



*Maradu Municipality
January 2020*

CHAPTER V

**MANAGEMENT OF PLASTIC WASTE, BIO-MEDICAL
WASTE, E-WASTE AND CONSTRUCTION AND
DEMOLITION WASTE**



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Insufficient collection of plastic waste from households, institutions and commercial establishments resulted in burning of plastic waste and dumping in public places. Shredding machines and bailing machines were not functional in several ULBs. Poor segregation of recyclable waste resulted in disposal of plastic waste as rejects. There were incidents of fire outbreaks caused by improper management and open burning of plastic waste. Extended Producer Responsibility (EPR) based plastic waste management system was yet to be established in test-checked ULBs. Kochi Corporation incurred an expenditure of ₹14.16 crore for transportation of 1,69,293 tonnes of plastic waste towards hiring charges of tipper lorries/JCBs etc.

The Corporation incurred an expenditure of ₹836 towards transportation of one tonne of plastic waste. We also noticed an instance of Kozhikode Corporation entrusting a Haritha Sahaya Sthapanam with the disposal of rejects, without even ensuring the mode or site of disposal chosen by the agency. The ULBs in the State were yet to achieve the target of utilising shredded plastic in 30 *per cent* of roads constructed in their jurisdiction. Rampant usage of banned single use plastic carry bags were noticed in test-checked ULBs as well as failure in implementation of projects on manufacturing substitutes for plastic carry bags.

Bio-medical waste reaching the IMAGE plant was much in excess of its processing capacity and resulted in accumulation of highly infectious waste which was left exposed without any safeguards in the plant premises. Lack of adequate Governmental intervention in distributing the load of bio-medical waste among the two common bio-medical treatment facilities, IMAGE and KEIL, resulted in underutilisation of capacity of one plant and inability to process the overload of waste in the other plant.

Medical College Hospital, Institute of Maternal and Child Health and Institute of Chest Diseases, at Kozhikode liquid waste generated drained directly to ground, polluting nearby water bodies. As regards e-waste management, there was no mechanism in place to ensure EPR, and records relating to waste generation were not seen maintained. Facility for processing, recycling and disposing Construction and Demolition waste was not established. The Government and ULBs need to comply with extant Rules/Manual provisions to ensure proper implementation of waste management at various stages and for each category of waste generated.

Special waste comprises of any solid waste that requires special handling and disposal because of its quantity, concentration, physical and chemical characteristics or biological properties, in order to protect human health and environment. Plastic Waste, Bio-medical waste, E-waste, etc. fall under the category of Special waste. Audit analysed the efficacy in management of the above Special wastes and Construction and Demolition waste in test-checked ULBs.

5.1 Plastic Waste

The Plastic Waste Management Rules, 2016 (PWM Rules, 2016) stipulated that every local body shall be responsible for development and setting up of infrastructure for segregation, collection, storage, transportation, processing and disposal of plastic waste either on its own or by engaging agencies or producers. According to Annual Report 2018 of Central Pollution Control Board (CPCB), approximately 9.4 million tonnes per annum (TPA) of plastic waste was generated in the country, which amounted to 26000 tonnes per day (TPD). As per the Annual report 2019-20 of Kerala State Pollution Control Board (KSPCB), 360 TPD of plastic waste is generated in the State.

5.1.1 Status of compliance with Rules on Plastic Waste Management

Clauses 5 and 6 of PWM Rules, 2016, State Policy, SWM Rules, 2016, etc. spell out the responsibility of the local bodies for plastic waste management. The status of compliance to the provisions related to plastic waste management by the test-checked ULBs is shown in **Appendix 9**.

5.1.2 Transportation, processing and disposal

According to PWM Rules, 2016, plastic waste, which can be recycled, shall be channelised to registered plastic waste recycler. As per the SWM Strategy issued by GoK, the non-recyclable plastic waste from the transfer stations shall either be shredded and used for road construction or be bailed and sent to cement plants for heat recovery. It can also be converted to Refuse-derived fuel along with other flammable waste and sold to cement plants or such other places for use as alternative fuel. It is the responsibility of Haritha Karma Sena (HKS) to sort and store the non-biodegradable waste in Material Collection Facilities (MCF) and hand over the segregated non-biodegradable waste to CKCL or other authorised agencies for disposal. However, it was seen that in the absence of proper segregation by HKS, 25 to 100 *per cent* of plastic waste collected was mixed up with other waste and was disposed as rejects (**Appendix 10**).

Audit observed the following with regard to management of plastic waste in the test-checked ULBs:

- Kochi Corporation is incurring huge expenditure towards hiring charges of tipper lorries, Hitachi/JCB, etc. for the transportation of plastic waste. Quantity of plastic waste collected, expenditure borne by the Corporation towards hiring charges and revenue fetched during the period 2017-2021 are shown in **Table 5.1**:

Table 5.1: Expenditure borne by Kochi Corporation for transportation of plastic waste and revenue earned

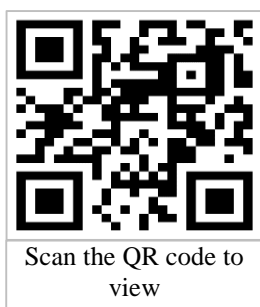
(in Rupees)

