

BEFORE THE HON'BLE NATIONAL GREEN TRIBUNAL
AT NEW DELHI.

ORIGINAL APPLICATION NO. 606 OF 2018

IN THE MATTER OF:

COMPLIANCE OF MUNICIPAL SOLID WASTE MANAGEMENT
RULES, 2016 AND OTHER ENVIRONMENTAL ISSUES.

REPORT FILED BY THE RESPONDENT STATE OF KERALA

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Progress report in NGT OA 606/2018 before the Hon'ble NGT(PZ)
on the Implementation of Solid and Liquid waste management in
Kerala

1. Introduction

In response to NGT OA 606/2018, a pivotal case addressing the matter of implementation of Solid and Liquid Waste Management, the State of Kerala has taken significant strides to bridge the existing gaps in waste management infrastructure. Recognizing the urgency of the matter, the State has not only committed to ring-fence financial allocations but has also embarked on comprehensive projects aimed at addressing the challenges outlined in the National Green Tribunal's directive. This collection of reports serves to articulate and evaluate the tangible progress made by the State in waste management endeavors, providing a detailed overview of the initiatives undertaken and the status of implementation as of March 15, 2024.

2. SOLID WASTE MANAGEMENT

2.1 Legacy Waste Management

2.1.1 Ring fenced amount

Table 1. Ring-fenced amount and its utilization in ULBs

Parameter	As per last report on 16.08.2023				Progress as on 15.03.2024			
	No.	Qty (in LMT)	Fund earmarked (Cr.)	Fund expended (Cr)	No.	Qty (in LMT)	Fund earmarked (Cr)	Fund expended (Cr)
Total identified legacy dumpsites	44	7.51			44	7.51		
Remediation completed	18	2.46			18	2.46		
Remediation started	6	2.38			12	3.21		
To be remediated	20	2.67			14	1.84		
			15.15	6.9			156.56	34.67

As part of a planned initiative, 44 legacy waste disposal sites have been identified for remediation through biomining. Remediation has been completed in 18 of these sites, having processed a total of 2.46 lakh tonnes of waste. For the remaining 26 sites, remediation efforts are ongoing at 12 locations, with 3.21 lakh

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tonnes of waste slated for processing. Additionally, remediation has been initiated at 14 other sites, where 1.84 lakh tonnes of waste is set to be processed. The total expenditure on legacy waste remediation amounts to Rs 34.67 Cr. Projects valued at ₹120 Cr under KWSMP and ₹36.56 Cr from other funding sources have been undertaken to address existing legacy dumpsites. In total, Rs 156.56 Cr has been allocated for legacy waste remediation.

2.1.2 Process and handling of remediated waste

Legacy dump sites are remediated by biomining, in which microorganisms and natural processes are used to excavate, treat, segregate, and recover valuable materials from old, accumulated waste dumps (landfills). These legacy wastes contain organic matter, plastics, metals, and other materials that have been compacted and decomposed over decades.

The biomined soil is used for filling at various locations. Specific interventions have been done at Brahmapuram, where biomining remediation is currently underway. The biomining is successfully completed at Kureepuzha in Kollam processing a total of 92,874 tonnes of legacy waste. This process has effectively sorted the waste into various categories including soil, stones, RDF, glass, plastic, tyre, wood, footwear, etc. Of these, 74,093 tonnes have been appropriately disposed of, while the remaining quantity is stockpiled for disposal.

2.2 Source Level Waste Management

Table 2. Ring-fenced amount for SWM activities and its utilization in ULBs

Component	As per last report on 16.08.2023		Progress as on 15.03.2024	
	(Qty in MT)	Fund expended (Cr)	(Qty in MT)	Fund expended (Cr)
Municipal Solid waste generated	3472		3472	
Solid waste processing capacity	3205		3797	
GAP (TPD)	267	2.67	0	83.05

3472 MT of solid waste has been reported as being generated from urban areas in the State. This has seen increase in the wake of the campaign for complete waste management (the malinya mukta, navakeralam campaign undertaken in 2023-24). As per the last report submitted, 3205 TPD was the waste processing

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capacity of the state. In order to bridge the gap, with the available financial support from central and state, 325 TPD waste management facilities have been installed in the state, with a total processing capacity of 3797 TPD. In the financial year 2022-23 and 2023-24, a total of Rs. 83.05 Cr has been expended for solid waste management.

2.3 Progress in waste management

Kerala's densely populated settlements and the rural-urban continuum contribute to its substantial waste output. This waste consists of both organic and inorganic components. Approximately 77% of the waste generated is organic waste and remaining 23% is inorganic waste including 5% reject material, which has a combustibility of 79.2%. 3823 TPD of waste is produced in urban LSGIs and 6857 TPD in rural LSGIs, based on the present population. The state of Kerala produces 10680 tonnes of waste every day in total based on current population (as per projected population data for 2024). Out of 3823 TPD waste generated, 2944 TPD is bio waste and 879 TPD is non bio waste including reject.

The Government of Kerala has now made amendments to the Kerala Municipality Act and the Kerala Panchayat Raj Act w.e.f 8th December 2023. The Amendments have brought in some changes to the existing laws. The main changes are as follows: Spot fine amount which was Rs 250 earlier has been increased to Rs. 5000 both in rural and urban areas. The fine amount for dumping has been increased to Rs. 50000 from Rs. 25000. This is keeping in line with the actual damage to the environment resulting from the crime. Under the revised law, all persons alike are now mandated to hand over waste to the local body or their authorized agency and are to maintain systems at home for this. This is keeping in line with the knowledge that all humans are waste generators and if they are not handing over at least non-biodegradable waste to the local body, they would be likely to dispose of it unscientifically elsewhere.

Penalties have also been introduced in the law for non-payment of user fee. Further, the Secretary of the local body is vested with the power to refuse other services from the local body in case of non-payment of user fee for the waste management services availed. In case of the local bodies defaulting on taking action in accordance with the instructions of the State government, fine can be imposed upon the local body as well. Further, considering the increasing number of celebrations and functions in the State, a provision has been introduced that whoever organizes any event with more than 100 persons in attendance needs to inform the local body 3 days in advance and hand over the requisite user fee to the local body for waste handling. Shops and establishments have to now ensure

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that their premises are kept litter free and that customers visiting their establishments also do not litter.

