BEFORE THE HONOURABLE NATIONAL GREEN TRIBUNAL

SOUTHERN BENCH, CHENNAI

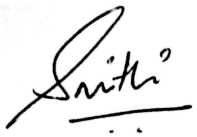
Original Application No.27 of 2021 (SZ)

Tribunal on its own motion Suo Motu based on the news item in The Hindu E-Paper, Edition dt. 28.01.2021, "Faecal contamination high in Perandoor, Edappally Canals" : Applicant(s)

Vs

The Principal Secretary to Govt. of Kerala, Environment Department & Ors. : Respondent(s)

REPORT FILED BY THE CHIEF ENVIRONMENTAL ENGINEER FOR AND ON BEHALF OF THE KERALA STATE POLLUTION CONTROL BOARD



Standing counsel for the 4th respondent

Rema Smrithi. V. K., Advocate
Additional Standing Counsel, National
Green Tribunal, (SZ), CHENNAI

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VOLUME – I

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Dated this the 26th day of April, 2025.

Rema Smrithi. V. K., Advocate

Standing Counsel for the 4th Respondent

BEFORE THE HONOURABLE NATIONAL GREEN TRIBUNAL

SOUTHERN BENCH, CHENNAI

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VOLUME – II

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Dated this the 26th day of April, 2025.

Rema Smrithi. V. K., Advocate

Standing Counsel for the 4th Respondent

BEFORE THE HONOURABLE NATIONAL GREEN TRIBUNAL

SOUTH ZONE, CHENNAI

Original Application No.27 of 2021 (SZ)

Tribunal on its own motion Suo Motu based on the news item in The Hindu E-Paper, Edition dt. 28.01.2021, "Faecal contamination high in Perandoor, Edappally Canals"	:	Applicant(s)

Vs

The Principal Secretary to Govt. of Kerala, Environment Department & Ors.	:	Respondent(s)

REPORT FILED BY THE CHIEF ENVIRONMENTAL ENGINEER FOR AND ON BEHALF OF THE KERALA STATE POLLUTION CONTROL BOARD

I, Baburajan P K, aged 53 years, am the Chief Environmental Engineer, Regional Office, Kerala State Pollution Control Board, Ernakulam. I am competent to and duly authorized to represent the 4th Respondent in the above application. I know the facts and circumstances of the case. The factual submissions made here under are true and correct to the best of my knowledge, information and belief. In these circumstances, it is just and necessary that this Hon'ble Tribunal may be pleased to accept the accompanying information on file and it is so humbly prayed in the interests of justice in this case.

BABURAJAN P.K.
Chief Environmental Engineer

1. NEERI had submitted a progress report on 25.02.2025 based on the three rounds of monitoring entitled "Feasibility Study on Development of Process Package for Treatment of Domestic Sewage (Edappally, Thevera-Perandoor, Patolithot and Valiyat Canals) to Meet Environmental Compliance". Copy of report is attached as **Annexure 1.**

2. NEERI officials had visited Edapally and Perandoor canal on 21st, 22nd and 23rd of March 2025. Samples were collected and sent to NEERI lab at Nagpur for further analysis. NEERI has also requested for secondary data from stakeholder departments for completion of their report. In the light of this, a meeting was again conducted by the Board on 22.03.2025 with participants from CSIR-NEERI, Kalamassery Municipality, Thripunithura Municipality, Kochi Corporation, Major Irrigation Section Thripunithura and Minor Irrigation Section II, Ernakulam. Accordingly, the concerned authorities were again requested to provide the available secondary data. Copy of Minutes of the meeting is attached as **Annexure 2.**

3. It is humbly submitted that the matter is being followed up to get the final report done through CSIR-NEERI, in compliance with the order of Hon'ble NGT.

All that is stated above are true to the best of my knowledge information and belief.

Dated this the 25th day of April, 2025.