Year	Tipper lorry rent (West zone)	Tipper Lorry rent (East zone)	Hitachi Hiring charges	Total amount	Amount received through sale of recyclable plastic
2017-18	87,04,589	1,58,68,814	35,25,400	2,80,98,803	4,48,803
2018-19	1,65,15,873	2,24,54,219	1,03,79,320	4,93,49,412	3,92,433

Year	Tipper lorry rent (West zone)	Tipper Lorry rent (East zone)	Hitachi Hiring charges	Total amount	Amount received through sale of recyclable plastic
2019-20	1,77,00,497	2,32,46,896	70,33,286	4,79,80,679	3,12,667
2020-21*	34,33,645	35,79,336	91,18,038	1,61,31,019	Not furnished
Total	4,63,54,604	6,51,49,265	3,00,56,044	14,15,59,913	11,53,903

*Until June 2020

(Source: Data segregated by Audit on the basis of recordings in registers maintained by Kochi Corporation)



- As per the data extracted by Audit from the registers maintained at Brahmapuram processing facility, the total quantity of plastic waste collected and transported to Brahmapuram plant during 2017-2021 was 1,69,293 tonnes. The total expenditure incurred towards transportation and hiring of Hitachi/ JCB was ₹14.16 crore. Among the unloaded plastic waste, recyclable plastic waste was sold by the Corporation @ ₹1.50 per kg to a contractor. However, only 769.3 tonnes (0.45 per cent) of recyclable plastic were recovered and revenue to the tune of ₹11.54 lakh alone fetched during the above period. Thus, on one tonne of plastic waste collected, the Corporation was incurring an expenditure of ₹836 towards transportation and hiring charges. The remaining waste was dumped at the site as rejects. During JPV of the site with the municipal staff, Audit observed that the total quantity of waste unloaded at the site was not properly segregated and included other waste such as leather, clothes, e-waste, etc.

Government responded (May 2022) that strict instructions would be given to the Corporation to ensure that segregation of waste takes place before transporting waste to the processing facility at Brahmapuram.

- Kozhikode Corporation (Corporation) entrusted (April 2017) Niravu, a Haritha Sahaya Sthapanam (HSS)⁸⁵, with the disposal of rejects collected at various wards of the Corporation under monthly agreements. But while executing the agreement, the Corporation did not ensure the mode of disposal of waste by Niravu. As per Corporation records, the rejects collected from Corporation wards were stated to have been removed to the processing plant of Niravu at Mandya in Karnataka. However, the Corporation stated to Audit that there was no such approved plant for Niravu at Mandya. Incidentally, Karnataka PCB wrote (January 2020) to Kerala PCB that there was illegal inter-state transportation of mixed solid waste from Kerala to Karnataka.

Despite the above, the Corporation further executed (June 2020) agreement with Niravu for a validity period of 36 months for the disposal of plastic waste collected from the Njaliyanparamba MCF. As per agreement conditions, plastic waste was to be sold to Niravu at the rate of ₹ four per kg and the reject waste to be taken away on payment of ₹4.90 per kg by the ULB. Accordingly, the Corporation handed over 31.13 tonnes of non-recyclable waste during the period from July 2020 to December 2021 to Niravu, with a financial commitment of ₹152.52 lakh, of which ₹55 lakh was paid till December 2021. Thus, the Corporation had incurred expenses

⁸⁵Agency to provide technical assistance to HKS in waste management activities

for the disposal of waste in another State, without even ensuring the mode or site of disposal chosen by the agency entrusted with the task.

- Audit observed that higher percentage of rejects was due to improper secondary segregation of waste. Huge quantities of rejects lying heaped at processing facilities resulting in fire outbreaks in three ULBs, viz., Kochi Corporation (2019, 2020, 2021), Perinthalmanna Municipality (2019) and Alappuzha Municipality (2022). Had effective segregation taken place at source/MCF/MRF/processing sites, such enormous quantity of mixed waste including recyclable plastic would not have accumulated at the facility.

Government stated (May 2022) in the exit conference that directions have been issued to strictly regulate interstate transfer of waste and to use GPS⁸⁶ enabled vehicles for transportation of waste and for tracking the movement of waste. Regarding fire outbreaks, it was stated that ULBs have now been directed to obtain Fire NOC⁸⁷ for MCFs.

5.1.3 Usage of shredded plastic in road work

In line with the Guidelines issued by Government of India⁸⁸ encouraging use of plastic waste in the construction of rural roads, GoK directed⁸⁹ LSGIs to use shredded plastic along with bitumen in the works relating to 30 per cent of the roads constructed in their jurisdiction. As per data furnished by CKCL, the State Public Works Department utilized 877.32 tonnes of plastic waste and constructed 877.32 km length of road. The Local Self-Government Institutions in the State constructed 2801.68 km of roads using 1120.69 tonnes of plastic waste during the period from 2016-17 to 2020-21. It was seen that the test-checked ULBs utilized 37.24 tonnes of plastic in constructing 93.09 km of road during the audit period. Seven⁹⁰ ULBs did not use any quantity of shredded plastic for road works during the period.

The details of quantity of plastic waste utilised and length of road constructed in test-checked ULBs are given in **Table 5.2**.