The state of Kerala adopts a decentralized waste management approach for handling wet waste. Various types of composting devices and small capacity biogas units are used for managing the wet waste at source. The compost produced by household waste treatment is utilised as manure for cultivation in the respective residences. 80% of the total bio waste generated at households is being managed at source. The remaining 20% and waste generated from community facilities are the responsibility of LSGIs. Based on the land availability, medium capacity decentralized composting facilities such as aerobic compost units, organic waste converters, windrow plants, bio-methanation facilities etc. are established at community level widely in Kerala. The compost generated from the treatment of waste at community facilities is branded and marketed as manure at Pattambi municipality, Wadakkanchery municipality, Perinthalmanna municipality and Munnar GP, and compost produced from many other facilities are being supplied to farmers groups free of cost.

Table 3. Details of Existing Waste Management Facilities

Sl. No.	Waste management facility	Urban Lbs	
		No of units	Capacity (TPD)
I	Wet Waste Management		
A	Composting Facilities		
	a. Household level composting devices	392750	907
	b. Compost pits	495940	480
	c. Institutional Composting Facilities	28420	83
	d. Community Level Composting facilities	793	458
	e. Centralized composting facilities	24	228
	Total capacity of composting facilities		2156
B	Bio methanation Facilities		
	a. Household level Biomethanation	77250	386

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	facilities		
	b. Community level Biomethanation facilities	117	58
	c. Centralized Biomethanation facilities	4	25
	Total capacity of Biomethanation facilities		469
C	Rendering plants	20	401
	Total Bio waste processing facilities		3026
II	Dry Waste Management		
A	Dry waste processing facilities (Public Sector)	348	696
B	Dry waste processing facilities (Private Sector)	30	60
C	Sanitary waste disposal facility (Community level)	1	5
D	Sanitary waste disposal facility (Institutional level)	3272	10
	Total Dry waste processing facilities	3651	771
	Total capacity of Existing facilities		3797

With the available financial support from central and state, 2625 TPD capacity bio waste management facilities have already been installed at household, institutional and community levels in urban areas. In addition to that, 401 TPD poultry slaughter waste is converted to various products such as pet feed, protein supplement, compost etc. For managing the dry waste including public and private sector there are 771 TPD capacity processing facilities established in the urban areas. On the whole 3797 TPD waste management facilities have been established in urban areas to cater to the present waste generated.

Local bodies, with the assistance of Harita Karma Sena, waste collectors from the kudumbashree network of Self help groups, manage the collection of dry waste from households and establishments. Subsequently, the collected waste undergoes segregation at Material Collection Facilities (MCFs) and Resource Recovery Facilities (RRFs). Recyclable waste is sent to recycling units, while non-recyclable waste is directed to co-processing facilities, such as cement plants, as Refuse-Derived Fuel (RDF) for energy recovery. To address specific waste components like sanitary waste, e-waste, construction & demolition waste, and hair waste, private partnerships are encouraged. Continuous monitoring of

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projects in this sector is conducted to ensure the effective maintenance of the system. The reject waste generated statewide in households/shops are segregated at MCFs and are sent to cement factories for onward utilization for energy generation.

Table 4. Quantity of Reject Waste transferred to Cement Plants from Jan 2023 to Dec 2023

By Government Sector	29,826 Tonnes
By Private Sector	18,205 Tonnes
Total	48,031 Tonnes

Projects have been taken up by LSGIs in all districts for effectively addressing the gap in the processing capacity.

Table 5. Details of projects undertaken by LSGIs for SWM from Central, State and local funds

Name of Districts	Biomethanation		Composting		MCF/ RRF / MRF/ Mini MCF	
	No. of projects	Fund Earmarked (in Rs.)	No. of Projects	Fund Earmarked (in Rs.)	No. of Projects	Fund Earmarked (in Rs.)
Trivandrum	76	45676434	245	263512921	205	256914050
Kollam	12	28165206	52	76370924	156	127928818
Pathanamthitta	3	2151062	7	27485623	20	19019521
Alappuzha	4	7865200	12	72602977	33	57928247
Kottayam	2	700000	8	6006399	9	4324813
Idukki	2	5000000	1	5583750	15	10100893
Ernakulam	8	24713033	14	38229878	36	55856234
Thrissur	8	18865944	24	101533565	68	102300901
Palakkad	-	-	7	21260294	24	28838153
Malappuram	2	463000	15	115701485	16	38340116
Kozhikode	6	848600	9	29458635	37	89730235

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Wayanad	-	-	2	3742500	2	5000000
Kannur	3	2950000	17	84310090	29	51964428
Kasargod	2	185000	2	11456000	10	22091140
Total	128	137583479	415	85,72,55041	660	87,03,37549

Statewide 128 biomethanation projects, 415 composting projects, 660 MCF/MRFs and 41 sanitary waste treatment plants have been proposed by various LSGIs. In order to manage the waste generated including the future requirements, projects have been planned & proposed in local bodies. Projects worth ₹ 99.48 cr have been taken up in local bodies for wet waste management and ₹95.40 cr have been taken up in local bodies for dry waste management. A total outlay of 194.89 cr has been earmarked for these projects.

Table 6: Details of Kerala Solid Waste Management Project (KSWMP)

No.	KSWMP – World Bank funded SWM Project Components	Total outlay in Rs. Cr.	FY 2022-23 & FY 2023-24 till date (31.01.2024)		Projected expenses till 31.03.2024 in Rs. Cr.
			Committed expenditure in Rs. Cr.	Firm contracts / Actual expenditure in Rs. Cr.	
I	Component 1				
1	Planning, Execution, Administrative Expenses & Capacity Building	320.00	50.00	44.00	16
II	Component 2				
2	ULB-level Investments (Procurement of SWM Goods & Works)	1,200.00	65.00	10.00	10
III	Component 3				
3	Dumpsite Remediation	120.00			10
4	Regional Infrastructure	760.00			10
	Total	2,400.00	115.00	54.00	46

A total outlay of Rs 2400 cr has been earmarked under KSWMP for capacity building, procurement of SWM goods, dumpsite remediation and regional infrastructure.