BABURAJAN P.K.
Chief Environmental Engineer

Chief Environmental Engineer

Urgent AEE1

From: "Pravin Manekar" <p_manekar@neeri.res.in>
To: "Sheela A.M" <ms.kspcb@gov.in>, pcbhorules2024@gmail.com
Cc: "Ritesh Vijay" <r_vijay@neeri.res.in>, "DIRECTOR NEERI" <director@neeri.res.in>, "S Venkata Mohan" <mohan.sv@neeri.res.in>, "Padma Rao" <ps_rao@neeri.res.in>
Sent: Tuesday, February 25, 2025 1:26:23 PM
Subject: Submission of the Rrogress Report-II

Ma'am,

Kindly find the attached Letter and Progress Report-II based on the three rounds of monitoring entitled “Feasibility Study on Development of Process Package for Treatment of Domestic Sewage (Edappally, Thevera-Perandoor, Patolithot, and Valiyat Canals) to Meet Environmental Compliance” for your kind perusal and comments, please.

Looking forward to your earliest response in this matter.

Thank you, and warm regards,

Pravin Manekar
Senior Principal Scientist
Wastewater Management -Sub-vertical : 3B
CSIR-National Environmental Engineering Research Institute
Mobile No. 09423404128

सी. एस. आय. आर. - राष्ट्रीय पर्यावरण अभियांत्रिकी अनुसंधान संस्थान
CSIR - National Environmental Engineering Research Institute
नेहरू मार्ग, नागपुर - ४४० ०२०, महाराष्ट्र, भारत Nehru Marg, Nagpur 440 020, Maharashtra, India
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Email/Speed Post

WWM/PM/ KSPCB/11
February 25, 2025

To,
The Member Secretary,
Kerala State Pollution Control Board (KSPCB)
Pattom, P.O., Thiruvananthapuram- 695 004

Sub: Submission of the Progress Report-II.

Ma'am,

This is in reference to your Email dated February 20, 2025, requesting to submit the Progress Report. Kindly find herewith the Progress Report-II based on the three rounds of monitoring entitled "Feasibility Study on Development of Process Package for Treatment of Domestic Sewage (Edappally, Thevera-Perandoor, Patolithot, and Valiyat Canals) to Meet Environmental Compliance" for your kind perusal and comments, please.

Looking forward to your earliest response in this matter.

Thank you, and warm regards,

Copy Encl.: Progress Report-II

Your's Sincerely

Pravin Manekar

Progress Report-II

Feasibility Study on Development of Process Package for Treatment of Domestic Sewage (Edappally, Thevara-Perandoor, Patolithot and Valiyat Canals) to Meet Environmental Compliance

Sponsor

Kerala State Pollution Control Board (KSPCB), Thiruvananthapuram

CSIR-National Environmental Engineering Research Institute
Nehru Marg, Nagpur – 440 020

February 2025

Content

Progress Report-II

Feasibility Study on Development of Process Package for Treatment of Domestic Sewage (Edappally, Perandoor, Patolithot and Valiyat Canals) to Meet Environmental Compliance

1.0 Preamble

The Thevara-Perandoor &, Edappally and, Patolithot, &Valiyat canals situated in Ernakulam and Kollam Districts, respectively, played a diverse benefit of transport, recreational opportunities, regeneration benefits, irrigation, fishing and drainage services, etc. However, due to the increase in population and the build-up of infrastructure in the Ernakulam and Kollam Districts, these canals have been converted into drains. The canal/drain carries stormwater and domestic sewage, including solid waste from different municipalities, through point and nonpoint sources. Therefore, Kerala State Pollution Control Board (KSPCB), Thiruvananthapuram, requested vide letter [No. PCB/HO/EE3/ O.A/ No.27 / 2021 (SZ)/ 2021] dated May 08, 2023, regarding the site visit of two experts for the above-mentioned canals to examine the feasibility of the Phytorid Wastewater Treatment Technology or any other similar technology for liquid waste management and submit the site visit report.