Table 5.2: Details of usage of plastic waste in construction of roads in test-checked ULBs during 2016-2021

Year	Quantity of plastic waste used (tonne)	Length of road constructed (km)
2016-17	0.48	1.19
2017-18	1.81	4.53
2018-19	2.46	6.15
2019-20	5.11	12.77
2020-21	27.38	68.45
Total	37.24	93.09

(Source: Data from Clean Kerala Company Limited)

⁸⁶ Global Positioning System

⁸⁷ No-Objection Certificate

⁸⁸ National Rural Roads Development Agency, Ministry of Rural Development

⁸⁹ 2016-17 and 2017-18:10 per cent, 2018-19:25 per cent, 2019-20:20 per cent, 2020-21:30 per cent

⁹⁰ Kochi Corporation, Mavelikkara, Muvattupuzha, Aluva, Maradu, Parappanangadi and Koyilandy Municipalities

Audit noticed that ULBs started using shredded plastic in road works only when its usage was made mandatory (2020-21) by Government in re-construction of roads affected by the great flood in 2018.

The efforts of State Government towards utilisation of plastic waste for road construction is commendable. However, ULBs in the State are yet to achieve the target of utilising shredded plastic in 30 *per cent* of roads constructed in their areas of jurisdiction.

5.1.4 Usage of banned plastic

As per PWM Rules, 2016, carry bags made of virgin or recycled plastic shall not be less than 50 microns in thickness. Government of India imposed prohibition on usage of carry bags below 50 microns from 2016 onwards and GoK banned⁹¹ single use plastic items from January 2020. The violators were to be fined ₹10,000, ₹25,000 and ₹50,000 in the first, second and third instances respectively and their licences cancelled in subsequent violations.

Audit observed that the test-checked ULBs conducted only 6638 inspections during the audit period (2016-2021) to detect violation of the above instructions. Considering the fact that there were 2,54,491 shops/hotels/restaurants in the test-checked ULBs, it was evident that only six to seven shops had been inspected in a month on an average, which was grossly insufficient. An amount of ₹ 24.44 lakh was seen collected as fine towards non-compliance. During JPV in 20 test-checked ULBs, it was noticed that plastics with thickness below 50 microns were being rampantly used in shops, hotels, markets, fish/vegetable stalls, etc. Banned plastic waste collected and deposited in bulk at the MCF/MRF in the 22 test-checked ULBs reflects the laxity on the part of ULBs to implement the ban. Plastic waste left scattered without organised collection methods cause fatality among cattle and other animals which consume them. As per the status report furnished by the Directorate of Animal Husbandry, of the 143 cattle died due to consumption of waste during 2016-2021 in the State, 47 had devoured plastic waste.

5.1.5 Extended Producer Responsibility

According to Rule 9 of PWM Rules, 2016, the primary responsibility for collection of used multi-layered plastic sachet or pouches or packaging is of the Producers, Importers and Brand Owners who introduce the products in the market. They need to establish a system for collecting back the plastic waste generated on account of their products. This plan of collection is to be submitted to the KSPCB while applying for Consent to Establish or Operate or Renewal. Government directed (2018) Suchitwa Mission to facilitate local governments to implement Extended Producer Responsibility (EPR) for applicable special waste in consultation with KSPCB. However, the State has not implemented EPR so far.

Audit noticed that companies who obtained registration from Central PCB have not furnished quarterly or annual progress reports on collection of plastic waste from the State to KSPCB. Consequently, KSPCB was unable to assess the

⁹¹ Ban on the manufacture, storage, transport and sale of single use plastic items *viz.*, plastic carry bags (irrespective of thickness), plastic sheets, cups, plates, flex, PET bottles of drinking water less than 300 ml, etc.






quantity of plastic waste taken back by the brand owners or verify any system for collection arranged by brand owners. Government replied (May 2022) that steps were being taken for the implementation of EPR in accordance with the Guidelines issued by GoI.






5.1.6 Strategy for implementation of 3R approach

The Integrated Solid Waste Management (ISWM) aims at maximising resource conservation and resource efficiency, while reducing the amount of waste being disposed. It is closely linked to the 3R (Reduce, Reuse and Recycle) approach, which helps to reduce the quantity of waste, cost associated with its handling and its environmental impacts. One of the objectives of State policy too, was to maximize the possibility of reduction, reuse and recycling of waste generated.

Audit analysed the extent of compliance of ULBs to the above approach as shown in **Table 5.3:**

Table 5.3: 3R strategy adopted and shortcomings noticed

	3R strategy adopted by the State	Deficiencies noticed in implementation
	Ban on plastic carry bags below 50 microns from 2016 and ban on single use plastic from 01 January 2020	Rampant usage of banned single use plastic carry bags noticed during JPV in shops and markets in all test-checked ULBs and usage of plastic carry bags below 50 microns, in 20 test-checked ULBs.
	Promotion of substitutes for plastic carry bags	Thiruvananthapuram Corporation incurred ₹45.06 lakh on construction, maintenance and purchase of raw materials for five cloth/paper bag manufacturing units during 2017-2021. Though the units commenced operation and manufactured 96,814 cloth bags, they were closed down (April 2020) in the Covid scenario. The Corporation stated that units were not revived till date, as they could not be run as business model.
	Utilisation of non-recyclable shredded plastic in roads to promote reuse of plastic.	Seven out of 22 test-checked ULBs did not utilise non-recyclable shredded plastic in roads during the audit period.
	Energy recovery from waste	Of the two Waste to Energy (WtE) projects proposed (June 2018) in the test-checked ULBs, no project has been initiated so far (March 2022). Though Perinthalmanna Municipality