2.4 Other interventions taken by the State in Solid Waste Management

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2.4.1. Door-to-Door Waste Collection

In the fiscal year 2023–2024, there has been a significant increase in door-to-door waste collection coverage across the State. 100% door to door collection is ensured by special interventions at LSGI level. Haritha Mithram app facilitated developing systematic and professional approach on customized strategies for increasing the D2D coverage, user fee collection, segregated material movement, and scheduled transportation of waste from door steps to disposal facilities. During this period, the volume of dry waste delivered to MCF/RRF facilities has correspondingly risen. To accommodate the increased amount of collected waste, an additional 41 godowns were established. Currently, there are 57 godowns with a combined area of 4,97,000 sqft to manage the increased volume of waste.

Table 7: Details of Solid Waste Management facilities in the state

Facility	Up to March 2023	Up to Jan 2024
RRF	93 Nos	167 Nos
MCF	1182 Nos	1981 Nos
Mini MCF	9357 Nos	20904 Nos
Godown facility	16 Nos	57 Nos
Godown Area	85,250 sqft	4,97,000 sqft

The state has made significant investments in infrastructure for the storage of dry waste. Currently, there are 167 Resource Recovery Facilities (RRF), 1981 Material Collection Facilities (MCF), 20904 Mini Material Collection Facilities (Mini MCF), and 57 storage godowns covering an area of 4,97,000 square feet.

2.4.2 Registration of Unauthorized Dealers

Scrap dealers are pivotal in the non-biodegradable waste management process in Kerala, contributing significantly to the collection and processing of waste. They engage in collecting, sorting, and processing diverse scrap materials, such as metals, paper, plastics, and electronics, contributing to the reduction of waste reaching the mainstream. Efforts are underway to register them officially and evaluate the volume of waste they manage.

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2.4.3 Lifting Plan and Forward Linkage

The transfer of waste from mini-MCFs to MCFs and RRFs faced inefficiencies due to insufficient vehicle resources and a lack of professionalism. Through the assistance of Haritha Sahaya sthapanams (green technical support agencies), a systematic plan for waste lifting has been devised and implemented. Additionally, a seamless disposal process for segregated waste has been established by identifying appropriate disposal facilities and recycling markets. To efficiently handle non-recyclable rejects, plans are underway to establish RDF plants at the district level.

Non-recyclable plastic waste is shredded in the MCF/RRFs and is used in the construction of PWD and LSGD roads. During the period 2016-2023, Clean Kerala Company Limited (CKCL) has produced 34443.142T of shredded plastics and given to various agencies (NHAI- 12-18T, PWD- 947.76T, LSGI-1151.2T). The total length of polymerized road constructed during this period using shredded plastic is 3838.04 km.

2.4.4 MCF Modernization

Most of the MCF/RRF facilities faced a shortage of sufficient space and machinery to handle the increased volume of waste. Technical measures have been implemented to recognize these gaps and upgrade the existing facilities. New projects have been initiated to address and bridge these gaps. 660 projects are taken up for an amount 87,03,37,549/- of this year for the construction of new MCFs and improvement and maintenance of existing MCFs.

2.4.5 GPS Tracking Facility

To control the illegal dumping of waste, GPS tracking systems have been mandated for vehicles transporting waste. The Kerala State Pollution Control Board has created a web portal for real-time monitoring of waste-carrying vehicles, both interstate and intrastate. Additionally, vehicles involved in the transfer of non-bio waste have been equipped with security stickers embedded with holograms. An app is under development to process information pertaining to the movement of vehicles through GPS tracking. It is expected that movement

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of all vehicles in waste management will be monitored through these systems in the near future, enabling effective action against unauthorised movement of waste.

2.4.6 IEC Interventions

IEC initiatives have been intensified to improve door-to-door waste collection and eliminate open littering.

- An informant incentive programme has been instituted to encourage public engagement in identifying instances of garbage dumping.
- Technical assistance has been provided to Bulk Waste Generators to strategize and establish waste management facilities independently.
- For effective waste management, private partnership has been ensured
- Ranking of LSGIs based on their performance on waste management is being undertaken.
- Ranking of public and private sector institutions based on cleanliness
- 100% User Fee challenge among LSGIs

2.4.7 Enforcement Action

To enforce waste management regulations and prevent open dumping, 23 squads were established in March 2023 to undertake enforcement actions. Single-use items constitute a significant portion of the waste discarded on roadsides. The enforcement team has conducted 33,405 inspections to date, identifying 9,078 violations and punishment actions have been undertaken. Fines amounting to Rs. 1,04,55,622/- have been collected. Additionally, approximately 161,456 kgs of single-use plastic items have been seized as a result of these enforcement efforts.

Control rooms are being set up at the District and Local Self-Government levels to closely monitor the existing collection of waste and their proper disposal. Control rooms are functioning effectively in 650 local self-government bodies, as

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on date.

2.4.8 Clearing and beautification of Garbage Vulnerable Points

With active public participation in a mass campaign, 1983 garbage vulnerable points were pinpointed. These locations underwent clearing and beautification efforts, with students (NSS, NCC, Student police corps etc) and environmentalists playing a crucial role. The once unsightly wayside waste heaps have been converted into small gardens or parks, so as not to become dumping sites for garbage again. The operation and maintenance (O&M) of each of these parks are to be carried out with the support of LSGIs, Resident Welfare Associations, trade unions, NGOs, etc.

2.4.9 Sanitary waste management

An incinerator plant for sanitary waste has been established in Palakkad district. Following satisfactory monitoring of its operation, new plants are now being proposed in all districts. The total number of planned projects for implementation in the state is 56. These plants will have a cumulative capacity of 46.80 TPD.

Table 8. Community level sanitary waste incinerator projects taken in local bodies.

