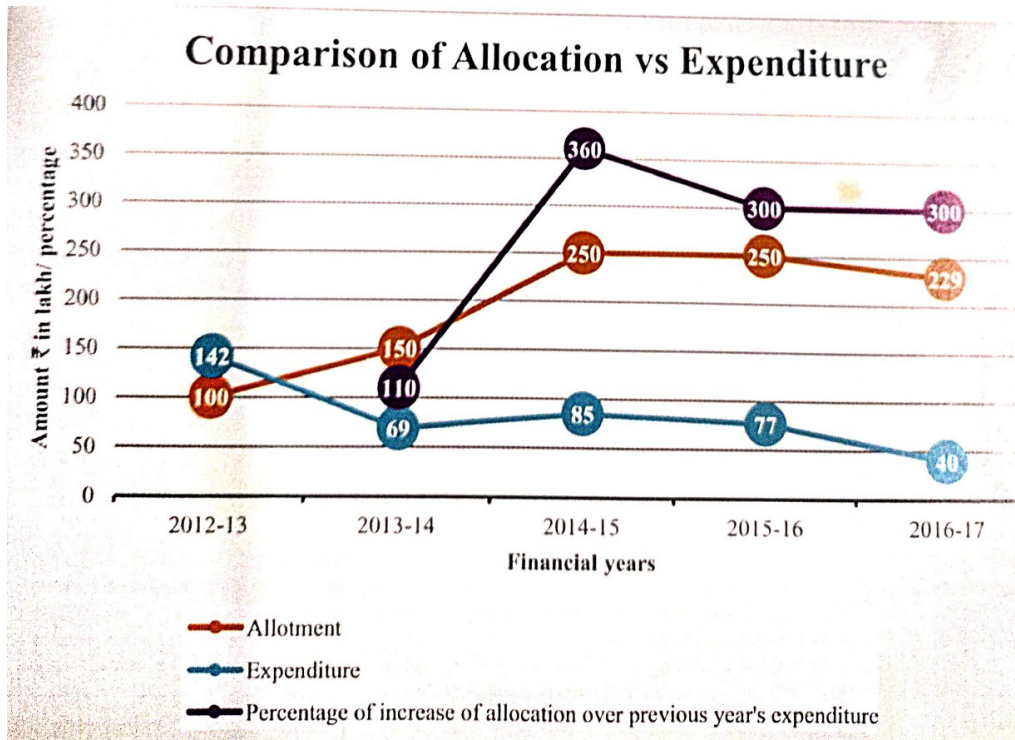
( ₹ in lakh)

Financial year	Budget Allocation	Expenditure
2012-13	100	142.34
2013-14	150	68.50
2014-15	250	84.67
2015-16	250	76.96
2016-17	229	39.93
Total	979	412.40

(Source: Information obtained from KWA Headquarters.)

- Audit observed that there was no clear-cut strategic planning. The absence of strategic planning was evident from the fact that during the period covered under audit, the expenditure under IT head was only 42.13 *per cent* of the budget allocated by KWA. Except for the financial year 2012-13, the expenditures were below the allocations. Only 46 *per cent* of budget allotment was spent in 2013-14, 34 *per cent* in 2014-15, 30.80 *per cent* in 2015-16 and 17.47 *per cent* in the financial year 2016-17. Interestingly, while the expenditure was decreasing over the years since 2013-14, the allocation for the subsequent years continued to be three times or more of the expenditure relevant to the previous years as depicted in Chart 5.1.

**Chart 5.1: Comparison of allocation versus expenditure for the period from 2012-13 to 2016-17**



(Source: Audit analysis of data obtained from KWA Headquarters)

- As per the roll out plan, the rolling out was to be completed in December 2013. However, only 70 per cent of the then consumers were brought under eABACUS by December 2013. Audit also observed that out of 297 offices, eABACUS was yet to be installed in 15 offices (December 2017). Out of 18 offices test-checked, where eABACUS was used, in two Sub-division Offices, due to the delay in capturing basic legacy data, like name, address and other details of consumers, details of the last billing information, etc., manual system was used simultaneously.

The Government stated (December 2017) that the budget allocation was as per plan, but as many of the software applications were developed in-house, there was considerable savings. The reply was not correct on two counts. Firstly, the gap

between the allocation and expenditure was widening continuously for the last four years. Secondly, the budget proposals for the succeeding years continued to be three times or more than the expenditure during the current years. Both of these establish absence of proper planning. The Government also stated that the delay of roll out was attributed to non-availability of last mile connectivity. Thus, absence of a predetermined IT strategy resulted in non- achievement of optimum benefits of eABACUS like providing facility for real time updation of the system at the time of taking water meter reading, developing web interface for system updation, when payments were made through NEFT, RTGS and IMPS, considering more online payment service providers so as to take advantage of competition, revamping the system for fixing bugs in the software, etc.

### **5.11.2 Documentation Deficiencies**

User Requirement Specifications (URS) document obtained from users and System Requirement Specifications (SRS) document developed by the software development team ensure that the needs of the users of the system are taken care of and the software developed meets the business requirements.

Audit observed that URS document was not prepared. Though System Requirement Specifications were prepared by the developer, the same were not formally accepted by the department. In addition, there was no signing-off<sup>19</sup> of the project. Absence of well documented URS deprived a benchmark both for the developer and KWA. This led to ad-hoc system development and design deficiencies as detailed in subsequent paragraphs (Paragraph 5.12). In the absence of URS, Audit could not assess precisely whether full functionality of the software and the intended benefits of computerisation were achieved.

The Government stated (December 2017) that the system was developed based on group discussions with NIC, who assessed the user requirements. The reply was not correct as documentation of User Requirement Specification was essential in the

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<sup>19</sup> Project sign-off is referred to mean that the developed application software is delivered and the project is closed after successful trial run of the software.



system development process and was required for both business and regulatory reasons.

### **5.11.3 Absence of IT Security policy**

Any good IT system should have specifically laid down IT security policy indicating minimum standards and compliance requirements for specific areas like assets classification, data security, personal security, physical, logical and environmental security, communications security, legal, regulatory and contractual requirements, business continuity planning, security awareness and training, security breach detection and reporting requirements, violation of enforcement provisions, etc.

Audit observed that KWA did not have a specifically laid down IT security policy. The Government stated (December 2017) that a security policy would be formulated as part of the revised IT master plan.

### **5.11.4 Lack of adequate training**

For effective operation of an IT system, 100 per cent of the employees involved in the operation of the system are required to be trained. However, in 18 sub- divisions test-checked, Audit observed that only 55 employees were trained in eABACUS out of 303 employees assigned with the operation of eABACUS.

The Government stated (December 2017) that training was provided to staff at the time of roll out. Consequent on transfers, new incumbents were trained by experienced persons. Periodic trainings have since been conducted. However, the fact remains that only 18.15 per cent of employees operating eABACUS in the test-checked offices were trained.

## 5.12 System Development and Design Deficiencies

### 5.12.1 System design deficiency

System design is concerned with how the functional requirements will actually be provided and provides the definition how the programmers will go on to build the system. Audit observed the following deficiencies in the system design.

#### 5.12.1.1 Avoidable fine on consumers

In the case of unavailability of eABACUS due to disruption in network, payments are received by issuing manual receipts and entered in the system on resumption of eABACUS services. Audit observed that the system did not have a provision to operate offline by storing the values in the local grid<sup>20</sup> and transmit the same to the central server, when the connectivity is established. Absence of the provision resulted in levying of fine in the case of consumers, who paid their dues within the stipulated date. Due to non-availability of network connectivity, the payment details were entered in the system only after the due date of payment. Thus, such consumers were penalised for no fault of theirs.

Audit observed that Vadakara Sub-division office started maintaining a manual register to record the cases of remittances, while the system was offline. It was observed that in three cases, fines were levied from consumers though they remitted water charges before the due date. Through interaction with consumers and KWA office staff, Audit observed that there were similar cases in all the Sub-divisions test-checked.

While admitting the lapse, the Government stated (December 2017) that action would be initiated to rectify the design deficiency.

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<sup>20</sup> Local grid is referred to mean that, when the online server connectivity is not temporarily available, the updation information is stored in the local system and subsequently synced with the server as and when the server connectivity is established.

### **5.12.1.2 Absence of provision for calculating renewal fees for casual connection**

According to the extant regulations<sup>21</sup>, when a casual connection is provided on account of commercial consumption of water like that of house construction, repair, etc., applicants should deposit an amount equal to the cost of 2.50 kilolitres of water for each square meter of plinth area of the building proposed to be constructed at the prevailing non-domestic rates, subject to a maximum of ₹ 20,000. According to Regulation 10 *ibid*, if the casual connection is continued as such after completion of one year, a renewal fee of ₹ 250 is to be charged from the consumer.

Audit observed that the system did not have a provision to calculate the annual renewal fees on completion of every year and raise the demand through subsequent bills as an automated process. In all the test-checked offices, there were omissions in collection of renewal fees. As per the data analysis, the amount that escaped collection was ₹ 76.50 lakh in respect of 5,686 cases.

The Government replied (December 2017) that provision would be made in the system to include renewal fees annually, in the subsequent bills.

The Government also stated that there was no revenue loss as renewal fees were collected at the time of conversion or disconnection. The reply was not correct as the fees were required to be collected annually as per the rules thereon and not at the time of conversion/disconnection.

### **5.12.2 Improper designing of database**

Audit observed the following deficiencies in database designing.

- The practice followed in KWA is that collection of cash towards water charges in the Revenue Collection Sections is closed each day at 3.00 PM and remitted to the respective Sub-division on the same day. The Sub-division consolidates the collection received from all the Sections under them and remits the amount to the non-operative account maintained for the purpose.

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<sup>21</sup> Regulation 5 of KWA (Water Supply) Regulations, 1991.