Accordingly, a two-member team from CSIR-NEERI, Nagpur, and officials of different Departments of Kerala visited the concerned sites during May 11-13, 2023. During this visit, locations of Canal/Drain/Nallah/River/Lake were identified, which carry untreated domestic wastewater as well as solid and plastic wastes from different locations or Municipal areas. Based on the site visit and preliminary discussions with the officials of KSPCB and different Government departments, the Site Visit Report based on observations also way forward for managing the discharge of untreated domestic sewage/septage, and effluent from the respective Municipalities, houseboats, and prawn peeling industries into different water bodies was submitted to the KSPCB, Thiruvananthapuram on May 30, 2023. Thereafter, based on the CSIR-NEERI's Site Visit Report, KSPCB requested CSIR-NEERI, Nagpur vide letter [No. PCB/HO/EE3/OA. No. 27/2021(SZ)/2021] dated July 04, 2023, to submit the Project Proposal with the scope of the work and financial budget. The Project Proposal for a feasibility study for developing a process package for domestic sewage to meet Environmental Compliance was submitted to KSPCB on July 28, 2023.

Lateral, the Member Secretary of the KSPCB requested through email, dated August 23, 2023, to submit a proposal for a feasibility study on the development of a process package for domestic sewage to meet environmental compliance for two sites, Patolithot and Valiyat Canals discharging sewage into Pallikalar River and Edappally and Thevara Perandoor canals. Accordingly, CSIR-NEERI submitted the proposal and subsequently issued a work order to conduct a feasibility study on developing a process package for treating domestic sewage of Edappally, Thevara Perandoor, Patolithot, and Valiyat canals to meet environmental Compliance.

2.0 Study Area

The study area lies in the Ernakulam and Kollam districts of Kerala State. The base map of the study area is prepared based on Survey of India topo sheets [Nos. 58B/4, 58B/10, and 58C/5] for Ernakulam and Kollam 58C/12 districts and the digital information received from KSPCB shown in **Figures 1 & 2**, respectively. The Edappally canal and Thevara-Perandoor canal (TPC) is situated in the Ernakulam district. The length of the Edappally canal is approximately 12 km, which originates from the Periyar River and the confluence with the Chambakkara canal. Both canals receive stormwater and domestic sewage from different Municipalities and are discharged into different water bodies (**Figure 1)**. The Patolithot and Valiyat canals are situated in the Kollam districts, which also receive stormwater and domestic sewage from the Karunagapally Municipality area and finally discharged into the Pallikalar River (**Figure 2)**.