Sl.No.	Name of District	Total Projects taken up in districts	Capacity (TPD)
1	Thiruvananthapuram	4	3.3
2	Kollam	7	5
3	Pathanamthitta	3	1.5
4	Alappuzha	5	3.5
5	Kottayam	4	4
6	Idukki	2	2
7	Ernakulam	3	4
8	Thrissur	4	4
9	Palakkad	3	3
10	Malappuram	5	5
11	Kozhikode	8	6
12	Wayanad	1	1
13	Kannur	6	3.5
14	Kasargod	1	1
Total		56	46.8

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2.4.10 Rendering plants

Meat rendering plants process animal by-product materials for the production of tallow, grease, and high-protein meat and bone meal. Plants operate in conjunction with animal slaughterhouses or poultry processing plants. The Government of Kerala developed guidelines for the operation of rendering plants which led to the standardization of facilities. The facilities use wastes as input material to create value added products as new outputs. The aim of resource-recovery is to reduce the amount of waste generated and optimize the values created from waste. Here, the newly functioning plants lead to the management of around 800 TPD of poultry waste which would have ended-up as waste and created a menace to the people.

Table 9 Details of Existing Rendering plants

District	Plant Details	
	No.	Capacity
Thriuvananthapuram	0	0
Kollam	2	9
Pathanamthitta	1	30
Alappuzha	0	0
Kottayam	0	0
Idukki	0	0
Ernakulam	7	216
Thrissur	2	5
Palakkad	7	103
Malappuram	15	204
Kozhikode	1	60
Wayanad	1	12
Kannur	2	54
Kasargod	2	110
	40	803

Rendering plants are available in 10 districts and the waste from other 4 districts are also processed at these plants.

3. LIQUID WASTE MANAGEMENT

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In compliance of Hon. NGT in OA No.606/2018(PZ) dated 01.12.2022 the State was directed to submit the six monthly reports on the progress achieved in the waste management activities. As per the order, the state has ring-fenced an amount of Rs 2343.18 Cr for liquid waste management activities. The State has submitted the first six monthly report to the Hon. NGT on 16.08.2023. As per the report the state has tied up an amount of Rs 1276.12 Cr in developing projects in the field of liquid waste management. The second six monthly report was submitted to Hon. NGT on 06.02.2024. This revised report serves to detail the progress made by the State in liquid waste management endeavors, providing a detailed overview of the initiatives undertaken and the status of implementation as of February 29, 2024. Also this report includes the capacity achieved, expenditure incurred, statement of comparison and various other initiatives put forward by the state in a holistic approach. The details are described in following sections.

3.1 Ring Fenced Amount Vs Achievement

As per the six-monthly progress reported on 16/08/2023, projects costing for Rs. 1276.12 Cr have been taken up under LWM out of the ring fenced amount of Rs.2343.18 cr. Now projects under LWM for a cumulative total of Rs. 2067.32 Cr have been taken up so far. The funds of AMRUT, Swachh Bharat, Finance commission tied grants, LSG own funds and development grants, MGNREGS have been earmarked and utilized for this purpose. The Table 3.1 below provides a summary of the ring-fenced amount under various schemes in the last submitted report and the current status.

Table 3.1 Details of Ring-fenced amount and its achievement

Sl.No.	Area	Scheme	Ring fenced amount (Rs. In Cr.)	Achievement so far (cr)	
				As per first six-month Report	Current status
1	Urban	AMRUT 1.0	659.65	412.06	345.55*
		Amrut 2.0	902.16	348.62	490.99
		ULBs	134.8	-	622.82
2	Rural	SB Gramin	426.69	124.76	157.86
		PRIs	219.88	354.68	401.81
		MGNREGS	-	36	48.29
Total			2343.18	1276.12	2067.32

*due to the closure of AMRUT 1.0, some projects were brought into AMRUT 2.0 - hence the variation

As reported in the compliance report dated 06.02.2024, the total amount allocated as per the scheme was taken (Rs 2301.4 Cr) and now it is limited to the amount

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that accorded Administrative Sanction (Rs 2067.32 Cr). Hence there is a decrease in the total achieved amount. Rs. 2067.32 Crore (more than 88% of the ring fenced amount) is being utilized for projects which are under various stages of project implementation such as completed ones, part bills released and projects which are in various stages of implementation. The detailed split up of the progress of projects under each scheme is summarized in the Table 3.2

Table 3.2. Details of achieved amount in various stages of the project

Sl.No.	Area	Scheme	Project Completed (Amount in Cr)	Under construction (Amount in Cr.)	Under process (Amount in Cr.)	Total (Amount in Cr.)
1	Urban	AMRUT 1.0	92.40	239.58	13.57	345.55
		AMRUT 2.0	-	118.39	372.60	490.99
		ULBs	26.58	98.75	497.49	622.82
2	Rural	SB Gramin	-	3.07	154.79	157.86
		PRI's	226.98	34.65	140.18	401.81
		MGNREGS	48.29	0	-	48.29
Total			394.25	494.44	1178.64	2067.32

The amount Rs 2067.32 Cr will be utilized for managing the liquid waste of capacity, 198.543 MLD. As described in table 3.2, the capacity that can be achieved by the amount invested in each section is described in Table 3.3. A total capacity of 14.82 MLD has been completed and commissioned and the ongoing projects can cater to approx 15.31 MLD after the completion of construction. The planned projects can cater to approx 168.413 MLD. The capacity catered to by the projects in various schemes is tabulated in Table 3.3.

Table 3.3 Details of Capacity achieved by the various schemes

Sl.No.	Area	Scheme	Capacity in MLD			
			Achieved by the completed projects	Expected to be achieved by Under Construction Projects	Expected to be achieved by Under Process Projects	Total Capacity in MLD
1	Urban	AMRUT 1.0	14.70	13.15	0.32	28.17
		AMRUT 2.0	-	-	32.244	32.244
		ULBs	0.11	1.75	131.712	133.572
2	Rural	SB Gramin	-	0.05	2.638	2.688

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	PRI	0.01	0.36	1.499	1.869
Total		14.82	15.31	168.413	198.543

In the case of financial progress, out of the earmarked amount of 2067.32 Cr, the state has achieved an expenditure of 551.232 Cr under different schemes. In achieving the 198.543 MLD of treatment capacity, the expenditure so far incurred in the area of completed projects and the under construction projects. The remaining amount (Rs. 1516.088 Cr) is allocated for the remaining of ongoing projects and the planned projects. Table 3.4 shows the detailed split up of expenditure.