Audit observed that at the Sub-division level, eABACUS did not contain any table/column to capture the remittances into bank. In the absence of proper online monitoring mechanism, the system was exposed to misappropriation of money. Audit observed instances of embezzlement of cash<sup>22</sup> amounting to ₹ 6.42 lakh in three out of 18 Sub-divisions test-checked. Embezzlement of cash included delayed remittances and partial remittance to bank. The deficiencies in the database design deprived the system of the facility of monitoring at various levels.

- There was a provision for levy of penalty of ₹ 250 in the case of dishonoured cheques. However, there was no column to store the penalty levied and hence, it was included among other items in the column for storing other adjustments. It lacked audit trail adversely affecting exercise of internal controls and execution of audit.
- Number of occupied dwelling units in an apartment complex varies from time to time. As narrated in the succeeding paragraph 5.17.4, the total number of dwelling units is required for calculation of water charges in the case of apartment complexes. Audit observed that the system did not have a provision for storing the number of dwelling units for every billing period. The system replaced the previous value with the latest number of dwelling units, instead of storing the respective value for every bill. This lacuna leaves the system without audit trail.
- Revenue recovery (RR) proceedings are initiated on disconnected consumers because of long pending dues. Once RR proceedings are initiated, the consumers concerned are permitted to make arrear payment only after remitting RR proceeding charges<sup>23</sup>. However, Audit observed that the system did not have a provision to capture initiation of RR proceedings. Hence, the

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<sup>22</sup> Delayed remittance of cash was ₹5.79 lakh in Aluva and Angamaly Sub-divisions. There were short remittances of cash amounting to ₹0.63 lakh in Aluva, Angamaly and Varkala Sub-divisions.

<sup>23</sup> As per Rule 5 of the Kerala Revenue Recovery Rules, 1968, the charges include 5 per cent of arrears to be collected, when the amount does not exceed ₹5 lakh and 7.5 per cent when it exceeds ₹ 5 lakh and ₹75 per every notice issued

counter staff members, unaware of the RR proceedings, accepted remittance of arrears by consumers, where RR proceedings were initiated without remitting the RR proceeding charges. During the course of and finalisation of RR proceedings by Revenue Officers, while approaching the consumers for attachment of movable or immovable properties, disputes arose between Revenue Officers and consumers as the payments were already made by the consumers through the cash counters.

The Government stated (December 2017) that action would be initiated to rectify the deficiencies.

### **5.12.3 Non-capturing of electronic fund transfers through banks**

The consumers can make payment of their water bills in any of the modes like, cash, cheques, demand draft, online transactions using net banking, credit cards, debit cards and bank transfers through NEFT<sup>24</sup>, RTGS<sup>25</sup> and IMPS<sup>26</sup>. However, the system did not provide any interface for consumers to make bank transfers through NEFT, RTGS and IMPS. Audit observed that consumers obtained the non-operative account number of the Sub-division concerned and made electronic funds transfer. However, in the absence of any web interface, in respect of bank transfers through NEFT etc., the Sub-division could credit consumers' ledgers only in respect of those consumers, who made subsequent representations. In the test-check of records for the period from May 2016 to October 2017 in Sub-division, Painavu, Audit observed 51 NEFT transactions. Of these, the Sub-division could not identify the remitters and credit the respective ledgers in five instances amounting to ₹6,180 even after 205 days (November 2017).

The Government stated (December 2017) that an interface would be provided in Eabacus.

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<sup>24</sup> National Electronic Funds Transfer (NEFT) is an electronic funds transfer system maintained by the Reserve Bank of India.

<sup>25</sup> In Real-Time Gross Settlement (RTGS) transfer of money takes place from one bank to another, where transactions are settled as soon as they are processed and payments are final and irrevocable.

<sup>26</sup> Immediate Payment Service (IMPS) is an instant interbank electronic fund transfer service.

#### **5.12.4 Deficiencies in software**

Billing and route information are ported to handheld devices, where they are used or reports generated and handed over to meter readers for taking meter reading as narrated in paragraph 5.5. The system is configured in such a way that once the route information is ported/generated, payments cannot be accepted until the meter reading is ported back to the system, due to locking of consumers' ledgers. Through interaction with consumers and KWA office staff, Audit observed that in such circumstances, if a consumer intended to remit water charges relating to any previous bill issued, the reading of which had been uploaded earlier, the system could not accept payments, unless the latest meter reading was uploaded to the system and thereby unlocking of consumers' ledgers.

The Government replied (December 2017) that a mobile application was planned to be introduced that would settle the issue.

**Recommendation 5.1: Design deficiencies may be remedied by comprehensive mapping of business rules.**

### **5.13 IT operations**

#### **5.13.1 Bypassing segregation of duties**

Segregation of duty at various levels of officers is the basic requirement for any good system. Every user is given certain privileges and rights according to the role they perform, data confidentiality and the related risks. The details entered in the system, if required to be modified or deleted later, should be done by a competent authority with adequate documentation.

Audit observed in 17 out of 18 test-checked offices that the Assistant Executive Engineers (AEE) shared their login credentials to subordinate counter staff members, who cancelled the receipts, adversely affecting the accountability of transactions made. This exposed the system to the risk of irregularity. The accountability could also not be fixed for the transactions made. Audit also

observed in the above offices that counter staff members were cancelling receipts, bypassing the segregation of duties.

The Government stated (December 2017) that action would be initiated to rectify the deficiency.

### **5.13.2 Access control failure**

Access controls are measures and procedures, aimed at protecting the IT resources against unauthorized access attempts. Audit test-checked the access controls in eABACUS and found that an employee logging in with his user credentials was able to alter the route information of any consumer falling under any other Sub-division exposing the system to the risk of excluding consumers from billing cycle either inadvertently or deliberately. For example, an employee working in Sub-division office Vadakara in the northern district of Kozhikode was able to modify the route information in respect of a consumer belonging to Sub-division Pongummodu in the southernmost district of Thiruvananthapuram.

The Government stated (December 2017) that action would be initiated to rectify the anomalies.

**Recommendation 5.2: Access controls may be ensured by defining and enforcing access rights.**

### **5.13.3 Irrelevant data of unidentified consumers**

Previous IT Audit Report<sup>27</sup> contained an observation that there were 2,198 unidentified consumers<sup>28</sup> in Kowdiar and Pongummoodu Sub-divisions and that the

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<sup>27</sup> Paragraph 2.6.2 of Report of the Comptroller and Auditor General of India – Government of Kerala (Civil) – for the year ended 31 March 2006 – Volume II.

<sup>28</sup> Normal billing period is bimonthly. Monthly billing is done in the case of consumers, who consume bulk quantity of water. Billing is done once in six months in remote villages. Even in the case of households kept locked for years, meter reading would be taken and the status stored as 'door locked'. Audit, therefore, quantified the number of consumers, in whose cases there were no activities (meter reading/bill generation/payment) for more than one year.

Government agreed to remove those consumers from the billing cycle, if they could not be identified even after a special drive. However, Audit observed that the number of unidentified consumers in Kowdiar and Pongummoodu sub divisions increased to 3,019. Analysis of the entire data showed that there were a total of 69,321 unidentified consumers, all over Kerala. The amount of arrears from these consumers was ₹15,489.94 lakh. The ageing analysis of arrears in respect of unidentified consumers is shown in **Table 5.2**.

**Table 5.2: Ageing analysis of arrears in respect of unidentified consumers**

Ageing	No. of unidentified consumers	Arrear amount ( ₹ in lakh)	Percentage of arrear amount
Above one year but below five years	41,972	7,333.26	47.34
Five years and above but below ten years	9,087	5,650.17	36.48
Ten years and above	18,262	2,506.51	16.18
<b>Total</b>	<b>69,321</b>	<b>15,489.94</b>	<b>100</b>

(Source: Analysis of eABACUS data.)

The above ageing analysis shows that 52.66 *per cent* of the arrear amount in respect of unidentified consumers remained untraceable for five years or more. Hence, the possibility of collecting the arrears from these consumers is remote. Maintenance of non-existing consumers in the database adversely affects data integrity and leads to generation of Management Information System Reports. Sundry debtors shown in the accounts include ₹155 crores as arrears receivable from the above unidentified consumers, which is a non-performing asset. As such, the balance sheet does not reflect a true and fair view of the accounts.

The Government stated (December 2017) that action would be initiated to remove unidentified consumers from the billing cycle.

#### **5.13.4 Change management**

Change management ensures that all changes to system configurations are authorised, tested, documented and controlled so that the systems continue to



support business operations in the manner planned, and that there is an adequate trail of changes.

Before making any modification and alteration of business rules, in the live environment, they should be tested, put to trial run, documented and reviewed in the testing environment. However, Audit observed that no version numbers were marked in the application. There was no formal/documented system for complaint reporting. Whenever, any bugs were observed, users were lodging complaints through telephone calls to database administration (DBA) wing. The DBA wing made changes in the system based on the complaints. These changes were neither recorded nor was there any evidence of conducting trial run. The system, thus modified, was put to use even without approval of competent authorities. The consequences of improper change management are pointed out in paragraphs 5.17.1 to 5.17.4.

The Government stated (December 2017) that major changes were made with the concurrence of High Level Committee and minor changes were made by database administrator maintaining logs. The reply was not correct as any changes made in the system should be after proper testing, trial run and approval of competent authority. The deficiencies in processing controls were the consequences of lapses in change management.

**Recommendation 5.3: Change management procedures may be as per the best practices in the industry and properly documented.**

#### **5.14 Contract management: Inadequate monitoring of service providers**

KWA entered into an agreement (February 2011) with BillDesk, a payment service provider, for facilitation of online payment, as per which consumers had to pay service charges to BillDesk for each transaction. It requires at least a five- way

communication<sup>29</sup> in an online transaction. First, a consumer's computer has to communicate to KWA server. KWA server has to communicate to BillDesk server to provide online payment service. BillDesk server, in turn, communicates to consumer's bank server to fetch the money. Once the money is credited to BillDesk by debiting consumer's bank account, the fact is to be communicated to KWA server for generating and issue of receipts to the consumer. If communication in all the above four channels are successful, the consumer can view his receipt and take the printout by the final communication from KWA server to the consumer. Once a receipt is generated, the system does not permit any more transaction of that particular bill. If the receipt is not generated, the option to make payments in the KWA interface will be active and the consumer gets to know that the transaction is not successful, even though the money was debited from the bank account.