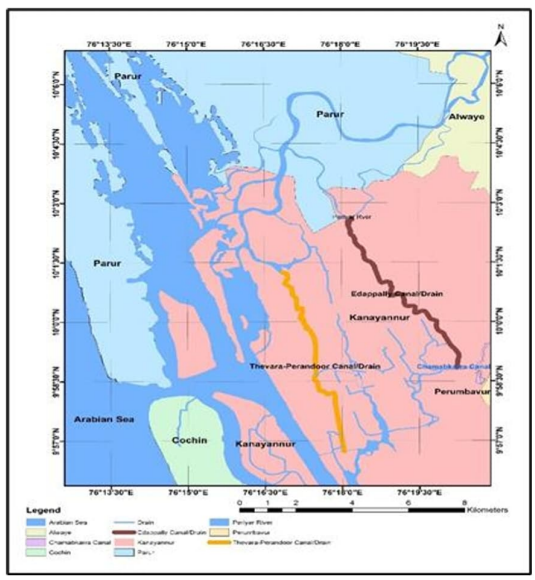

Figure 1: Base map of Edappally and Thevara-Perandoor (TP) Canals/Drain

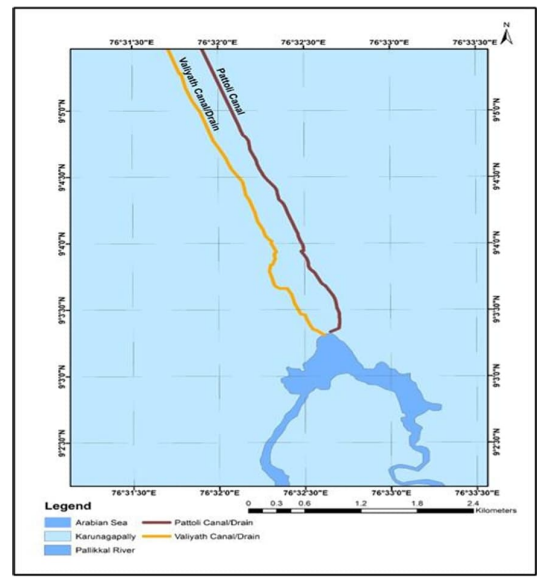

Figure 2: Base map of Patolithot and Valiyat Canals/Drain

3.0 Site Observations/ Infrastructure Facility

The study area comprising Ernakulam and Kollam districts of Kerala State was undertaken to identify the existing infrastructure facilities available for conveyance, collection, treatment, and disposal of the domestic sewage and fecal sludge generated from the abovementioned area. The following are site-specific observations of the Edappally, Thevara-Perandoor canals situated in Ernakulam District and Patolithot and Valiyat canals located in Kollam District:

- The aerial length of the Edappally canal is approximately 12 km, which originates from the Periyar River and the confluence with the Chambakkara canal. The configuration of the canal throughout its length is not uniform in terms of width and depth. There is the tidal effect in the canal, which allows the flow of water/wastewater in both directions. The main purpose of the canal was navigation and trading. Presently, it carries stormwater and domestic sewage generated from the Kochi Municipal Corporation (KMC) area.
- The Edappally canal passing adjacent to Lulu Mall was found covered with water hyacinth at the top surface and sludge deposited at the bottom. Therefore, monitoring the flow and collecting the wastewater samples was difficult. However, the sample collection and flow monitoring were shifted to 40m upstream from the bridge near the Lulu Mall.
- Fish harvesting by the local people was carried out during monitoring near the confluence of Edappally and Chambakkara canals.
- The Thevara-Perandoor canal (TPC) originates between the interconnection of the Thevara canal, and at approximately aerial distance of 9.83 km downstream, the canal is the confluence with the Perandoor canal within Kochi City. This canal was previously used for business purposes, namely, navigation and trading. The configuration of the canal throughout its length is not uniform. The tidal effect in the canal allows the flow of water/wastewater in both directions. Presently, it carries stormwater and domestic sewage generated from KMC area.
- As per the secondary data received from the Minor Irrigation Central Circle, Ernakulam, the catchment area of the TPC is ~30 sq.km. which gets the stormwater and domestic sewage from 1.15 km from both sides of the canal for a total length of 9.95 km, width of 15 m, and depth of 3 m.

- The three existing sewage treatment plants (STPs) that were visited during the second round of monitoring are located near the TPC. Out of three STPs, one STP with 0.45 MLD capacity is situated in Ward No. 67 (Ernakulam North) on the Eastern side of the TPC, and two STPs of 5 and 0.75 MLD are located in Ward 54 (Ernakulam) and 39 (Dhevankulangara), respectively, on the Western side of the TPC.
- The 5 MLD STP installed at the Kerla Water Authority site at Elamkulam in Kochi covers five divisions such as Elamkulam (54), Kadavandra (57), Eranakulam South (62), Gandhi Nagar (63), and Eranakulam Central (66). The STP covers a present population of 30000, and the treatment plant benefits a projected population of 41000. The treatment scheme of 5 MLD STP comprised a screen, grit chamber, equalization basin, and moving bed bioreactor I&II followed by the secondary clarifier. The clarified effluent is routed to the pressure sand filter and activated carbon column and finally disinfected. The final treated sewage from this STP is being discharged into the Chettithara Cana. The secondary sludge is thickened in a gravity thickener followed by a centrifuge for dewatering.
- During the site visit, it was informed that the existing 5 MLD STP was operated at 50 percent of its capacity. An additional 2.5 MLD sewage can be accommodated for operating the STP at full capacity.
- The unit operations and processes of 0.45 MLD of M/s Greater Cochin Development Authority (GCDA), Marine Drive, Kochi, comprised of the screen, grit chamber, and collection tank. The preliminarily treated sewage is subjected to the activated sludge process followed by the pressure sand filter and activated carbon column. The details of the ward covered with population by the 0.45 MLD STP will be required for assessing and excluding a new proposed sewage treatment plant.
- Another STP of 0.75 MLD of M/s GCDA, near International Stadium Kaloor, comprises a screen, oil, grease trap, and equalization basin followed by the moving bed bioreactor, flash mixer, flocculator, and secondary clarifier. The biologically and chemically treated sewage is subjected to a pressure sand filter and activated carbon column. The details of the ward covered with population by the 0.75 MLD STP will be required for assessing and excluding a new proposed sewage treatment plant.
- There is no sewage treatment plant to treat sewage that is being discharged from the different areas into the Edappally canal. However, the secondary data received