Table 3.4 Details of Expenditure incurred by various schemes

Sl.No.	Area	Scheme	Total (Rs in Cr.)	Expenditure (Rs. In Cr.)
1	Urban	AMRUT 1.0	345.55	240.70
		AMRUT 2.0	490.99	3.58
		ULBs	622.82	31.44
2	Rural	PRI	401.81	227.22
		SBM Gramin	157.86	
		MGNREGS	48.29	48.29
Total			2067.32	551.23

The following subsections highlight the major projects undertaken Table 3.2 in each scheme that contributes to the liquid waste management initiatives.

3.2. Urban

Kerala state has 93 urban local bodies (ULB) including 6 Municipal Corporations and 87 Municipalities. Among these ULBs, 9 AMRUT cities are catered by the Projects under AMRUT 1.0 & 2.0 which is a centrally sponsored scheme. In the other regions, ULBs have formulated Projects with different sources of funds such as SBM(urban), KIIFB, RKI, State Plan Funds, and Local body fund. Details are described in the following sections.

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3.2.1 AMRUT - 1.0 & 2.0

The amount under AMRUT-1.0 comes to Rs 345.55 cr against the earmarked amount of Rs. 412.06 Cr due to the shifting of slow-starting projects from AMRUT 1.0 to 2.0. The overall expenditure as of 29.02.2024 stood at Rs. 240.70 Cr. The allocation of 345.55 Cr caters to 9 STPs with a collective capacity of 27.70 MLD and septage co-treatment capability of 0.15 MLD. Allocation under AMRUT-1.0 also caters to 5 Faecal Sludge Treatment Plants (FSTPs) with a collective capacity of 0.32 MLD and sewer network initiatives under the sewerage and septage sector. Major projects which were completed recently are the following.

- 5 MLD STP at Thiruvananthapuram Medical College & Elamkulam
- 2 MLD STP at Kozhikode Medical College with 100 KLD co-treatment facility
- 1 MLD STP at Padannapalam, Kannur
- 1 MLD STP at Kozhikode Medical College

A major project of 12 MLD capacity is being constructed at Kureepuzha, Kollam which is currently at 87% of completion. The other ongoing project is the 1.1 MLD STP at Ambedkar Colony, Edakochi South, Ernakulam.

Under AMRUT 2.0, as on 29.02.2024, approval has been received from the Ministry of Housing and Urban Affairs (MoUHA) for sewerage and septage sector projects worth Rs.490.99 Cr and Administrative Sanction has been issued for projects worth Rs.490.99 Cr. Currently, there are 2 STPs with co-treatment facilities with a capacity of 32.244 MLD. The expenditure incurred as on 29.02.2024 stood at Rs. 3.58 Cr. Major projects are the following.

- 27 MLD STP at Sarovaram, Kozhikode, with a septage co-treatment capacity of 220 KLD
- 5 MLD plant at Elamkulam, Ernakulam, with a septage co-treatment capacity of 24 KLD

3.2.2 Various Funds used in ULBs

3.2.2.1 SBM (Urban)

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Proposals of 16 ULBs to establish STPs with a total capacity of 50.5 MLD have been approved in the SLTC held on 18.10.2023. Total project cost proposed by KWA for these STPs is Rs. 146.68 Cr. The estimate prepared by Kerala Water Authority (KWA) being on the higher side, SLTC intimated KWA to rework the STP technology and the cost to limit it within the SBM capping of Rs.2 Cr/MLD. Septage receiving facility for co-treatment at STP for 14 ULBs of total capacity 165 KLD has also been approved by the SLTC. The above proposals after SLTC approval were forwarded to MoHUA for fund release.

For the associated sewer network component, the average cost of laying sewer including the road restoration charges as per the estimate of KWA comes to Rs. 3.43 Cr per km. Since there is no SBM funding available for setting up the sewer network, the balance fund besides the available CFC fund will have to be pooled in by the State/ ULB. KWA is reworking the cost of the sewer network.

FSTP Proposals of 9 ULBs with a total capacity of 105 KLD have been approved by the SLTC and forwarded to MoHUA for fund release. The above proposals were considered in the National Advisory and Review Committee (NARC) of MoHUA held on 04.01.2024 and as per the minutes of NARC, 8 FSTP proposals are approved by the NARC. However the communication regarding the amount approved for the FSTP is awaited from the Ministry.

3.2.2.2 KMRL

Under the purview of ULBs, a major project of 77 MLD capacity is being planned by Kochi Metro Rail Limited under the Integrated Urban Regeneration and Water Transport System (IURWTS) with the help of KIIFB funding. A total of 4 projects included in this proposal. Collection system, laying of sewer lines, construction of manholes, sewage networks, sewerage connections etc. will also be set up as part of this project. This project enhances the sewage treatment facility in the Kochi Corporation and is expected to bring out a permanent solution for preventing water pollution in major canals of Kochi Corporation that includes, Perandoor Canal and Edappally Canal. The overall project cost is Rs. 288.22 Cr.

3.2.2.3 O&M for Treatment Plants

The maintenance of the treatment plant is essential for the effective working of the plant. A total of 22.79 Cr has been utilized for the operation and maintenance of two plants - Muttathara Thiruvananthapuram and Wellington septage treatment plant.

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3.2.2.4 RKI & KIIFB funding through IMPACT Kerala

Impact Kerala is a special purpose vehicle (SPV) that deals with waste management activities and other infrastructure projects in the state. They use the funds allocated from KIIFB and Rebuild Kerala Initiatives for their work. In the field of waste management, Impact Kerala is involved in the construction of treatment plants. This agency has taken both STP projects and FSTP projects. A total of 7 projects worth Rs 54.99 Cr have been taken up including an ongoing FSTP project in Cherthala with a capacity 250 KLD. The total capacity catered by this agency is 4.78 MLD for sewage and 300 KLD for septage. The 1.5 MLD plant at Ottapalam, Palakkad is one among the projects taken up by the agency.