The consumers, therefore, resort to repeating the bill remittance process with the expectation that the amount of failed transactions would be credited back to their accounts as per the industry best practices. However, Audit observed that in respect of unsuccessful transactions, instead of paying back the amounts debited from consumers' bank accounts along with the debited service charges, BillDesk credited the multiple remittances to KWA accounts. The duplicate amounts were given credit to the consumers' ledgers as advances by KWA. KWA did not direct BillDesk to rectify their application for reversing the money debited from the consumers' bank accounts on account of the failed transactions. Though the duplicate amounts were given credit to the consumers in eABACUS as advances, no interest was paid or discount given to consumers for advance remittances.

There were 2,272 multiple transactions credited to KWA account by BillDesk involving an amount of ₹ 8.50 lakh excluding service charges as observed in data

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<sup>29</sup> For simplicity, only the vital channels of communications relevant for the above narration are discussed. A Payment Service Provider can connect to multiple acquiring banks, card, and payment networks. An acquiring bank is a bank or financial institution that processes credit or debit card payments on behalf of a merchant by allowing merchants to accept credit card payments from the card-issuing banks within an association like, Visa, MasterCard, Discover, Indian Rupay, American Express, Diners Club, etc.

analysis. Data analysis also revealed that in eleven transactions made on 28 January 2016, the money (₹ 859) debited from consumers' accounts was not transferred to KWA by BillDesk. Audit observed that the settlement details in respect of these cases were demanded from BillDesk (10 February 2016). However, there was no follow up action to effect the payment from BillDesk and the money was not transferred to KWA (December 2017).

Audit also observed that KWA did not initiate any action to take advantage of competition among payment service providers and consider the ones that provide services free of cost like eTreasury, etc.

While accepting the observation, the Government stated (December 2017) that action would be initiated to avoid the drawbacks in future.

## **5.15 Business continuity planning**

### **5.15.1 Lapses in business continuity planning and disaster recovery planning**

Business continuity planning is the process an organisation uses to plan and test the recovery of its business processes after a disruption and how an organisation will continue to function under adverse conditions like natural or other disasters. Disaster recovery planning is a subset of business continuity planning. It is the process of planning and testing for recovery of information technology infrastructure after a natural or other disaster.

Audit observed that adequate measures were adopted for backup of data and its offsite storage. However, there was no prescribed procedure for regular disaster recovery testing. Audit observed that the lone data recovery conducted (28 January 2016) was consequent on corruption of database.

For proper maintenance of any good IT system, a log register is required to be maintained for recording the duration of network failures. Log registers of availability of network connectivity were not maintained in 17 out of 18 offices test-checked. In the absence of log registers, Sub-division offices could not ascertain the up/downtime and initiate action for ensuring uninterrupted business. However, during discussion with eABACUS users, Audit observed average network downtime of five hours per week. Absence of log registers brought to light the lapses in exercising monitoring controls.

The Government accepted the observation and stated (December 2017) that immediate action would be initiated for maintenance of logs.

**Recommendation 5.4: Immediate action may be initiated to maintain log registers for recording the duration of network failures.**

#### **5.15.2 Preventive and Environmental Controls**

Environmental controls prevent or mitigate potential damage to facilities and interruptions in service. It was observed that none of the offices visited by Audit were equipped with fire alarms, smoke detectors, fire extinguishers and fire-suppression systems.

The Government stated (December 2017) that action would be initiated to provide fire alarms, smoke detectors, fire extinguishers and fire suppression systems.

#### **IT Application controls**

##### **5.16 Input controls: Delay in updating meter reading**

As narrated in paragraph 5.5, after taking the reading, the meter reader issues bills to the consumers, which are payable from the third working day. Once billing and route information is generated/porting to handheld devices, the system locks the consumers' ledger from accepting payments. The system will further enable payment only after uploading the latest reading. Audit observed that, when a

consumer approached a KWA cash counter to pay water charges, if there was delay in uploading of reading information, the system could not accept payment and prompted: “Reading not posted”. In such circumstances, the counter staff made telephone calls to the meter reader and uploaded the meter reading information for enabling the system to accept payments. However, for consumers resorting to other modes of payments like ECS, FRIENDS Centres, Akshaya Centres etc., there was no option other than to wait until the system is updated for making payments. Malfunctioning of handheld devices is one of the reasons for delay in updation of the system. Another reason for the delay is lapses in exercising of management controls. Data analysis revealed that in 3,59,857 billing instances, there was delay of more than two weeks in uploading of route information in the system causing hassles to consumers.

While accepting the observation, the Government replied (December 2017) that they were planning to introduce a mobile application to capture reading and synchronise it with server immediately.

**Recommendation 5.5: Meter reading procedure may be automated and it should be in sync with the billing procedures.**

## **5.17 Processing controls**

### **5.17.1 Non-collection of sewerage charges on account of delay and mistake in mapping of business rules**

Along with revision of water tariff with effect from 01 October 2014, KWA introduced collection of sewerage charges for consumers having sewerage connections. The revised rates are shown in **Appendix 5.2**. The rates of 111Audit Report (General and Social Sector) for the year ended March 2017 sewerage charges are 10 percentage of water charges payable by all categories of consumers.

Data analysis revealed that sewerage charges were included in the water bill only from June 2015 owing to delay in mapping of business rules. In addition to that, there was delay in capturing data since June 2015. On account of the above delays, the sewerage charges that escaped collection amounted to ₹311.50 lakh.

Moreover, in Kochi Division, even capturing of data in respect of consumers with sewerage connections began only in January 2017. Details of only 41 out of 1,184 consumers were entered into the system in Kochi (November 2017). Owing to this non-inclusion of 1,143 consumers in the system, sewerage charges were not collected from 1,143 consumers in Kochi Division for the period from October 2014 to March 2017. The sewerage charges that escaped collection in Kochi Division due to non-inclusion alone was estimated to be ₹17.47 lakh<sup>30</sup>.

Data analysis further revealed that there was error in calculating the sewerage charges. Based on meter reading, the monthly average consumption was first calculated, which was multiplied with the applicable rates and the number of months in the billing period. However, while 10 per cent of the monthly water charges were rightly worked out, multiplying the same with the number of months in the billing period was omitted. Consequent short collection of sewerage charges was ₹107.52 lakh. Thus, total sewerage charges that escaped collection on account of delay and error in mapping of business rules was ₹436.49 lakh.

The Government stated (December 2017) that action would be initiated to collect arrears.

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<sup>30</sup> Audit quantified the sewerage charges which escaped collection in the following method. During the quarter January to March 2017, sewerage charges (₹2,089) were seen levied on 41 consumers. The average monthly amount per consumer was calculated (₹50.95). The average amount was multiplied with 30 months (period from October 2014 to March 2017). That amount was further multiplied with the number of consumers, whose details have not been captured (1,143).

Regarding the error in calculating sewerage charges, the Government stated that the anomaly was rectified in 2016. The reply was not correct as data analysis revealed errors for the period up to April 2017.

### **5.17.2 Short collection of water charges on account of delay in mapping of business rules**

Government of Kerala revised (September 2014) water tariff with effect from 01 October 2014. The revised rates are shown in **Appendix 5.2**. As the billing of water charges up to 31 October is generally done with effect from 01 November, the revised rates were mapped to the system effective from the billings made since 01 November. However, Audit observed that in 2,581 cases billings done in October 2014 (on account of consumer services<sup>31</sup>) contained water consumption for the months of September and October 2014. In those cases, the consumption since 01 October 2014 should have been charged at the revised rates. As there was delay in mapping of business rules in the system, adjustment bills could have been issued in these cases. However, the system was not enabled to revise bills based on the revised tariff for issue of adjustment bills. The consequent loss incurred by KWA was ₹14.17 lakh.

The Government accepted (December 2017) that there was a delay in making changes in the software. However, the reply was silent about the intended course of action on short collection.

**Recommendation 5.6: KWA may initiate action to settle the outstanding dues from the consumers.**

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<sup>31</sup> Consumer service is the term used in KWA to denote honouring of service request from consumers like, change of consumer category, replacement of water meter, etc. A prerequisite for performing a consumer service is that the consumers are required to clear all the arrears. Under such circumstances, the system generates a bill in advance for the current bimonthly billing period based on up-to-date meter reading.

### 5.17.3 Excess collection due to inaccurate mapping of business rules

While mapping the water tariff revised with effect from 01 October 2014 mistakes crept in the program in respect of calculation of water charges consequent on consumer service. The tariff contained several slabs viz., consumption of water up to 5 kilolitres (KL), above 5 KL and up to 10 KL, above 10 KL and up to 15 KL, etc. However, while writing the program, the upper limit of each slab was wrongly applied with the rates of the subsequent slab. For example, domestic rate for consumers falling in the slab 'above 10 KL and up to 15 KL' was '₹40 plus ₹5 per KL in excess of 10 KL'; rate for slab 'above 15 KL and up to 20 KL' was ₹ 6 per KL for the entire consumption'; etc. Thus, a domestic consumer, whose meter reading is 15 KL had to pay ₹65 {40 + (5 x 5)}. However, due to the inclusion in the subsequent higher slab, he was required to pay ₹90 {15 x 6}. Similarly, consumers, with consumption of 20, 25, 30 and 40 kilolitres, were incorrectly required to pay excess amounts. Data analysis revealed that during this period, the excess amount of water charges collected from consumers was ₹1.35 lakh in 1,805 cases.