	3R strategy adopted by the State	Deficiencies noticed in implementation
		constructed (January 2021) Bioshakthi biomethanation plant to generate electricity from bio-waste, the plant could not be made functional due to inadequacy of waste brought in for energy recovery.
	Construction of Resource Recovery Facility (RRFs) with shredding and bailing machines for recovery of plastic	Sixteen out of 22 ULBs constructed RRFs with shredding/bailing machines, of which eight ULBs ⁹² failed to utilise the facilities because of non-availability of electricity, delay in repairing machinery, etc.
	Conduct IEC activity for waste minimization through 3R concept	Nineteen test-checked ULBs have not prepared specific action plan for implementation of 3R strategy and 18 ULBs did not conduct any IEC activity for creating awareness on the importance of 3R concept.
	State designated Suchitwa Mission as a scientific advisory for technical and financial assistance for managing special waste	Suchitwa Mission did not offer assistance to ULBs in managing special waste other than plastic.
	Implementation of EPR based plastic waste management	The State has not implemented EPR system.

(Source: SWM Rule, State Policy, Government orders)

The National indicators of Sustainable Development Goal (SDG) 12.5 aims to substantially reduce waste generation through prevention, reduction, recycling and reuse by the year 2030. For the year 2020-21 the target set for the quantity of plastic waste to be generated per 1000 population is 1.27 tonnes per annum. As per KSPCB data pertaining to 2021, plastic waste generated per 1000 population in State was 3.5 tonnes per annum. In the test-checked ULBs, plastic waste generated ranged between 5.15⁹³ and 68.12⁹⁴ tonnes per annum for 1000 population. The trend is not appreciative, as it indicates that the efforts towards reduction of plastic waste in the State were not adequate enough to help the State achieve the SDG by 2030.

Government informed in the exit conference (May 2022) that the State had achieved considerable progress in prohibiting the usage of banned plastic carry

⁹²Thiruvananthapuram Corporation, Nedumangad, Kayamkulam, Mavelikkara, Muvattupuzha, Eloor, Angamaly and Vadakara Municipalities

⁹³ Neyyattinkara Municipality

⁹⁴ Kochi Corporation

bags during the second half of 2019 and that Covid had undone all progress attained until then. The reply is not convincing because even as the usage of plastic below 50 microns was banned by GoI in 2016 itself, Audit had noticed rampant usage of plastic carry bags of the banned category during field verifications in 2021-22. This points to the insufficiency of action taken by GoK over the years to prohibit the manufacture, transport, storage and sale of banned carry bags.

Accepting the audit observation on non-functioning of cloth bag manufacturing units in Thiruvananthapuram Corporation, Government replied (May 2022) that the ULB Council has decided to revive all the defunct units. Government also stated that steps are being taken for the implementation of EPR.

5.2 Bio-medical waste

Bio-medical waste (BMW) includes any waste, which is generated during the diagnosis, treatment or immunisation of human beings or animals, or research activities pertaining thereto, or in the production or testing of biological or in health camps. The KSPCB is the authority designated for implementation of the provisions of these rules in the State.

Kerala has the highest number (about 27 per cent) of health care facilities (HCF)/institutions in India and the total bed strength of hospitals in Kerala is 1,19,762. However, there are only two Common Bio-medical Waste Treatment and Disposal Facilities (CBWTF) in the State, viz., IMAGE⁹⁵ having installed capacity of 55.8 tonnes/day and KEIL with an installed capacity of 16 tonnes/day. Also, 51 HCFs are having captive facility for processing BMW, with an installed capacity of 3.4 tonnes/day.

Audit analysed the issues associated with the management of BMW in test-checked ULBs.

5.2.1 Non assessment of quantity of Bio-medical waste generated

In order to implement and enforce Bio-medical Waste Management Rules, 2016 effectively, authentic and accurate data of BMW generated in the State is necessary. However, KSPCB has not so far assessed the quantity of BMW generated in the State. It was seen that KSPCB depended on the annual reports furnished by HCFs for assessing waste generated in a year in the State. However, all HCFs did not submit annual reports regularly to KSPCB. Of the 17,122 HCFs in the State, only 2,487 HCFs had submitted annual reports to KSPCB during 2020. The quantity of BMW generated in the State during the period from 2016-17 to 2020-21 as estimated by KSPCB ranged from 37.81 to 42.93 tonnes/day. In the absence of regular submission of annual reports by HCFs to KSPCB, Audit could not ascertain the veracity of the estimated value of generation of BMW in the State.

5.2.2 Status of authorisation of Health Care Establishments in the State

According to Rule 10 of BMW Management Rules, 2016, every occupier or operator handling BMW shall make an application to the KSPCB for grant of

⁹⁵ Indian Medical Association Goes Eco-friendly, established by Kerala State branch of Indian Medical Association in 2003

authorisation. The details of HCFs identified by KSPCB and those functioning without authorisation from KSPCB are given in **Table 5.4**.