3.2.2.5 Smart City

Smart City Mission has deposited Rs.9.34 cr to Kerala Water Authority for revamping of old sewer lines and laying new lines along the smart city roads in Thiruvananthapuram.

3.2.2.6 KWA Plan Fund

The Government of Kerala had provided budget allocation to Kerala Water Authority for the improvement of the sewerage schemes and the works for the prevention of river pollution and creating awareness for the compliance of Hon. NGT direction. This head is utilized for increasing the capacity of sewage pipelines, extension of sewerage, and reconstructing RCC manholes etc. Administrative sanction for an amount of Rs. 67.55 Cr has been accorded under the above heads during 2022-23 and 2023-24.

3.2.2.7 Institutional STPs

For the hassle-free execution of institutional STPs, Suchitwa Mission has empaneled agencies for establishing packaged/ containerized sewage/wastewater treatment plants in establishments vested under LSGIs. As per the proceedings of the Executive Director Suchitwa Mission 4215/G/2022/SM dated 24.05.2023 and the GO (Rt) No. 1727/2023/LSGD dated 24.08.2023 packaged treatment plants can be implemented in the local body. Treatment plants with a total capacity of 0.582 MLD capacity are proposed by various ULBs. The cost of these projects comes up to Rs 9.41 Cr.

3.2.2.8 Biodigestors

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Biodigester is a DRDO developed technology for treating faecal waste, in an anaerobic (oxygen-free) environment. The biodigesters have been extensively fitted in different types of rail coaches by Indian Railways with collaboration of DRDO. Projects worth Rs. 87.00 lakhs have been taken up by the Kollam Municipal Corporation. Among this, Thirty-seven lakh rupees have been earmarked by Kollam Municipal Corporation for providing biodigester toilets to BPL houses near Ashtamudi Lake through Finance Commission Tied Grant and Rs. 50,00,000/- (Fifty Lakhs) has been allocated through the Development Fund of Kollam Municipal Corporation (Finance Commission Tied Grant) for the works of installing septic tank /biodigester replacing the leach pits of individual wards.

3.2.2.9 Mobile Treatment Units (MTU)

Mobile Treatment Unit technology is developed by WASH Institute and recommended by Principal Scientific Advisor (Sanitation) under Innovative Technologies list. In order to cover the areas where centralized treatment facility coverage is not available, Local Self Government Institutions (LSGIs) have spearheaded this initiative by proposing the deployment of 12 MTUs, reflecting a concerted effort to bridge the existing gap in wastewater treatment infrastructure.

- A substantial budget of Rs. 5.3 crore has been allocated to facilitate the deployment of sanitation solutions, emphasizing a commitment to effective sanitation in the targeted regions.
- Work orders for the project have already been issued by two Local Self-Government Institutions (LSGIs), demonstrating a proactive approach to the imminent deployment of Mobile Treatment Units (MTUs).
- These MTUs collectively aim to treat the volume of 288 kiloliters of fecal sludge per day, showcasing the potential impact of this initiative on public health, environmental sustainability, and overall community well-being.

3.3 Rural

In the rural areas also, several liquid waste management activities have been taken up. The components monitoring the rural area include SBM Gramin, Panchayat Raj Institutes (i.e, Local Bodies), and MGNREGS. The total fund allocated in the rural region sums up to Rs 559.69 Crores. As per the current status, projects worth Rs157.86 Cr are approved in SBM G and Rs401.81 Cr are approved in rural local bodies.

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3.3.1 SBM (Grameen)

SBM Grameen fund is a centrally sponsored fund under Swachh Bharath Mission focusing on sanitation and hygiene in the rural areas. The prime focus of this fund is to be utilized in the implementation of Faecal Sludge Treatment plants across the state. Under this 25 projects are approved and 20 other projects are in consideration. With this, a total of 2638 KLD of septage can be treated.

3.3.2 Panchayat Raj Institutions (PRIs)

These are the local self-government bodies (LSGs) which ensure the public health and basic needs of the people come under their jurisdiction. Under these several institutions like Family health centre, Auditoriums, Hospitals, Schools etc. exist. The waste management activities in these bodies come under the purview of the local body and projects are taken up.

3.3.3 Institutional STPs

A total of 1.87 MLD is being proposed to be treated in various local bodies.

3.3.4 Mobile Treatment Units

2 mobile treatment units are approved in the 2 rural local bodies worth Rs 0.91 Crores.

3.3.5 Biodigestors

A biodigester is a waste treatment system that uses microorganisms to break down organic matter, particularly human waste, in an anaerobic (oxygen-free) environment. Thirty-seven lakh rupees have been earmarked by Kollam Municipal Corporation for providing biodigester toilets to BPL houses near Ashtamudi Lake through Finance Commission Tied Grant. Panayam GP has proposed 105 numbers of biodigester costing Rs 1.05 Cr. Rs. 50,00,000/- (Fifty Lakhs) has been allocated through Development Fund of Kollam Municipal Corporation (Finance Commission Tied Grant) for the works of installing septic tank /biodigester replacing leach pits of individual wards. Coastal Panchayat of Karimkulam has installed 50 Biodigestors.

3.3.6 MGNREGS

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In regions earmarked for the establishment of Fecal Sludge Treatment Plants (FSTPs), it is imperative to implement a comprehensive strategy for the effective management of greywater. To address this crucial aspect of decentralized wastewater management, a total of 53,662 household-level soak pits, with an investment of Rs. 48.295 crore, have been strategically constructed. Simultaneously, 3,392 community-level Grey Water Management (GWM) systems have been implemented at a cost of Rs. 10.17 crore under MGNREGS & SBM G. These endeavors signify a significant financial commitment to ensuring the separate and efficient treatment of greywater in areas where FSTPs are anticipated. The construction of household-level soak pits and community-level GWM systems not only aligns with environmental sustainability goals but also contributes to the overall improvement of decentralized wastewater infrastructure, reinforcing the state's commitment to holistic and efficient sanitation practices.