The Government stated (December 2017) that the anomaly was rectified. However, the reply was silent about the intended course of action on the excess amounts collected from consumers.

**Recommendation 5.7: KWA may adjust the future bills to be issued to the affected consumers by giving credit for the excess amount collected from them.**

### 5.17.4 Mistakes in billing

The objectives of processing controls are to ensure that processing of transactions is accurate and complete. Audit observed weak process controls and mistakes in software that led to generation of inaccurate water bills.

Data analysis revealed variation in the water charges collected with that of the right calculation as per the tariff in some cases. Detailed substantive testing brought to



light various types of mistakes in system calculated figures due to non-uniformity in processing, some of which are narrated below.

- There is only one water meter in an apartment complex. Meter reading is normally taken bimonthly or with a higher interval. The total consumption of water has to be apportioned to various distinct units for applying the respective slab. Hence, the course of action followed is dividing the total consumption in respect of an apartment complex by the number of months pertaining to the billing period to arrive at the monthly consumption. The monthly consumption is then divided by the number of distinct units and is stored in the system as the monthly consumption of a unit. The monthly water charge is then calculated by applying the relevant rate. The monthly charge is then multiplied with the number of units and the number of months pertaining to the billing period for generating bill for the respective flat. However, Audit observed mistakes in bill generation in the cases, where current reading was not captured. In such cases, system adopted the latest available consumption stored (a figure that was arrived at by dividing the total monthly consumption by the number of occupying units) and wrongly divided it again by the number of units and generated the bill. This resulted in short billing and short collection of water charges amounting to ₹17.38 lakh.
- As various procedures or modules are prepared by different programmers and as per changes in business rules, proper processing controls should ensure that there should be integration of all the modules in an application system so that the results of the processing should be uniform. Rounding off of values is required to be done only at the final stage of generation of bills for easy facilitation of collection of money and is not to be followed in between the processing stages. However, Audit observed that rounding off to the nearest Rupee was followed in some of the intermediary procedures. The

aggregate difference in the water charges on account of wrong application of rounding off was ₹21,029.

- There is a table for storing water meter reading details and another for storing provisional invoice card details. The former table stores the reading taken and the date of taking the reading. The latter table, a system generated table based on the values in the former table, is used for calculating provisional invoice. Obviously, both the tables should have the same date of reading in respect of every consumer, for a particular billing period. While the former table stores meter reading, the latter generates the quantity and cost of monthly water consumption. However, Audit observed that in certain instances, the system stored multiple dates, quantity and amount of monthly consumption in the latter table in respect of the same consumer for the same billing period. Consequently, the invoice was seen generated with inaccurate consumption. The aggregate difference in the water charges on account of the above was ₹6,257.

While agreeing to audit comment, the Government stated (December 2017) that immediate action would be initiated to rectify the anomalies.

**Recommendation 5.8: The system may be revamped to ensure that all the business rules are accurately mapped in the system.**

### **5.18 Output controls: Inaccurate generation of Management Information System (MIS) reports**

Management Information System reports <sup>32</sup> are effective tools for managing any system. eABACUS has provision to generate status reports on 'Reading Monitoring' and 'Amount Monitoring' that provide information on the details of

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<sup>32</sup> Management Information System reports provide a concise view on the various parameters that are vital to the business and are effective tools for managing any system.

water meter reading captured in the system and the relevant money collected in a particular Revenue Collection Section respectively, during a particular period. However, Audit observed that whatever be the parameters pertaining to a particular Revenue Collection Section selected from the list box<sup>33</sup>, the system generated the status for the entire State. Further, Audit observed inaccuracies in generation and unavailability of the required MIS reports.

The reliability of MIS reports is vital for management decisions. In the absence of reliable MIS reports, the revenue monitoring such as dues and arrears by each Sub-division will not be possible.

The Government stated (December 2017) that action would be initiated to rectify the deficiencies.

## **5.19 Application security controls**

### **5.19.1 Non-deactivation of users**

Application security controls require that on transfer or termination of services of employees because of retirement or otherwise, the login-ids provided to them should be deactivated. However, in nine out of 18 offices test-checked, the number of active login-ids were 374 as against 203 employees assigned with operation of eABACUS. Non-deactivation of past users is a clear indicator of risk of intrusion into the system by unauthorised persons. It would also cause serious IT security risks and adversely affect accountability.

The Government stated (December 2017) that action would be initiated to deactivate such login-ids.

### **5.19.2 Master file and standing data protection**

#### ***5.19.2.1 Presence of junk data in master file***

Master tables contain data of a permanent nature that seldom changes like, consumer ID, name, address, etc., the accuracy of which is of vital importance.

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<sup>33</sup> A list box is a graphical control element that allows a user to select one or more items from a list contained within a static, multiple line text box.

Standing data errors have a far-reaching effect on the application, since this data might be used for a very large extent of the application's transactions. The previous IT Audit Report<sup>34</sup> contained an observation on storage of junk data in master tables. Data analysis revealed continuance of the presence of junk data. The column relating to consumer name contained junk characters in 889 rows. There were test data in the consumer ID column in respect of eight rows and the key ID column contained junk character in one row. Storage of junk data in the system had adverse effect in processing and consequent non-integrity of the MIS reports generated. The Government stated (December 2017) that action would be initiated to correct errors.

#### ***5.19.2.2 Absence of storage of vital data in master file***

Status of water meters is stored in master file. However, a vital piece of information of meter status – 'No meter', in the case of absence of water meter owing to theft or otherwise, is not available in the master file. For categorisation of consumers, certain inputs like office, labour camp, bachelor, etc., are required as these are the decisive factors in categorising a consumer into domestic or non-domestic. Audit noticed that these values were not stored in Master files.

The Government stated (December 2017) that action would be initiated to rectify the deficiencies.

### **5.19.3 Information security issues**

#### ***5.19.3.1 Flaws in web security***

- Audit observed that eABACUS did not undergo STQC<sup>35</sup> audit. In its absence, several lapses in access controls, data security and web security of eABACUS pointed out elsewhere in the audit observations remained

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<sup>34</sup> Paragraph 2.6.1 of Report of the Comptroller and Auditor General of India – Government of Kerala (Civil) – for the year ended 31 March 2006 – Volume II.

<sup>35</sup> Standardisation Testing and Quality Certification is an organization under the Ministry of Electronics and Information Technology, Government of India, which provides quality assurance services in the area of Electronics and IT through countrywide network of laboratories and centres.

unnoticed. But, an STQC testing process of the KWA website was initiated by KWA. As per the report (February 2013), there were 35 vulnerabilities with high severity<sup>36</sup>. However, no follow up actions were initiated to rectify the vulnerabilities pointed out in the report and complete the testing process. The Government stated (December 2017) that action would be initiated to complete certification process and to rectify the flaws.

- Audit observed major flaws in information security. It was observed that when a user, say Assistant Executive Engineer (AEE) assigned with the highest privileges in a Sub-division, exited the application by clicking the close button without logging off the system, anybody else could login to the system by keying in any characters, say 'abcd' as user-id and the same or any other characters as password. It indicated that there was no automatic session log-off, when a user exits the application by clicking the close button. The flaws are serious, which are prone to misuse as AEEs are assigned with the role of cancellation of paid bills.
- The risk of interception of passwords sent over the Internet can be reduced by using cryptographic protection and all passwords stored in the system should be encrypted. Audit observed that KWA did not have laid down password policy. Data analysis revealed that the passwords used for online transactions were stored in the database tables in unencrypted format. Minimum length was not ensured. Easily guessable text like, names, mobile phone numbers, email ids, etc., were seen stored as passwords, which was a serious security flaw.
- Use of USB<sup>37</sup> storage devices is one of the main reasons for virus infiltration. Industry best practices demand disabling of USB drives from organisational networks. Audit observed that USB drives were not disabled and antivirus applications were not installed in any of the systems in the offices visited.

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<sup>36</sup> In the case of vulnerabilities with high severity, any failure would cause impairment of critical system functions, for which no workaround solution exists.

<sup>37</sup> Universal Serial Bus (USB) is a plug-and-play interface that allows a computer to communicate with peripheral and other devices.

Thus, the system was exposed to the risk of loss of vital data due to virus infiltration, adversely affecting the business continuity.

The Government stated (December 2017) that action would be initiated to rectify the flaws.

**Recommendation 5.9: The flaw in the system login may be addressed immediately to prevent unauthorised login and the system subjected to STQC audit. Data security may be ensured by defining and enforcing password policy and a robust system of backup and recovery.**

## 5.20 Conclusion

Audit observed that the designing and implementation of e ABACUS benefitted both KWA and consumers. The introduction of a web based application, facilitating more payment options like online mode, bank transfers and payments through common service centres benefitted KWA by enhanced collection of dues and benefitted the consumers with the comfort of making payments from home rather than visiting KWA counters. However, Audit noticed the following deficiencies in the process of billing, collection and accounting of water charges, in improving consumer satisfaction, in project and contract management and in IT controls, which stood in the way of eABACUS becoming a robust IT system.

- Design deficiencies and lapses in monitoring controls led to cash embezzlement.
- Lapses in change management resulted in deficiencies in processing controls.
- Inadequate accessories, coupled with lack of password policies led to unauthorized access rights provisioning in the system.
- Non-automated meter reading hindered timely collection of dues from consumers.

- Insufficient providing of facilities of various online modes of payments caused difficulties to consumers in timely remittance of their dues.