Table 5.4: HCFs identified/functioning without authorisation

Year	Total number of HCFs identified by KSPCB	Number of HCFs functioning without authorisation
2016	9154	5401
2017	9628	4785
2018	12668	5806
2019	13869	7108
2020	17122	3708

(Source: Annual Reports of KSPCB)

As of December 2020, 3708 HCFs were functioning without authorisation in the State. It was also seen that of the 17,122 HCFs identified by KSPCB, only 16,602 HCFs had registered with IMAGE for collection of BMW generated. As such KSPCB/Government had no mechanism to ascertain the nature of disposal of BMW by the unauthorised HCFs in ULBs.

5.2.3 Functioning of Common Bio-medical Waste Treatment and Disposal Facility

5.2.3.1 IMAGE

There was only one Common Bio-medical Waste treatment and Disposal Facility (CBWTF) in the State viz., IMAGE till May 2021⁹⁶ and the entire BMW in the State was being transported to the facility. As per BMW Management Rules, CBWTF located within the respective State/UT was allowed to cater to healthcare units situated at a radial distance of 75 km. However, in a coverage area where 10,000 beds are not available within a radial distance of 75 km, existing CBWTF could cater to the healthcare units situated upto 150 km radius, provided the BMW generated was collected, treated and disposed of within 48 hours. The above stipulation was not adhered to, as the BMW generated in HCFs in southern and northern tips of the State had to cover 400 km and 380 km respectively to reach the common facility.

IMAGE was having treatment capacity of 49 tonnes/day, which was enhanced to 55.8 tonnes/day as the waste generation increased significantly amidst Covid-19 pandemic. IMAGE informed (May 2021) the Environmental Engineer, PCB, Palakkad that 58 tonnes of waste (COVID and non-COVID) reached the plant daily. Audit observed during JPV that, regular collection of covid/non-covid waste was not undertaken by IMAGE from the Medical Colleges at Thiruvananthapuram and Kozhikode. Laxity on the part of Government in setting up regional BMW treatment facilities resulted in BMW reaching the IMAGE plant in excess of its processing capacity. This resulted in accumulation of highly infectious waste which was left exposed without any safeguards in the plant premises.

Categorisation of bio-medical waste

The BMW Management Rules, 2016 prescribe yellow, red and white coloured bags for the treatment and disposal of human/animal anatomical waste,

⁹⁶ KEIL started functioning from May 2021



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recyclable contaminated waste and sharp waste including metals, respectively. Yellow bags were to be disposed by Incineration or Plasma Pyrolysis or deep burial, and red and white bags by Autoclaving followed by shredding or mutilation.

The BMW Management Rules, 2016 stipulated that untreated human/animal anatomical waste, soiled waste and biotechnology waste shall not be stored beyond a period of 48 hours. Joint physical verification at IMAGE (December 2021) revealed that BMW in red/yellow/white bags were left without disposal for several months in violation of Rules. Further, yellow bags enclosing body parts of humans/animals were seen scattered and dumped negligently, which was a serious offence on the part of IMAGE authorities. Further, such instances also point to the lack of effective monitoring by KSPCB. It was stated by the IMAGE authorities that the boundless increase in BMW due to the spread of the pandemic had resulted in the backlog. Audit observed that accumulation of huge quantity of BMW at IMAGE resulted in a major fire outbreak in January 2022. It was estimated that 2000 tonnes of waste was burnt during the incident, causing irreparable damage to the ambient air. Such instances causing potential threat to environment calls for fixing of responsibility so as to curb lapses in effective monitoring and supervision.

Bio-medical waste dumped at IMAGE (December 2021)



5.2.3.2 KEIL

Though KEIL had a capacity to process 16 tonnes/day, only 6.2 tonnes of waste reached KEIL, whereas IMAGE received waste in excess of its capacity. Despite KSPCB, directing (August 2021) all HCFs in the five districts⁹⁷ to

⁹⁷ Alappuzha, Kottayam, Ernakulam, Pathanamthitta, Idukki

provide BMW (covid and non-covid) to KEIL, the direction was not complied with by the HCFs in the districts. In reply, KEIL stated that the HCFs in the said districts have not registered themselves with KEIL and still rely upon IMAGE for processing their BMW. Lack of adequate Governmental intervention in distributing the load of BMW among the two Facilities has resulted in underutilisation of capacity of one plant and inability to process the overload of waste in the other plant.

5.2.4 Waste management in Government Health Care Facilities/Institutions

- Health Care Facilities (HCF) being centres where diagnosis, treatment or immunisation of human beings or animals is provided, were to be registered with CBWTF. As per information exhibited on the website of the Directorate of Health Services Kerala, the number of HCFs in Kerala under the Government Sector was 6691, out of which only 2190 (32.73 per cent) HCFs were registered with CBWTF.
- The BMW Management Rules, 2016 stipulated that BMW was to be segregated at the point of generation in designated colour coded bins by the person who is generating the waste. However, it was seen during JPV in three Medical Colleges⁹⁸ that segregation of waste was not done properly and solid waste got mixed with BMW.
- Scrutiny of the records/JPV of 23 HCFs and 38 Veterinary hospitals in the test-checked ULBs revealed that 12 HCFs and 17 Veterinary hospitals were functioning without the authorisation of KSPCB. It was also seen that 34 HCFs/Veterinary hospitals have not obtained registration of IMAGE/KEIL for disposal of BMW generated. The authorities in four Veterinary Hospitals stated that surgical waste was being taken away by the owners/care takers of the animals as the hospitals did not have disposal facility. Used syringes along with needles, gloves, etc. were seen scattered/buried/burnt in the premises of seven Veterinary institutions in violation of BMW Management Rules.