3.4 Other Interventions by State

3.4.1 Water Quality Improvement

In the year 2018, there were 21 polluted river stretches in the state in different priority levels. Action plans were formulated for these polluted river stretches and are being implemented by Stakeholder departments. As a result of continuous efforts in control of pollution of water bodies the water quality has improved. As per CPCB report on Polluted River Stretches for restoration of water quality 2022, 11 river stretches were delisted from the list of polluted river stretches. 8 new river stretches were newly added, but at the lowest priority level. Total number of polluted river stretches is reduced to 18. Karamana river stretch (Priority I to III), Kadambayar (Priority IV to V), and Manimala (Priority IV to V) are shifted to lower priority, 2 rivers are added in priority IV and 6 rivers in priority V. As per the new list there is no river in Priority 1 and 2. On comparing the water quality data published by Kerala State Pollution Control Board for 169 stations in rivers for the months of August 2023 and November 2023, drastic reduction in faecal coliform in 111 stations have been observed; i.e., about 65.68% reduction.

3.4.2 Information Education Communication (IEC) Programs and Capacity Building (CB) Programs

The State has executed over 165 Information, Education, and Communication (IEC) and capacity-building (CB) programs throughout its regions, showcasing a concerted effort towards enhancing Liquid Waste Management (LWM) initiatives. Notably, districts in Kerala have adopted a comprehensive and diverse strategy to elevate LWM through the implementation of IEC programs and

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capacity-building initiatives.

697 elected representatives and officials visited operational Faecal Sludge Treatment Plants (FSTPs) and LWM facilities both within and outside the State in an attempt to reduce local resistance to such projects.

A rigorous campaign titled "Malam Bhootham" was launched to underscore the perils of faecal contamination and emphasize the imperative for immediate intervention.

The Liquid Waste Management Campaign, named "Thelineer Ozhukum Nava Keralam" conducted a community based analysis of water quality in various bodies, enabling the identification of pollution sources.

3.4.3 Prevention of Marine Littering

The Govt. of Kerala along with German Company Plastic Fischer, initiated the Trivandrum Project in 2022, aiming to combat marine plastic pollution. By deploying TrashBoom systems in the identified locations, Plastic Fischer successfully collected and managed a total of 257 tons of plastic material from rivers, riverbanks, and beach cleanups until the end of 2023. Plastic Fischer obtained the required government permits and deployed 18 TrashBoom systems. Out of the total collected plastic material, 12 tons of plastic were recycled while 245 tons of non-recyclable material were sent to co-processing at cement plants.

On 1 June 2023, "No More Beach Cleanups" was officially launched along the coastal line of city of Thiruvananthapuram in participation with GIZ to demonstrate behavioral change focused on awareness and action, beach cleanups, youth mobilization, community engagement and promotion of plastic alternatives in selected locations. In participation with GIZ, at 8 beach locations, 44 beach cleanup drives were conducted in Trivandrum involving 2831 volunteers and 11.15 tonnes of waste were removed.

Under the GIZ project, NCSCM joined hands in G20 beach clean-up. The clean-up drive was conducted at three beaches in Kerala-Trivandrum, Alappuzha, and Fort Kochi in Kerala (More than 500 volunteers across three beaches collected litter weighing around 1710 kg).

3.4.4 Lake Rejuvenation Projects by ULBs

For cleaning and upgrading the section from Manichithod to Ashtamudi Lake, a budget of Rs.1 Cr has been allotted. In addition to cleaning the canal, the project includes the installation of barricades at various places to prevent plastic waste

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from flowing in and the installation of nets on the side of the canal to prevent dumping of garbage. This work is in progress.

Rs. 50,00,000/- (Fifty Lakhs) has been allocated through Development Fund of Kollam Municipal Corporation (Finance Commission Tied Grant) for the construction of toilets and septic tanks on the banks of Ashtamudi Lake and other coastal areas.

Kollam Corporation along with 12 neighboring Panchayats have earmarked Rs. 4.20 Crores for Ashtamudi lake cleaning. This project includes cleaning, restoration and protection of various areas of the Kollam Corporation and nearby Panchayats on the banks of Ashtamudi Lake. This project is in progress. 48 jetties in the banks of Ashtamudi Lake have been cleaned under this project so far and 500 tonnes of garbage and 60 loads of plastic have been removed.

Reconstruction of modern jetties is in progress. This project will enable Ashtamudi Lake and its surroundings to regain its water quality.

3.5 Comparison of Status of projects filed in the first six month report.

The state has filed the first six month report on 16.08.2023 which showcases the projects worth 1276.12 Cr. As per the report submitted, there were 8 projects under construction, 39 projects in Approved and 74 projects as new proposals. Among the 8 under-construction projects, 5 projects got completed and commissioned, 2 projects are in the construction stage and 1 is yet to start. The status of other projects are described in the below table. A major drop has occurred in the case of new proposals due to concerns like severe local agitation and land issues as a result of which, 38 projects got dropped. But the state was able to identify another 41 new projects which came under various schemes. The new projects consist of Sewage Treatment Plants, STPs with Co-treatment facilities, FSTPs and MTUs.

Table 3.5 Status of projects submitted as per first six monthly report

Project Stage	No. of Projects reported	Current status of project
Under Construction	8	Completed – 5 Under construction – 2 Work not started – 1
Approved	39	Completed – 1 Under construction – 2

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		Agreement Executed (work to be started) – 2 Agreement to be executed – 1 Work to be awarded – 3 TS stage – 2 DPR stage – 13 Tender / Retender – 8 Approved – 1 Land Issues (Protest / NOC) – 5 Cancelled – 1
New Proposal	74	DPR stage – 1 AS Obtained – 7 Tender stage – 9 AS to be obtained – 8 Land issues (Protest / NOC) - 11 Dropped - 38

3.6 Conclusion

The compliance efforts undertaken by the State of Kerala towards addressing liquid waste management as mandated by the Hon. National Green Tribunal (NGT) Order 01.12.2022 in OA No.606/2018(PZ) are as follows:

- The State has ring-fenced Rs. 2343.18 Crore in liquid waste management.