**[The Audit paragraph 5.1 to 5.20 contained in the report of the C &AG for the year ended 31 March 2017.]**

**The notes furnished by the Government on the audit paragraph are given in Appendix II**

### **Discussion and findings of the Committee**

#### **5.11. IT Governance**

##### **5.11.1. Absence of IT Strategy and Planning**

The Committee observed that the intended objectives of the eABACUS project could not be achieved in the absence of clear planning and enquired about the current status of the eABACUS project. The Principal Secretary, Water Resources Department informed that various in-house softwares were developed by KWA and the hardware required for eABACUS was procured during 2012-13, only the amount required for the maintenance and support of the software had to be spent in subsequent years. He added that this does not affect the smooth functioning of Water Authority and efficiency has increased and steps are currently being taken to modify the software. The Joint Managing Director, KWA added that currently 37 softwares have been installed for different activities of the Water Authority and placed the list before the Committee for verification.

The Committee inquired about the defects, rectification and upgradation of eABACUS software. The Database Administrator informed that eABACUS software could not be implemented in 15 section offices in rural areas during the audit period due to non-availability of network connection and the rollout plan had been implemented in all the remaining section offices. He added that tender procedures are being initiated to revamp the eABACUS software since it was technologically outdated. He informed that now the rollout plan has been implemented through BSNL network in 15 section offices and currently payment

and collection of ₹42 lakh connections including JJM connection is being done through eABACUS. He added that all the services of the water authority have been made online and information regarding the same has been made available on the website of KWA.

The Committee accepted the reply.

### **5.11.2 Documentation Deficiencies**

The Committee sought explanation regarding the non-preparation of URS document before the development of eABACUS software and about the non-signing-off of the eABACUS project at the time of implementation. The Database Administrator explained that there was lack of expertise in KWA at that time, nevertheless SRS was prepared by NIC after conducting system study in 2004-05 period. He added that now it has been rectified and new software tendering is done by proper documentation of URS and SRS.

The Committee observed that the project signing-off was not done when the eABACUS project was implemented in KWA as the Department not accepted the SRS software prepared by the IA which is not flexible and fulfilling the business requirements of KWA. Therefore, the Committee suggested that signing off must be done while revamping the eABACUS software.

### **Conclusions/Recommendations of the Committee**

***1.The Committee observes that the project signing-off was not done while implementing eABACUS project in KWA because SRS was prepared by the IA without a well documented URS which has resulted in the preparation of an ad-hoc software which is not flexible and could not fulfil the business requirements of KWA. The Committee suggests that signing off must be done while revamping the eABACUS software after testing its utility.***



### **5.11.3. Absence of IT Security Policy**

The Committee enquired whether the security policy has been implemented in the revised Information Technology master plan. The Database Administrator informed that all the softwares in the Water Authority has been security audited as it is currently following the security policy of the IT Mission and all 33 softwares were developed according to the norms of the Information Technology Security Policy.

The Committee accepted the reply.

### **5.11.4. Lack of Adequate Training**

To a query about training, the Database Administrator informed that the support cell and related systems have been put in place to provide training and at present master trainers have been appointed at each division level to provide training. He informed that 97% of the employees have been trained and only the newly appointed employees are to be trained.

The Committee enquired whether there is an output commensurate with the training given to the employees. The Database Administrator informed that the collection has increased and there is a call center for customer queries and that 90% of the complaints received on the number 1916 were resolved immediately and all queries were answered through SMS.

The witness added that the complaints related to leakage of water in major trunks were resolved through PWD by cutting the roads. But some leakages could not be rectified immediately because the pipeline pass through PWD/National Highway roads. The Committee opined that the leakage of pipes which runs across the panchayath roads remains unresolved even after reporting the complaints to the concerned number. So the Committee recommended to cross check these facts and to ensure efficiency and thereby resolving the drinking water problem of ordinary people.

The Committee opined that if the Water Authority implements software to receive complaints online like KSEB, it will be possible to understand the time when the complaint is registered and when it was resolved. The Committee observed that there was a dispute between the PH Division and the Project Division regarding the resolution of the leakage of pipes. The Committee noted that in case of pipe-bursting during the course of work undertaken by Jal Jeevan Mission and KIIFB, there is lack of clarity regarding the responsibility of repair of pipes and there were cases where no action was taken even after months of water leakage. The Committee observed that the worn-out pipes burst continuously at the same place. Hence the Committee recommended that utility shifting should be done properly and all project works should have a proper monitoring system.

The Technical Member informed that the PWD checks the standard of the road and invites tenders for the work as per its specification and Water Authority has the responsibility of patch works and the amount for the entire work is not included in the estimate of Water Authority.

To a query of the Committee regarding Central Monitoring System, the Technical Member informed that there is a Central Monitoring System in Water Authority and as and when a complaint is received on the concerned number, the attending staff will send a message to the Assistant Engineer through SMS and after repair, the concerned Assistant Engineer will report the information back to the cell, so that the whole procedure is reviewed properly.

The Committee noted that there are complaints that water bills are issued even if water is not used or for no water has been received. The Technical Member informed that sometimes it happens due to air ingress and the eABACUS software shows the average reading of the water used by consumers in the last 6 months, but if the meter shows more than that, it may be due to leakage or jerking.

The Committee observed that all the families registered in IMIS under the Jal Jeevan Mission project have been given connection but many beneficiaries get the

bill before getting drinking water. So the Committee recommends to resolve this problem.

### **Observations/Recommendations of the Committee**

*2. The Committee observes that though the percentage of training given to the staff of KWA at the time of audit was very low, KWA now imparts training to majority of the staff. But the complaints which were received through the telephone number of KWA about the leakage of pipes that run across the panchayath roads, remains unresolved. So the Committee recommends to ensure the efficiency in resolving the complaints and thereby assuring drinking water to ordinary people.*

*3. The Committee observes that the leakage of pipes remains unresolved due to the dispute between PH division and Project Division of KWA and there occurs a contention between Jal Jeevan Mission and KIIFB about the repair of pipes. The Committee also observes that the worn out pipes burst continuously at the same point. So the Committee recommends that utility shifting should be done at regular intervals and all the project works should be properly monitored.*

*4. The Committee observes that all families registered in IMIS under the Jal Jeevan Mission project were given connections, but many households receive water bills before getting drinking water. Therefore, the Committee recommends to resolve this issue.*

## **5.12. System Development and Design Deficiencies**

### **5.12.1. System Design Deficiency**

#### **5.12.1.1. Avoidable Fine on Consumers**

The Committee enquired whether defect in the design which led to the levying of unnecessary fines on the consumers since they cannot pay charges on time due to error in the system had been rectified or not. The Database

Administrator informed that the said shortcoming has been resolved and in the case of power/network connection failure, there was a situation where it was not possible to receive the amount from the consumers and at present all those things were being recorded on a daily basis. He added that a tender has been invited for the implementation of palmheld machine for recording meter reading in Water Authority and if it is implemented then payment could be received in field or office even if there is no network system.

The Committee inquired whether payments are being accepted offline and how the amount would be collected in cases where the network was unavailable due to technical glitches. The Database Administrator informed that they are currently not accepting the amount offline as it may lead to financial malpractice. The Finance Manager informed that the amount could be remitted through Post Offices, Akshaya Kendras, Janasevana Kendras, Website, Google Pay, Phone Pay etc.

#### **Conclusion/Recommendation of the Committee**

***5. The Committee observes that the KWA had invited a tender for the implementation of palmheld machine for recording meter reading. So the Committee recommends to furnish a report regarding the present status of implementation of palmheld machines.***

#### **5.12.1.2. Absence of provision for calculating renewal fees for Casual Connection**

The Committee sought clarification regarding the steps taken to set up a mechanism in the system for inclusion of renewal fee every year. Accounts Officer replied that as per regulation 5 of KWA(Water Supply) Regulations, 1991, when a casual connection was provided on account of commercial consumption of water like that of house construction, repair etc. applicants should deposit an amount equal to the cost of 2.50 kilolitres of water for each squaremeter of plinth area of the

building proposed to be constructed at the prevailing non-domestic rates, subject to a maximum of ₹20,000/-. Also if the casual connection is continued as such after completion of one year, a renewal fee of ₹250 is to be charged from the consumer. The Accounts Officer further stated that the system of calculating the annual renewal fee on completion of each year could not be included in the old software and assured that it will be included in the new software. He added that now the renewal fee is being charged manually from the consumers at the appropriate time.

The Committee enquired about the amount due to KWA including Government Departments and Local self-government bodies as renewal fee and the procedures adopted to recover the same. The Finance Manager informed that the amount to be recovered was around ₹1500 crore last year and now it has been reduced to ₹1200 crore.

To a query of the Committee about public taps and Jaljeewan Mission connections, the Technical Member informed that there are only a few public taps now and Jaljeewan Mission is providing more connections by laying pipelines in all places. He added that if the panchayat or the corporation informs that there is no need for public taps in the areas where connection is given under the Jaljeewan Mission project, it will be disconnected without delay.

The Committee observed that there are some technical problems prevailing even now in current software for calculating the annual renewal fee which has not been fully rectified so far. Even though the financial condition of KWA is very dismal, it has to get ₹1500 crore as renewal fee from Government Departments and Local bodies. The Committee also assessed the fact that the software developed by KWA is not effective which shows, the apathy of the Department and recommended that provision should be made to include renewal fee in the revamped software.

#### **Observation/Recommendations of the Committee**

***6. The Committee observes that it would be difficult to incorporate the provision for the calculation of renewal fee in the existing software. So the Committee***

***recommends to incorporate the provision in the new software and to report the same to the Committee***

#### **5.12.2. Improper designing of database**

In the audit para it was stated that the deficiencies in the database design led to the embezzlement of cash. The Committee sought clarification regarding this. The Database Administrator replied that those who pay money through bank can remit the amount through the software called SBI collect in collaboration with SBI and auto challan of the amount collected every day is being generated and reconciled with the bank. He further informed that a new column has been included in the software to record the penalty for the dishonoured cheques.

The Deputy Accountant General inquired whether any action has been taken against the officials who embezzled the money. The Joint Managing Director informed that disciplinary action has been taken against the officer who embezzled the money in Aluva and he has repaid the amount with interest and his promotion and increment has been barred as part of departmental action and all punitive measures including suspension have been taken. The Committee was not satisfied on the reply that disciplinary action has been taken against the concerned official and opined that a case should have been filed in the court for embezzlement.