Scan the QR code to view



Kochi Corporation District Veterinary Hospital - Bio-medical waste mixed with other waste (December 2021)

Lack of organized system of disposal of BMW generated by households/institutions rendering palliative home care services have already been mentioned in paragraph 3.2.2 of this report. Instances of improper segregation and dumping of BMW captured during joint physical verifications

⁹⁸ Medical College Hospitals at Thiruvananthapuram, Kozhikode and Alappuzha

are presented below:

Improper Segregation and Dumping of bio-medical waste



Medical College, Thiruvananthapuram (November 2021)



Bio-medical waste dumped in Kozhikode Medical College for transportation to IMAGE (September 2021)



Mixed waste dumped near parking ground in Thiruvananthapuram Medical College (November 2021)



Bio-medical waste dumped for incineration at Kozhikode Medical College (September 2021)

5.2.5 Inadequate Liquid waste treatment posing risks to environment

According to BMW Management Rules, 2016, the occupier of HCF shall ensure segregation of liquid chemical waste⁹⁹ at source and pre-treatment or neutralisation prior to mixing with other effluents. A separate collection system leading to effluent treatment system was to be installed for treatment of liquid waste generated. Audit conducted JPV in 66 HCFs in 22 test-checked ULBs and observed that 35 of them did not have Effluent Treatment Plant (ETP) installed to treat bio-medical liquid waste generated. In seven hospitals¹⁰⁰ bio-medical liquid waste mixed with other liquid waste was directly disposed to common drain/canals after chlorination and without any prescribed treatment procedures, polluting water bodies and endangering the health of humans/animals in the vicinity.



Kochi Corporation Palluruthy Taluk Hospital - Bio-medical liquid waste is let out directly to drainage (November 2021)

Medical College Hospital (MCH), Institute of Maternal and Child Health and Institute of Chest Diseases at Kozhikode with total bed strength of 2405 generated four million litres per day (mld) of liquid waste. However, capacity of the Sewage Treatment Plant (STP) installed in the HCF was only two mld. During JPV, it was noticed that treated liquid waste from the two mld plant was being routed to the nearby Kanoli canal. The remaining quantity of waste water generated was directly drained to ground from the hill top area where the MCH was situated. In the course of JPV, Audit entrusted sample testing of drinking water collected from four wells and one pond in the vicinity to

⁹⁹Used or discarded disinfectants, Silver X-ray film developing liquid, discarded formalin, infected secretions, aspirated body fluids, liquid from laboratories and floor washings, cleaning, house-keeping and disinfecting activities

¹⁰⁰Koyilandy Taluk Hospital, Government Beach Hospital, Kozhikode, Women and Child Hospital Kozhikode, Palluruthi Taluk Hospital, Kochi, Karuvelippadi Taluk Hospital, Kochi, Mattanchery Taluk Hospital, Alappuzha Medical College Hospital

District PCB. The sample testing revealed high content of different types of chemicals rendering the water unpotable for use.

- In the three Government MCHs¹⁰¹ visited by Audit, no ETPs to treat bio-medical liquid waste were seen installed. As per BMW Management Rules, 2016, sludge from ETP was to be supplied to CBWTF for incineration or to Hazardous waste treatment, storage and disposal facility for disposal. However, Government Medical College Hospital and Korambayil hospital at Manjeri were using this sludge containing hazardous chemical elements as manure, which would harm plant and animal health.

5.2.6 Unauthorised operation of incinerators in hospitals

The BMW Management Rules, 2016, do not permit installation of in-house incinerators. However, in case there is no common bio-medical facility nearby, the same could be installed by the occupier after taking authorisation from KSPCB. The BMW Management Rules, 2016 prescribed standards for incinerators so that emission of harmful chemicals like Dioxin and Furan could be limited to minimum. All incinerators installed were directed to comply with the above standards within a period of two years from the date of notification.

The District PCBs in Kozhikode, Malappuram and Alappuzha replied to Audit that they have not noticed any instance of unauthorised incinerators being operated in HCFs in their jurisdiction. However, JPV conducted by Audit alongside PCB staff revealed that 20 out of 50 test-checked hospitals had installed incinerators without obtaining authorisation from PCB. These incinerators were used for treating huge quantities of both solid and bio-medical waste generated in these hospitals. That the hospitals were operating incinerators which were not subject to mandated checks by PCB is a matter of concern.

Accepting the audit findings, Government stated in reply (May 2022) that the issue of BMW would be taken up separately on high priority and that the matter would be discussed and resolved at the earliest.

5.3 E-waste

E-waste refers to electrical and electronic equipment, whole or in part discarded as waste by the consumer as well as rejects from manufacturing, refurbishment and repair processes. The presence of elements like lead, mercury, arsenic, cadmium, selenium, and hexavalent chromium and flame retardants beyond threshold quantities in e-waste classifies it as hazardous waste. As e-waste dismantling or incineration is considered toxic, they are targeted for reuse, recovery or hazardous waste disposal.