Currently Projects worth Rs. 2067.32 Crore have been taken up in the State. State could formulate projects of around 88% of the ring-fenced amount within one year span. Additionally, an amount of Rs 452.30 cr has been committed through funds from other institutional sources including parastatls and special projects, which bring the total amount of committed funds for liquid waste management to Rs 2519.62 Cr. The details of these funds and the purpose of their utilisation are provided in the paragraphs above.

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- More than 26% of the allocated funds have been used to complete or partially establish the treatment systems.
- Projects worth over 24% are ongoing and progressing as planned.
- Remaining projects (over 50%) have been approved and implementation has commenced or will soon begin.
- AMRUT 1.0 & 2.0: Projects worth Rs. 836.54 Crore are underway to establish STPs, FSTPs, and sewer networks.
- Various Funds Used in ULBs: Institutional STPs, SBM (Urban), KMRL projects, O&M for treatment plants, MTU and biodigesters are being implemented with various funding sources.
- Smart City Mission and Kerala Water Authority Plan Fund are also contributing to infrastructure upgrades.
- Over 53,000 soak pits and 3,392 GWM systems have been constructed under MGNREGS & SBM G.

Overall, the State of Kerala has demonstrated significant progress in fulfilling its Hon.NGT-mandated obligations for liquid waste management. With ongoing and planned projects, the state will be able to attain 100 % sanitation coverage. Continued efforts to address challenges like land acquisition are crucial for ensuring the success of this initiative. The consolidated details of projects taken up for LWM so far out of the Ring fenced allocations are as below:

- AMRUT 1.0 - Rs. 345.55 Cr
- AMRUT 2.0- Rs.490.99 Cr
- ULB- Rs. 622.82 Cr
- SBM Grameen - Rs. 157.86 Cr
- PRI- Rs. 401.81Cr

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• MGNREGS- Rs. 48.29 Cr

Total :Rs 2067.32 Cr

This report presents the actions undertaken by the State of Kerala to improve solid as well as liquid waste management, as directed by the Hon. National Green Tribunal (NGT) Order dated 01.12.2022 in Original Application No. 606/2018(PZ). It outlines the progress made in bridging gaps in the mandated capacity, specific initiatives implemented in urban and rural areas, and other interventions aiming to improve solid and liquid waste management in the State.

Annexures

1. Remediation Completed Sites

SL.No	District	Name of Local body	Name of Location	Volume of Waste (in tonnes)
1	TVM	Thiruvananthapuram	Palayam market	4804
2	TVM	Thiruvananthapuram	Erumakuzhi, near chala market	900
3	KLM	Kollam	Kureepuzha	74053.44
4	KKD	Kozhikode	Kalliyi, ward-56, beside the river	10
5	PTA	Pathanamthitta	Near Mini stadium	250
6	PTA	Pandalam	Near RRF Unit	400
7	TSR	Guruvayoor	Choolpuram	13638
8	PLK	Pattambi	Shangaramangalam	1041.15
9	MLP	Perinthalmanna	Kunnappalli	200
10	KKD	Koyilandi	Below bridge	25
11	ERKM	Kalamassery	Kalamassery	35000
12	PTA	Adoor	Kaimalapara, Ward no. 2	500
13	KKD	Kozhikode	Njaliyan parabu	65000
14	TSR	Kodungalloor	Pullut, Chappara	30000
15	MLP	Malappuram	Near Inkel city, Ward 38, Puliyeetummal	32.5
16	MLP	Tirur	Trenching ground, Ottilathara	30
17	WYD	Kalpetta	Vellaramkunnu	18211
18	MLP	Manjeri	Vettekkode	2500

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2. Remediation Work in Progress

SL.No	District	Name of Local Body	Name of Location	Volume of waste(in tonnes)	Status of remediation
1	PLK	Ottapalam	Panamanna	10050	70% work completed in Phase-1 (CFC Tied grant). Remaining work started and is ongoing by MCK Kutty.
2	TVM	Attingal	Chudukad	9250	50% land cleared in Ist phase completed for 7800 m3. Second phase work order given
3	TSR	Chavakkad	Chavakkad	2105	98% work completed
4	ALP	Alappuzha	Sarvodayapuram	11250	Phase 1 completed, Phase II to be retendered
5	TSR	Thrissur	Laloor	19500	95% work completed
6	TSR	Kodungulloor	T.K.S. Puram	607	90% work completed
7	KNR	Kannur	Chelora	60161	60% work completed
8	ERKM	Kochi	Brahmapuram	150000	Restarted (12%)
9	KTM	Kottayam	Vadavathoor	40000	Started (10% completed)
10	KTM	Changanacherry	Fathimapuram	3650	Started
11	ERKM	Kothamangalam	Kumbalathumuri	12500	Started
12	KSGD	Kanhangad	Trenching Ground Chemmattamvayal	2803.5	Started

3. Remediation work about to start

SL.No.	District	Name of Local body	Name of location	Volume of waste (in tonnes)	Status of remediation
1	ALP	Kayamkulam	Murukkummoodu	3650	Work order issued
2	KNR	Iritty	Athithattu	1900	Work order issued
3	KNR	Kuthuparambu	Palapparamba	24500	Work order issued
4	TSR	Kunnamkulam	Kunnamkulam	8092	Work order issued
5	PLK	Palakkad	BPL Junction, Koottupatha	28500	Work order issued
6	KSGD	Kasaragod	Kelugudde	5612.5	Work order issued
7	IDK	Muvattupuzha	Kurianmala	18000	Work order issued

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8	IDK	Thodupuzha	Parakadavu	13000	Agreement executed. Yet to start
9	KNR	Mattannur	Karithurparamba	9800	Agency selected
10	TSR	Irinjalakkuda	Mangadikunnu, Porathissery	600	Agency selected
11	KNR	Thalassery	Punnoolpetty palam	28350	To be retendered
12	KTM	Erattupetta	Thevarrupara	38500	Retendered
13	IDK	Kattappana	Puliyanmala	3000	To be retendered
14	KNR	Payyannur	Moorikkovval	1312	Retendered

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