The Committee enquired about the steps taken to include the facility to store the number of dwelling unit in the apartment for each billing period. The Database Administrator informed that a separate column has been included in the system to record the details of the apartments and the number of consumers in the flats. He added that it was difficult to record the history of flats in the current system and efforts are being made to include those matters.

The Committee inquired whether there is a mechanism to receive the bill amount through the counter from consumers, for whom the RR proceedings were initiated. The Database Administrator informed that consumers who have been recommended for RR measures are blocked in the software so they cannot pay directly through the counter.

The Committee observed that there are some faults prevailing in the eABACUS software such as the difficulty to record the history of flats. So the Committee recommends to take appropriate action to make the software flawless.

### **Observations/Recommendations of the Committee**

***7. The Committee observes that the lack of a proper monitoring mechanism in the database design led to the embezzlement of cash. The Committee expresses its discontent about the action taken against the concerned official and opines that a case should have been filed in the court.***

***8. The Committee observes that some faults are still prevailing in the eABACUS software such as difficulty to record the history of flats. So the Committee recommends to take appropriate action to make the software flawless.***

#### **5.12.3. Non-Capturing of electronic fund transfers through bank**

The Committee sought explanation for the audit remark that, as per the records of Painav Sub-Division for the period from May 2016 and October 2017 audit observed 51 NEFT transactions. Of these, the sub division could not identify the remitters and credit the respective ledger in five instances amounting to ₹ 6180 even after 205 days. The Database Administrator replied that during the audit period, KWA did not have a system to trace the consumers who had paid the amount to the account of the concerned subdivision and at present they do not allow payment in that way and now a system has been implemented to get the receipt at the time of payment to the virtual account of SBI.

To a query of the Committee regarding the absence of interface for payments through NEFT, RTGS, IMPS in eABACUS, the Database Administrator replied that since the NEFT service was not so popular in 2005, such a module was not included in the software and KWA could understand about the transfer of funds only if the customer who had paid through NEFT informed them over phone or SMS. He added that this kind of payment is not being done now and an accurate record is maintained as the payment is made through a virtual account.

The Committee noted that RBI had clear guidelines for fund transfer through NEFT, RTGS IMPS etc. The Committee observed that the department was unable to give a clear explanation regarding the settlement of amount remitted through NEFT. Hence the Committee recommend to find out the consumers who remitted the amount through NEFT and to find out those who defaulted the payment and also urge to make the system foolproof.

#### **Observation/Recommendation of the Committee**

***9. The Committee observes that the RBI had clear guidelines for fund transfer through NEFT, RTGS, IMPS etc, Yet the department fails to provide a clear explanation on settling amounts remitted via NEFT. Hence, the Committee recommends to identify the consumers who successfully remitted funds through NEFT and those who defaulted on payments and to prevent future discrepancies, the Committee urges to make the system foolproof.***

#### **5.12.4 Deficiencies in Software**

The Committee enquired whether mobile application has been installed to solve the deficiencies in the eABACUS software. The Database Administrator informed that the mobile application has been installed and since there was no automatic connectivity to the reading machine during the audit period, the communication would have been received only when the meter reader reached the office after



taking the reading, but through the newly installed online portal, the customer can pay the bill in advance even if the meter reading is not taken.

The Committee accepted the reply. Hence no remarks.

## **5.13 IT operation**

### **5.13.1. Bypassing segregation of duties**

The Committee sought explanation regarding the action taken to prevent bypassing of segregation of duties. The Database Administrator informed that during the audit period, the transferred employees used to log in the new office without terminating the login access of their previous office, which would pave the way to discrepancies. But now the password policy is strictly followed.

The Deputy Accountant General enquired about the steps taken for the inclusion of multifactor authentication and stoppage of password sharing. The Database Administrator informed that it was stated in the password policy that the password should not be shared and every employee has been given a password linked to the PEN number. He further informed that as per the information received from the police department, necessary steps are being taken for multi-factor authentication in such a way that OTP is received in the mobile phone.

The Committee observed that multi-factor authentication was not implemented yet and directed the department to give a report after its implementation.

### **Observation/Recommendation of the Committee**

***10. The Committee observes that multi-factor authentication is yet to be implemented and directs the department to provide a progress report regarding the same after its implementation.***

### **5.13.2. Access control failure**

The Committee enquired whether the access control had been fixed in the updated software system. The Database Administrator informed that the said problem has been resolved and currently they are logging in with PEN so that only the information of the new office is available. He added that this problem was noticed when an employee of Vadakara Sub-Division office was transferred to Thiruvananthapuram and he logged in the new office without terminating the old login access.

The Committee accepted the reply. Hence no remarks.

### **5.13.3. Irrelevant data of unidentified customers**

To a query of the Committee regarding unidentified consumers, the Accounts Officer stated that the list provided by the municipality included many water connections which were not physically present and were not waived during the audit period, but during 2019-20, an internal audit was conducted and 52000 consumers who had not been traced for 15 years were removed from the list. He added that at present the number of unidentified consumers has reduced significantly.

To a query about audit para, the Accounts Officer informed that this issue remain unnoticed as none of the unidentified consumers applied for the one time settlement conducted by Water Authority. But two or three years ago, Water Authority identified the matter and the officers conducted field verification and removed some customers who were not identified. He further informed that an amount of ₹231 crore as dues from unidentified consumers have been written off. The Technical Member stated that the problem of unidentified consumers may have arisen as the owners of houses demolished at the time of road widening do not report the same to the officials of Water Authority. The Committee opined that there are 69321 unidentified consumers out of 36 lakh connections across the State and it is irresponsible to conduct Adalat for those who have not received their bills.

The Committee enquired whether the consumers who remained unidentified for 10 to 15 years were verified as non-existent before writing off. The Finance Officer informed that now there are no unidentified consumers and earlier there were errors in giving connections but now GIS mapping of each connection is being done. The Joint Managing Director informed that through GIS mapping, Water Authority could get accurate count of consumers and added that non-existent connections are being written off.

The Committee enquired the reason for not taking any action against the officials who generated the unauthorised customers in the records. The Technical Member informed that these unauthorised connections were given years ago by plumbers without the knowledge of Water Authority but now it is not possible and all the unauthorised connections are being cut off. He added that all the officers of that period had retired from service. The Accounts Officer added that now the number of unauthorised consumers had been reduced to 5000.

The Committee sought clarification about the procedure of writing-off the unidentified customers. The Technical Member stated that a committee constituted at the executive officer level conducted a field visit in the year 2022-23 to ensure whether the connection exist or not.

The Committee observed that it was sheer negligence on the part of Water Authority which led to the situation to write off a huge amount after 15 years claiming that the connection does not exist. So the Committee recommended to furnish a detailed report regarding the matter.

#### **Conclusions/Recommendations of the Committee**

***11. The Committee vehemently criticises the Water Authority for their lackdaisical attitude in handling the matter of unidentified consumers. The Committee is astonished to notice that the authorities were unaware of the occurance of unidentified consumers for several years which generated a huge amount as dues which was written off after 15 years. So the Committee recommends that the***

*Authority should search for unidentified consumers every month in each division and a separate procedure including punitive action of such consumers should be framed and if such theft is continuing after 3 months the responsible officials should also be booked. The MD should also monitor the status once in 3 months and to furnish a detailed report to the Comiittee.*

#### **5.13.4 Change Management**

To a query of the Committee about change management, the Database Administrator informed that earlier the software was implemented with the help of NIC and after being taken over by Water Authority, everything including change management was being recorded.

The Committee accepted the reply. Hence no remarks.

#### **5.14 Contract management: Inadequate monitoring of service providers**

The Committee sought clarification about the audit observation. The witness informed the Committee that during the audit period Bill Desk was the only competitive service provider to perform the task and the contract with Bill Desk was made in such a way that the amount will be credited to the KWA account if the transaction fails due to communication failure. He added that once transaction failed it was handled offline but now it was made online and the issue has been resolved. He informed that now there are about seven payment gateways uploaded in the site of the KWA. He assured the Committee that in the case of failure of transaction, the consumer will get back the amount within three days.

The Committee accepted the reply. Hence no remarks.

#### **5.15 Business continuity planning**

##### **5.15.1 Lapses in business conituity planning and disaster recovery planning**

The Committee sought explanation regarding the disaster recovery plan. The Database Administrator informed that during the audit period there was no network coverage in the respective offices and now there are network administrators to monitor the network centrally and online monitoring system is available at all

locations. He informed that the backup is hosted at the State Data Centre and they have a disaster recovery plan and Water Authority takes monthly/daily backup and conducts mock drills. He added that at the time of a network failure, the time taken to restore data is calculated and a log register is maintained to record the duration of network failures.

The Committee accepted the reply. Hence no remarks.

### **5.15.2 Preventive and Environmental Control**

The Committee enquired whether any action has been initiated to equip the offices with fire detecting/fighting devices. The database administrator informed that the new office buildings have been constructed with all the safety systems to detect/fight fire and these systems are being installed even in all the smaller offices.

The Committee accepted the reply. Hence no remarks.

### **5.16. Input Controls : Delay in updating meter reading**

To a query of the Committee about the introduction of mobile application and its present status, the Database Administrator (DBA) informed that currently the mobile application has been implemented in three sections and maximum dues have been recovered so far. He added that tenders have been invited for new palmheld machines and the mobile application can be implemented all over Kerala by May 2024.

The Committee enquired whether the existing problem regarding payment of bills has been resolved. The DBA informed that the difficulty in paying the bill is due to the delay in taking the reading from the meter reader and updating it in the software. When the new mobile application becomes operational, the reading can be updated in the field itself, so that the bill can be paid immediately and then all the existing problems related to paying the bill will be solved.