5.3.1 Status of e-waste generation

There are no specific estimates on the generation of e-waste in the State despite it being a major waste stream. The quantity of e-waste collected in the State during 2019-20 and 2020-21 as per the Annual Reports of KSPCB is shown in **Table 5.5**:

¹⁰¹ MCHs at Thiruvananthapuram, Alappuzha and Kozhikode

Table 5.5: Quantity of e-waste collected in the State

Year	Category wise quantity of e-waste collected per year			Total quantity of e-waste collected (tonne)
	Information Technology and Telecommunication equipment (tonne)	Consumer Electrical and Electronic items (tonne)	Other items (tonne)	
2019-20	108.356	82.244	1098.61	1289.21
2020-21	27.66	88.33	1378.06	1494.05

(Source: Data provided by KSPCB)

The 22 test-checked ULBs did not maintain any records relating to the quantum of e-waste generated/collected from their areas.

5.3.2 Collection and handling of e-waste

E-waste Management Rules, 2016 stipulate that it is the responsibility of municipal authorities/ local bodies to ensure that e-waste, if found mixed with Municipal Solid Waste or pertaining to orphan products is to be properly segregated, collected and channelised to authorised dismantler or recycler. Government directed (January 2014) LSGIs to set up models for door-to-door collection, local and centralised storage facilities and arrangements with registered recyclers for transportation and disposal of e-waste in their jurisdiction. It was seen that the test-checked ULBs have not set up a mechanism for collection of e-waste from households so far. As a result, e-waste generated in households was found mixed with solid waste.

The collection centres were to store e-waste category-wise and maintain the records of e-waste collected and account the same to respective producers. The storage space for refrigerators and air conditioners required adequate facilities for managing leakage of compressor oils, coolant/refrigerant gases, mercury, etc. Audit, along with ULB staff visited 42 scrap dealer shops which collected e-waste unauthorisedly. It was observed that these scrap dealers did not adhere to prescribed methodology of assessment, storage and processing of e-waste, raising concerns regarding the safeguards to be complied with. Lack of awareness imparted to public on the proper disposal of e-waste, absence of door-to-door collection facilities, shortage of collection centres, etc. contributed to substantial quantities of e-waste reaching the hands of informal waste pickers and scrap dealers.

During JPV, Audit noticed instances of accumulation of e-waste such as refrigerators, television sets, etc. dumped in open space as well as unauthorised dismantling of Television sets by scrap dealers in six ULBs¹⁰² in violation of CPCB guidelines.

5.3.3 Role of local body as bulk consumer

The CPCB guidelines envisaged bulk consumers to ensure that e-waste generated by them was handed over only to producer take back/channelisation system. Government of Kerala directed (January 2014) Government Departments, Public Sector Undertakings, Boards and Corporations to incorporate the buy back/take back system of electronic goods like Compact

¹⁰²Thiruvananthapuram, Kozhikode Corporations, Koyilandy, Kayamkulam, Mavelikkara and Vadakara Municipalities

Fluorescent Lamps (CFL) and Fluorescent Tube Lights (FTL), Computer systems, etc. by the producer as a mandatory condition in all the tenders floated by them. The test-checked ULBs purchased laptops/computers/UPS/street lights, etc. for ₹8.18 crore and awarded Annual Maintenance Contract (AMC) for ₹62.84 crore during the audit period.

Despite being aware of the potential load of e-waste to be generated, none of the test-checked ULBs included the clause on buy back/take back system in the tenders floated. The ULBs, by excluding the above clause, could not ensure that the onus of recycling of e-waste was vested in the producers. This would result in ULBs facing practical difficulties in disposing of e-waste in an environmentally sound manner.



*E-waste dumped at Pottakuzhi in Kochi Corporation
(December 2021)*

Audit observed that two ULBs¹⁰³ disposed e-waste through scrap dealers and four ULBs¹⁰⁴ could not dispose the e-waste generated, leading to its accumulation.

5.3.4 Collection of e-waste by Clean Kerala Company

Government of Kerala permitted (March 2016) CKCL to collect E-waste generated in Government offices, institutions, public sector undertakings, etc. and dispose them of by handing over to authorised e-waste collectors/recyclers. It was seen that only 60 local bodies in the State handed over E-Waste (tube light, CFL, etc.) to CKCL during the period from 2016-17 to 2021-22 (upto December 2021) and only 35.24 tonne of e-waste were collected. None of the test-checked ULBs handed over e-waste to CKCL indicating that there was no system in place for effective management of e-waste.

5.4 Construction and Demolition Waste

Construction and Demolition (C&D) waste means the waste comprising of building materials, debris and rubble resulting from construction, re-modelling, repair and demolition of any civil structure. According to Rule 6 (4) of Construction and Demolition Waste Management Rules, 2016, local bodies shall make arrangements and place appropriate containers for collection of C&D waste and the collected waste shall be transported to appropriate sites for processing and disposal, either through own resources or by appointing private operators.