from KSPCB, the domestic sewage, septage, and industrial effluent generated from Ernakulam city is treated in the four sewage treatment plants (STPs), two fecal sludge treatment plants (FASTs), and three common effluent treatment plants (CETPs), respectively. The details of the existing STPs, FASTs, and CETPs with hydraulic flow capacity are presented hereunder:

Sr. No	Treatment facility	Process	Capacity, MLD
Sewage treatment Plants (STPs)			
1.	STP owned by Greater Cochin Development Authority, Marine Drive, Kochi (0.45 MLD)	Activated Sludge Process (ASP)	0.9
2.	STP at Elamkulam, Kochi (AMRUT-1.0)	Moving bed bioreactor (MBBR)	5
3.	STP is owned by GCDA, International Stadium Kaloor	Activated Sludge Process (ASP)	0.75
4.	STP at Kalamassery, Market, Kalamassery Municipality (PRS)	-	10
Fecal sludge treatment plants (FASTs)			
3.	Septage Treatment Plant at Brahmapuram, Kochi Corporation, Ernakulam	Moving bed bioreactor (MBBR)	0.1
4.	Septage Treatment Plant at Wellington Island, Kochi Corporation	Moving bed bioreactor (MBBR)	0.1
Common effluent treatment plants (CETPs)			
5.	CETP at Kinfra Small Industries Park Nellad, Mazhuvanoor	-	0.4
6.	CETP at Rubber Park India Private Limited (New Plant Valayanchirangara, Ernakulam	-	0.25
7.	CETP at CSEZ, Kakkanad, Cochin Special Economic Zone, Ernakulam	-	1

Source: Kerala Stata Pollution Control Board, Trivandrum.

- The details of the above-mentioned STP, FSTP, and CETP, along with the ward and its population, are required to assess the existing capacity operating capacity and an additional flow of sewage that STP and FAST can accommodate for the treatment of sewage and septage.
- Patolithot and Valiyat canals carry stormwater and untreated domestic sewage from the inhabitants of the Karunagapally Municipality area, which is finally discharged into the Pallikalar River. The configuration of both canals, as monitored, is not uniform in terms of width and depth. During the monitoring, the septic condition and water hyacinth were also observed. Some portion of the canals at the top was also covered with concrete slabs.

- As per the KSPCB, Kollam households have been facilitated with the septic tank, and its overflow is discharged into the canal. This indicates that there is no sewerage system or sewage treatment plant to carry and treat domestic sewage generated by households. Therefore, the sewage is discharged into the above-mentioned canals.

4.0 Secondary Data Received from KSPCB

The secondary data received from the Kerala State Pollution Controlled Board (KSPCB), Trivandrum, has been critically reviewed for water requirement, domestic sewage generation, existing treatment facility, population, desilting of the canals, and a project in the pipeline for cratering the domestic sewage generated including the maps of the study area. The review of the secondary data is as follows:

- The review of details provided by the Kerala Water Authority (KVA), Jalabhava, Thiruvananthapuram, are as follows:
  - The raw water sources of Kochi Corporation are the Periyar River (Aluva) and the Moovattupuzha River. Aluva and Maradu water treatment plants (WTPs) supplied treated water to the Kochi Corporation. Kochi Corporation's water supply demand for the year 2024 is 270 MLD. In addition to the existing water supply, the Kerala Water Authority has proposed a new 190 MLD WTP at Aluva. However, the corporation can supply 65 percent of the total demand (210 MLD), and the remaining 35 percent is lost due to water supply through the old conveyance system.
  - Sewage generated from the Kochi Corporation area is connected to the sewerage collection network, which is approximately 28 km long. Some portion of the sewage is received and treated in the 5, 0.75, and 0.45 MLD sewage treatment plants, respectively. However, as per KWA 161.8 MLD sewage finds its way to the different water bodies, finally reaching the Arabian Sea.
  - M/s Kochi Metro Rail Ltd, as a part of canal rejuvenation (Thevera-Perandoor Canal, Chilavannoor Canal, and Edappally Thodu), has designed a sewerage collection network and STPs (at Elamkulam, Vennala, Muttar and Perandoor) and the DPR for the same has already been submitted. The left-out area of the Kochi Corporation has been taken by KWA, and the DPR for the same has already been submitted. The capacity of the proposed STP is not mentioned.

- The details provided by the Suchita Mission, Local Self-Government, Government of Kerala are as follows:
  - Details of the entire Ernakulam and Kollam District population have been provided. However, the population of the wards coming under the watershed Edappally, Thevara-Perandoor, Patolithot, and Valiyat canals is required. The list of the population in the ward of the watershed of the Edappally, Thevara-Perandoor, canals is handed over to the officer of KSPCB, Ernakulam.
  - Six STPs have been proposed, and one STP is ongoing for Ernakulam District. The status of the ongoing and proposed sewage treatment plants (STPs) in Ernakulam District is hereunder:

S.N.	Agency	Project Name	Capacity	Status
Ongoing STP				
1.	AMRUT	Ambedkar colony	1.1	Work in progress. Physical progress 41%. Civil works of the plant are expected to be completed by 30.11.2024.
Proposed STP				
2.	AMRUT	Elamkulam	5 with 24 KLD Co-treatment	KWA split the work into 5 sub-works and issued TS. TS of the STP is being revised by KWA. Tender to be floated by KWA for the STP & network packages. Expected to be tendered by 31.10.2024.
3.		Ray Flats Fort Kochi	0.105	MoHUA's approval was received on 01.10.2024. DPR of the project to be submitted by the ULB for placing in the SLTC / SHPSC for approval of AS. DPR is expected to be submitted by 26.10.2024.
4.	IMPACT	Cochin Marine Drive	2	Awaiting KIIFB approval
5.		Life Mission Site	1	
6.		Kaloor Market	0.25	
7.		Kadavanthra Market	0.03	

Source: Suchita Mission, Local Self-Government, Government of Kerala.

  - Two STPs are ongoing for Kollam District. The status of the ongoing sewage treatment plants (STPs) in Kollam District is hereunder:

S.N.	Agency	Project Name	Capacity	Status
Ongoing STP				
1.	AMRUT	Kureepuzha	12 with 50 KLD Co-treatment	work in progress. Physical progress -90%. In the meeting held on 19.09.2024 at the Kollam Corporation by the Hon'ble Minister of LSGs, the KWA was directed to complete the STP works by 31.10.2024 so that the inauguration of the STP can be done on 01.11.2024.
2.	IMPACT	Mayyanad	0.59	Work in progress.

Source: Suchita Mission, Local Self-Government, Government of Kerala.

The locations and coordinates of the ongoing and proposed sewage treatment plants at Ernakulam and Kollam Districts are required. This will help to identify whether these STPs come under the watershed of the four Edappally, Thevara-Perandoor, Patolithot, and Valiyat canals. This will aid in making the decision to propose the new sewage treatment plants within the study area.

5.0 Water Quality Assessment (First and Second Rounds of Monitoring)

In order to assess the water quality of the four canals, an extensive water quality survey of these canals, in flow drains to the canals, and Rivers was carried out during April and October 2024. For this purpose, sampling locations were identified in consultation with KSPCB, the topography and hydrogeology of the area, and the secondary information available.