The Committee inquired whether the existing problems in the Abacus system since 2014 have been resolved. The DBA replied that anomalies related to tariff revision in 2014 and the problems related to the payment of bill through online due to the delay in the updation of the reading have also been rectified. When the witness added that the report in this regard has been furnished to the Accountant General, the Senior Deputy Accountant General informed the Committee that this reply has not yet been furnished to the Accountant General and the reply received from the Department was that the action was being taken and it was silent about the steps to be taken to implement the mobile application and on the rectification of arrears. The witness added that the consumers had to pay the water bill with penalty due to the delay in entering the meter reading in the system. The Joint Managing Director admitted the delay and informed that these cases were waived off. He added that the delay in the implementation of mobile application was due to the delay in finalizing the discussion with K-DISC and assured that it will be implemented by the month of June 2024.

To a query about palmheld machine, the Technical Member replied that the tender estimate for 1000 palm held machine was ₹1.69 crore, but an offer quoted at a lower rate was accepted among the two pre-qualified companies. He added that the machine being an Android based one, the system will be updated as soon as the reading is taken and there will be no delay. He added that as the Parliament election has been declared, work order will be issued with the permission of Election Commission.

The Committee vehemently criticised Water Authority for not furnishing the latest details to the Accountant General. The Committee pointed out that due to the lackadaisical attitude of the officials of Water Authority the ordinary people had to pay the penalty. The Committee evaluated that as The Accountant General pointed out in its Report, the water authority has not yet resolved the problem of updating the meter reading. So the Committee recommended that meter reading procedure

may be automated and it should be in sync with billing procedures and mobile application should be implemented throughout Kerala by June 2024 and to intimate the same to the Committee.

**Conclusion/Recommendation of the Committee**

***12. The Committee observes that the problems in updating the meter reading has not yet been resolved. So the Committee recommends that the meter reading procedure may be automated and it should be in sync with billing procedures and mobile application should be implemented throughout Kerala by June 2024.***

**5.17. Processing Controls**

**5.17.1. Non-Collection of sewerage charges on account of delay and mistake in mapping of business rules**

The audit objection was that though the collection of sewerage charges was introduced with effect from 1<sup>st</sup> October 2014, owing to the delay in mapping of business rules it was implemented only from June 2015 and the sewerage charges escaped collection amounted to ₹311.50 lakh.

To a query of the Committee about sewerage connection and its revenue, the Database Administrator reported that there were 15879 connections in 2014 and now it has increased to 62666; of which about 55000 connections were in Thiruvananthapuram, 2000 connections in Ernakulam and 28 new connections in Guruvayur and the revenue is about ₹1.7 crore per month.

The Committee sought clarification regarding non inclusion of 1143 consumers in the sewerage system in Kochi Division. The Database Administrator informed that the water authority did not have the information of the consumers with sewerage connection as the sewerage system was provided free of cost earlier and consumers were not aware of such connections. When the sewerage charge was implemented in 2014, the water authority marked the data of sewerage connections and started charging a certain percentage of amount along with the water charge.

The Committee enquired whether it is justifiable to collect the arrears now with retrospective effect from 2014 on humanitarian grounds. The Database Administrator reported that since the delay was occurred on the part of the Water Authority in marking the data of the consumers with sewerage connection, the old dues are not collected now and all sewerage connections have been marked at present.

The Deputy Accountant General opined that if the Government/KWA decides to impose a charge, a strict procedure should be followed in collecting the charge as well as waiving the penalty and KWA should obtain the approval of the Department in order to regularise the revenue loss. He added that it was a serious lapse on the part of Water Authority. The Witness assured that they would place the matter before the Board for approval and would follow the procedure.

The Deputy Accountant General remarked that if the sewerage charge collected per month is ₹1.7 crore, the penalty for those who have not generated bill for two years will be about ₹75 lakh per month. The Database Administrator informed that initially there were only 15000 connections and water charge was less and the income increased only after the revision of tariff. He added that the sewerage charges are levied according to water consumption and the sewerage charge is 10% for low users and 50% for high users.

The Committee recommended that stringent action should be initiated to regularise the total sewerage charge arrear amounted ₹436.49 lakh that was omitted for the period from 2014 to 2017 due to delay and error in mapping of business rules and to furnish a report to Audit.

### Conclusion/Recommendation of the Committee

***13. The Committee recommends to initiate stringent action to regularize outstanding sewage charge arrears of ₹ 436.49 lakh, which was omitted between***



***2014-2017 due to delay and error in mapping of business rules. The Committee also demands a comprehensive report detailing corrective measures.***

### **5.17.2 Short collection of water charges on account of delay in mapping of business rules**

To a query about the delay in mapping of business rules in the system, the Database Administrator reported that as the order of revised water charges was issued on 30-09-2014 and the revised rate came into effect from 1-10-2014, there was some delay in making these changes in the software and added that now all the said issues have been resolved.

The Committee accepted the reply.

### **5.17.3 Excess Collection due to inaccurate mapping of business rules**

The Committee noted that while mapping the water tariff revised with effect from 1<sup>st</sup> October 2014 mistakes crept in the program in respect of calculation of water charges consequent on consumer service. The committee enquired whether any modification has been made in the software to calculate the water charge for one month at the revised rate and for one month at the old rate. The Database Administrator informed that this was a program developed by NIC in 2007, and since NIC's support was not available to Water Authority after 2010, now Water Authority performs software programming by training a few staff in-house and it was decided to invite a tender to replace the e-ABACUS software. The Joint Managing Director informed that the tender was invited with a closing date of 30-03-2024 and opening date of 2-4-2024. He added that the new software could solve all the existing problems in the e-ABACUS software and that the tender includes the condition that the software should be capable for capturing the reading, billing and payment on bill every month by installing a prepaid meter.

The Committee enquired whether the additional amount imposed on the consumers due to the error in the software had been adjusted from the future bills. The Joint

Managing Director informed that if any additional amount had been collected from the consumers, that would have been adjusted from the future bills.

To a query about the financial burden of new software, the Technical Member informed that the cost of installing the new software is ₹5 crore and there was no online payment system in the old software and currently 65% to 70% of the payment is online so that all the payment related matters have been included in the new software. He added that in 2005, the e-ABACUS software was developed at a cost of around ₹ 15 lakh and the Kerala Water Authority only paid the salary of the programmers of NIC.

The Senior Deputy Accountant General commented that almost cent percent data is in e-ABACUS software and while transferring data from one software to another, data manipulation and data inaccuracy may occur.

To a query about the transfer of data from e-ABACUS to new software, the Database Administrator informed that the new tender includes open source software which includes provision to migrate the entire data using third party tools without data loss. He added that a period of six months is needed for the software development and six months for implementation and that the whole project will be completed within one year.

The Committee accepted the reply. Hence no remarks.

#### **5.17. 4 Mistakes in billing**

The Committee wanted explanation regarding the audit objection. The Database administrator informed that the data duplication was caused not because of errors in software but due to the errors in logic during program development and that all the flaws have been rectified now.

The Committee accepted the reply.

### **5.18 Output Controls: Inaccurate generation of Management Information System Reports**

The Committee sought explanation regarding the inaccurate generation of MIS reports. The Database Administrator replied that all MIS reports were prepared using existing system and currently state wide and division based MIS reports are available and added that only after the implementation of new software the MIS reports will be available through mobiles.

The Committee observed that errors in the preparation of MIS reports have not yet been rectified. So the Committee recommended to implement the new software and to check whether the errors are rectified and to submit a report to the Committee.

#### **Observation/Recommendation of the Committee**

***14. The Committee observes that the errors in MIS report preparation have not yet been rectified. Hence, the Committee recommends to implement new software and to check whether the errors are rectified and to submit a report to the Committee.***

### **5.19. Application Security Controls**

#### **5.19.1. Non-deactivation of users**

To a query about audit objection, the Database Administrator informed that once an employee got transferred, his password must be changed and deactivated. But this procedure was not followed in all units. So a user audit was conducted and everyone except the existing employees were suspended from using the password. He added that now there is a system in which the password expires automatically even if the employee did not deactivate it because the password is given with an exact expiry date.

The Committee opined that the officials of Water Authority should submit a report to the audit department after rectification on the basis of audit objection.

### **5.19.2. Master file and standing data protection**

#### **5.19.2.1 Presence of junk data in Master file**

The Committee sought explanation regarding the presence of junk data in master tables. The Database Administrator informed that some offices of the water authority enters a test data in order to understand the new water connection method in e-ABACUS software and that was saved in the master file as junk data.

The Committee was astonished to notice that the responsible officials did not check the presence of junk data in the master table and the committee opined that it is very pathetic that such lapses cannot be detected by themselves. Hence the Committee recommended to furnish a detailed report regarding the action taken to avoid the entering of junk data in master files.

#### **Observation/Recommendation of the Committee**

***15. The Committee vehemently criticizes the officials of Water Authority for not identifying the presence of junk data in the master files. The Committee opines that it is very pathetic that the audit have to point out such errors. So the Committee recommends that the officials of Water Authority must be more careful in handling the master files and recommends to furnish a report detailing the actions taken to avoid the entering of junk data in the master files.***

#### **5.19.2.2 Absence of storage of vital data in Master file**

The Committee sought clarification regarding the insertion of vital data in master file. The Database Administrator replied that Water authority would not give any connection without meter and if the meter was damaged, status would be recorded as 'faulty meter', if it was not working, status would be 'not working' and

if it was stolen, status would be recorded as 'meter stolen'. He added that if the meter was stolen, it would be replaced after receiving FIR from the police .

The Committee observed that although an explanation was given regarding the status of the meter, there was no clear explanation regarding the categorisation of consumers like office, occupation, labour camp and bachelor, which are vital information for classifying the customers, were not stored in the master file. Therefore, the Committee recommends to submit a report in this regard.