5.4.1 Status of generation of Construction and Demolition waste

Specific estimates of quantity of C&D waste generated in their jurisdiction were not available with any of the 22 test-checked ULBs. Based on the waste generation data of Technology Information Forecasting and Assessment Council (TIFAC) and extent of demolished area in ULBs during the period from 2016-17 to 2020-21, Audit estimated the approximate quantity of C&D waste

¹⁰³ Vadakara and Perinthalmanna Municipalities

¹⁰⁴ Kozhikode, Kochi Corporations and Neyyattinkara, Nedumangad Municipalities

generated in 16 ULBs¹⁰⁵ as 77,598.47 tonnes. It was observed that though these ULBs generated on an average, 42.52 tonnes of C&D waste per day, they did not adopt prescribed methods of disposal of C&D waste generated in their jurisdiction.

5.4.2 Collection and processing of C&D waste generated in the ULBs

According to C&D Waste Management Rules, 2016, ULBs were to place appropriate containers for collection of waste which shall be removed at regular intervals and collected waste was to be transported to appropriate sites for processing and disposal, either through own resources or by appointing private operators. However, the test-checked ULBs did not make arrangements for collecting C&D waste generated. As such the waste generators were compelled to dispose of the C&D waste emanating from construction/demolition activities. During JPV in four ULBs¹⁰⁶, Audit noticed instances of dumping of C&D waste in marshy lands, roadsides, markets, etc.

As per C&D Waste Management Rules, 2016, local bodies were to identify land for collection and processing of C&D waste within 18 months from the date of notification of the Rules. They were to establish and make C&D waste processing plant functional within 24 months for cities with population of five lakh to 10 lakh, and within 36 months for cities with population below five lakh. However, none of the local bodies in Kerala have established C&D waste processing/recycling/disposal facility so far. This is indicative of the laxity of ULBs in effectively establishing a system for management of C&D waste.

Government stated during the exit conference (May 2022) that draft guidelines on the processing and disposal of C&D waste were under consideration of Government.

Reclamation of water body using C&D waste



C&D waste dumped in water body in Maruthankuzhy, Thiruvananthapuram (August 2021)

¹⁰⁵ Of the remaining ULBs, Alappuzha, Kayamkulam and Feroke Municipalities calculated property tax on the basis of Annual Rental Value, based on which floor area and extent of demolished area could not be reckoned. Kochi Corporation, Aluva and Parappanangadi Municipalities did not furnish data to Audit

¹⁰⁶ Kozhikode, Thiruvananthapuram Corporations and Vadakara, Angamaly Municipalities

5.4.3 Improper disposal of demolition debris

Based on the judgement of Hon'ble Supreme Court, four apartments¹⁰⁷ in Maradu Municipality were demolished (January 2020) through controlled explosion method. The processing and disposal of C&D waste generated was entrusted to M/s. Prompt Enterprises, a Land developer, which claimed to have removed 69,606 tonnes of debris from sites, by 18 June 2020. As per Rule 6(5) of Construction and Demolition Waste Management Rules, 2016, the local body was to transport the collected waste to appropriate sites for processing and disposal either through own resources or by appointing private operators. The C&D waste could be utilised in sanitary landfill for municipal solid waste, drainage layer in leachate collection system, daily cover over fresh waste in the landfill, paving blocks in pedestrian areas, etc.

Audit noticed that the agreement executed between the ULB and selected agency did not specify the locations to which the waste was to be transported or the proposed method for reuse/recycle/disposal of waste. Consequent upon receipt of direction from NGT Monitoring committee, the agency submitted a plan of action indicating 11 sites in Ernakulam and Alappuzha districts to which waste would be transported. Though Maradu Municipality stated that major part of the demolition waste (37,441 tonnes) was transported to Kumbalam and Varapuzha Grama Panchayats and KSIDC¹⁰⁸, Pallippuram, the GPs/KSIDC replied to Audit that they had not given any sanction to the agency for dumping of demolition waste in their jurisdictional area. No records were furnished to Audit by the ULB/agency in proof of the quantum of waste transported to the locations cited or method of processing and disposal of the massive quantity of the C&D waste resulting from the first major demolition activity undertaken in the State.

Recommendation 10: Government must direct State Pollution Control Board to establish a mechanism by which Producers, Importers and Brand owners of products fulfill their Extended Producer Responsibility (EPR) obligation under Plastic Waste and E-waste Management Rules, 2016.

Recommendation 11: With a view to maximise the possibility of reduction, reuse and recycling (3R strategy) of waste generated, Government must ensure that ULBs effectively implement ban on single use plastic, promote substitutes for plastic carry bags, use non-recyclable shredded plastic in roads, operationalise Waste-to-Energy plants, etc.

Recommendation 12: Government must ensure that ULBs set up Material Collection Facilities in all wards to facilitate proper segregation of recyclable portion of plastic waste.

Recommendation 13: Government must initiate urgent steps for establishing Common Bio-medical Waste Management Facilities at regional level to ensure disposal of bio-medical waste within the time limit and distance specified in the Rules. Government and the State Pollution Control Board must oversee that Health care facilities (HCFs) are functioning with proper

¹⁰⁷ H₂O Holy faith, Alpha Serene Towers, Jain Coral Cove and Golden Kayaloram

¹⁰⁸ Kerala State Industrial Development Corporation

authorisation and that solid/liquid bio-medical waste generated in these HCFs are treated effectively.

Recommendation 14: ULBs must place appropriate containers for collection of Construction and Demolition (C&D) waste and identify land for establishing processing plant for C&D waste generated within their jurisdiction.