### **Observation/Recommendation of the Committee**

***16. The Committee observes that vital consumer categorization details, such as office, occupation, labour camp, bachelor status etc are missing in the master file. Therefore, the Committee recommends to submit a comprehensive report detailing the steps taken to rectify these faults in the master file.***

#### **5.19.3 Information security issues**

##### **5.19.3.1 Flaws in web security**

To a query of the Committee about the flaws in web security, the Database Administrator informed that e-ABACUS does not include security auditing as the software is only connected to intranet. He added that earlier online payment was done using password but now login is done using consumer-id or registered mobile number and hence there is no need to maintain a password. He further stated that instead of disabling the USB drive, antivirus softwares have been enabled and new software has been tendered with provisions including security auditing.

The Committee accepted the reply. Hence no remarks.

#### **5.20 Conclusion**

The Committee suggested that the new software should be designed in such a way that all the deficiencies pointed out by the audit could be resolved.

## **Audit Paragraph (2015-16)**

### **Kerala Irrigation Infrastructure Development Corporation Limited**

#### **3.2. Sub-contract Management by Public Sector Undertakings**

##### **Introduction**

**3.2.1** Public Sector Undertakings (PSUs) in Kerala carry out supply and installation of equipment and execution of civil works on behalf of Departments/ agencies of Government of Kerala (GoK). These PSUs in turn engage sub-contractors for procurement of equipment and execution of work awarded by Departments of GoK/ agencies.

In order to examine compliance with rules and regulations and transparency in sub-contract management by PSUs, we examined 50 works<sup>38</sup> relating to supply and installation of equipment and 107 works relating to civil construction in seven<sup>39</sup> PSUs during the period 2010-11 to 2015-16. Out of these, 29 work orders valuing ₹ 178.79 crore for supply and installation of equipment were issued to the PSUs by GoK on nomination basis of which 20 work orders costing ₹ 51.47 crore were issued to the PSUs without preparing cost estimate. The cost estimates for these works were prepared by the PSUs based on which, work orders were issued by GoK to them on back to back basis<sup>40</sup>. The cost estimate in respect of 10 work orders for ₹ 27.77 crore was prepared with the help of business partners of the PSUs to whom these works were later sub-contracted.

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38 41 works executed by Kerala State Electronics Development Corporation Limited (KELTRON) on behalf of 18 Departments/ agencies of GoK and nine works executed by Kerala Small Industries Development Corporation Limited (SIDCO) for one Department/ three agencies of GoK.

39 Kerala State Electronics Development Corporation Limited, Kerala Small Industries Development Corporation Limited, Roads and Bridges Development Corporation of Kerala Limited, Kerala State Construction Corporation Limited, Kerala State Coastal Area Development Corporation Limited, Kerala Irrigation Infrastructure Development Corporation Limited and Forest Industries Travancore Limited.

40 Back to back basis' is a term used by PSUs. It refers to purchases done by PSUs for GoK/ agencies whereby PSUs get orders from GoK / agencies who then pass it on to private parties with payment terms that PSU would make payment to private parties only after receipt of payment from GoK/ agencies.

### **Execution of civil works on behalf of agencies of GoK**

**3.2.5** GoK and its agencies executed various civil construction works through PSUs such as SIDCO, Kerala State Construction Corporation Limited (KSCC), Kerala Irrigation Infrastructure Development Corporation Limited (KIIDC), Forest Industries Travancore Limited (FIT), Kerala State Coastal Area Development Corporation Limited (KSCADC) and Roads and Bridges Development Corporation of Kerala Limited (RBDCK). These PSUs received (2013-14 to 2015-16) 166 work orders valuing ₹ 2,111.67 crore from various departments of GoK for execution of civil works. Out of these, we examined 107 work orders valuing ₹ 1,718.81 crore in order to ascertain transparency in award of work and efficient execution.

All 107 work orders examined by us were issued to PSUs on nomination basis in violation of the provisions of Kerala Financial Code (KFC). These works were subsequently sub-contracted by the PSUs. Deficiencies noticed in the award of work by PSUs and their execution is discussed below.

#### **Award of work to sub-contractors**

**3.2.5.1** We noticed violation of codal provisions in award of 69 works to sub-contractors by four PSUs as detailed in Table 3.9.

**Table 3.9: Irregularities in award of work to sub-contractors**

Sl. No.	Criteria/ Norm	Audit Observation
2	As per Rule 7.7 of SPM, tenders should be invited for purchase of stores if the estimated value of stores is above ₹ 1 lakh.	KIIDC issued (May 2014 to February 2015) five work orders for installation of biogas plants at a cost of ₹ 1.67 crore under project of Implementation of Urban Environment Improvement Project to six suppliers without invitation of tenders.

**Recommendation**

1. GoK should dispense with the system of awarding works to PSUs on nomination basis.
2. GoK should comply with the provisions of SPM and invite competitive tenders.
3. PSUs which get work orders after participating in tenders should ensure that all the provisions of SPM and CVC guidelines are complied with.

**Discussion and findings of the Committee**

The Senior Audit Officer apprised the Committee that the reply furnished by KIIDC on the audit recommendations was satisfactory. So the Committee accepted the reply. Hence, no remarks.

*Thiruvananthapuram*  
*21<sup>st</sup> March,2025.*

**E. CHANDRASEKHARAN,**  
*Chairperson,*  
*Committee on Public Undertakings.*



**APPENDIX-I**  
**SUMMARY OF MAIN CONCLUSIONS/RECOMMENDATIONS**

Sl No.	Para No.	Department Concerned	Conclusions/Recommendations
(1)	(2)	(3)	(4)
1	1	Water Resources	The Committee observes that the project signing-off was not done while implementing eABACUS project in KWA because SRS was prepared by the IA without a well documented URS which has resulted in the preparation of an ad-hoc software which is not flexible and could not fulfil the business requirements of KWA. The Committee suggests that signing off must be done while revamping the eABACUS software after testing its utility.
2	2	Water Resources	The Committee observes that though the percentage of training given to the staff of KWA at the time of audit was very low, KWA now imparts training to majority of the staff. But the complaints which were recieved through the telephone number of KWA about the leakage of pipes that run across the panchayath roads, remains unresolved. So the Committee recommends to ensure the efficiency in resolving the complaints and thereby assuring drinking water to ordinary people.
3	3	Water Resources	The Committee observes that the leakage of pipes remains unresolved due to the dispute between PH division and Project Division of KWA and there occurs a contention between Jal Jeevan Mission and KIIFB about the repair of pipes. The committee also observes that the worn out pipes burst continuously at the same point. So the Committee recommends that utility shifting should be

			done at regular intervals and all the project works should be properly monitored.
4	4	Water Resources	The Committee observes that all families registered in IMIS under the Jal Jeevan Mission project were given connections, but many households receive water bills before getting drinking water. Therefore, the Committee recommends to resolve this issue.
5	5	Water Resources	The Committee observes that the KWA had invited a tender for the implementation of palmheld machine for recording meter reading. So the Committee recommends to furnish a report regarding the present status of implementation of palmheld machines.
6	6	Water Resources	The Committee observes that it would be difficult to incorporate the provision for the calculation of renewal fee in the existing software. So the Committee recommends to incorporate the provision in the new software and to report the same to the Committee
7	7	Water Resources	The Committee observes that the lack of a proper monitoring mechanism in the database design led to the embezzlement of cash. The Committee expresses its discontent about the action taken against the concerned official and opines that a case should have been filed in the court.
8	8	Water Resources	The Committee observes that some faults are still prevailing in the eABACUS software such as difficulty to

			record the history of flats. So the Committee recommends to take appropriate action to make the software flawless.
9	9	Water Resources	The Committee observes that the RBI had clear guidelines for fund transfer through NEFT, RTGS, IMPS etc, Yet the department fails to provide a clear explanation on settling amounts remitted via NEFT. Hence, the Committee recommends to identify the consumers who successfully remitted funds through NEFT and those who defaulted on payments and to prevent future discrepancies, the Committee urges to make the system foolproof.
10	10	Water Resources	The Committee observes that multi-factor authentication is yet to be implemented and directs the department to provide a progress report regarding the same after its implementation.
11	11	Water Resources	The Committee vehemently criticises the Water Authority for their lackdaisical attitude in handling the matter of unidentified consumers. The Committee is astonished to notice that the authorities were unaware of the occurrence of unidentified consumers for several years which generated a huge amount as dues which was written off after 15 years. So the Committee recommends that the Authority should search for unidentified consumers every month in each division and a separate procedure including punitive action of such consumers should be framed and if such theft is continuing after 3 months the responsible officials should also be booked. The MD should also monitor the status once in 3 months and to furnish a

			detailed report to the Comiittee.
12	12	Water Resources	The Committee observes that the problems in updating the meter reading has not yet been resolved. So the Committee recommends that the meter reading procedure may be automated and it should be in sync with billing procedures and mobile application should be implemented throughout Kerala by June 2024.
13	13	Water Resources	The Committee recommends to initiate stringent action to regularize outstanding sewage charge arrears of ₹ 436.49 lakh, which was omitted between 2014-2017 due to delay and error in mapping of business rules. The Committee also demands a comprehensive report detailing corrective measures.
14	14	Water Resources	The Committee observes that the errors in MIS report preparation have not yet been rectified. Hence, the Committee recommends to implement new software and to check whether the errors are rectified and to submit a report to the Committee.
15	15	Water Resources	The Committee vehemently criticizes the officials of Water Authority for not identifying the presence of junk data in the master files. The Committee opines that it is very pathetic that the audit have to point out such errors. So the Committee recommends that the officials of Water Authority must be more careful in handling the master files and recommends to furnish a report detailing the actions taken to avoid the entering of junk data in the master files.
16	16	Water	The Committee observes that vital consumer categoriza-

		<b>Resources</b>	tion details, such as office, occupation, labour camp, bachelor status etc are missing in the master file. Therefore, the Committee recommends to submit a comprehensive report detailing the steps taken to rectify these faults in the master file.
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