The physicochemical characteristics of the Thevara-Perandoor, Edappally, Patolithot, and Valiyat canals and drains discharging into the canals during two rounds of monitoring (April and October 2024) were low in organics, inorganic, and nutrients and thus classified as low-strength. The heavy metal analysis of these water samples indicates below the detectable limit or present in extremely low concentrations. The analysis data reveals that the third round of monitoring is essential to get a broader scenario of the study area. Justification for a third round of monitoring is detailed in the next Section.

6.0 Third Round of Monitoring

The third round of monitoring comprises flow measurement and on-site monitoring of physical parameters of collected samples from different water bodies and was

conducted from February 6-13, 2025. The monitoring was done to determine its water/wastewater quality and quantity and to identify various issues of the canals. The onsite flow measurement of different canals was carried out with an area velocity flow meter. The grab samples were collected from different locations of the five significant canals, namely Edappally, Thevara-Perandoor, Patolithot, and Valiyath and Chambakkara canals, including incoming drains of these canals and water bodies, such as the Periyar and Pallikalar Rivers.

All the samples were placed directly into acid-rinsed polyethylene bottles without any filtration. Onsite measurements of pH, temperature, and dissolved oxygen were done. Samples preservation was performed immediately after sample collection. All other analyses were performed at CSIR-NEERI, Nagpur. The samples were preserved, processed, and analyzed according to standard Methods for the Examination of Water and Wastewater, 22nd. Ed., American Public Health Association, American Water Works Association, & Water Environment Federation, Washington, DC, 2012 (APHA 2012).

6.1 Water Quality Monitoring

The sampling locations were identified considering the probable locations of the four canals concerning the incoming drain to the canals. The samples collected from the Periyar and Pallikalar Rivers, Chambakkara, Edappally, Thevara-Perandoor, Patolithot, and Valiyat canals, and drain discharging into the canals during three rounds of monitoring are delineated hereunder.

Sr. No.	Rivers/canals	Sample collected within River and Canal	Darin discharged into the canal
1.	Periyar River	1	-
2.	Pallikalar	1	-
3.	Chambakkara canal	1	-
4.	Edappally canal	8	7
5.	Thevara-Perandoor	8	5
6.	Patolithot canal	10	2
7.	Valiyat canal	9	-
		38	14
Total sample: 52			

- No incoming drain to canal or river

The details of the sampling locations, along with coordinates of the Periyar & Pallikalar Rivers, Chambakkara, Edappally, Thevara-Perandoor, Patolithot, and Valiyat canals, including incoming drains to the canals, are presented in **Table 1**.

Table 1: Details of the sampling location of Periyar and Pallikalar River and Chambakkara, Edappally, Thevara-Perandoor, Patolithot, and Valiyat canals

S.N.	Sample ID	Particulars	Latitude (N)	Longitude (E)
Periyar River (PR)				
1.	PR-01	Located at 10 m upstream of the confluence of the Edappally Canal and Pariyar River and 50 m from the starting point of EC-01 of the Edappally canal.	10° 2'36.71"	76°18'11.51"
Edappally Canal (EC)				
2.	EC-01	Located at 30 m downstream of the confluence of the Periyar River and Edappally canal near Muttar Kadava Road.	10° 2'36.01"	76°18'12.08"
3.	DoEC-01	Drain from Muttar, Vattekunnam, Eddappally, located at 7.60 m downstream of the EC-01 and 36.0 m downstream of the confluence of the Periyar River and Edappally canal.	10° 2'35.86"	76°18'12.26"
4.	EC-01A	Located at 0.18 km downstream of the EC-01 and 0.19 km downstream of the confluence of the Periyar River and Edappally canal near Mr. K.A. Akber, Kattilaparambil House.	10° 2'32.32"	76°18'9.16"
5.	DoEC-01A	Located at 40 m downstream of the EC-01A and 0.23 km downstream of the confluence of the Periyar River and Edappally canal.	10° 2'30.60"	76°18'16.10"
6.	EC-02	Located at 2.0 km downstream of the EC-01A and 40 m upstream of the bridge near Lulu Mall.	10°1'36"	76°18'26"
7.	DoEC-02A	Located at 0.41 km downstream of the EC-02 and 2.61 km downstream of the confluence of the Periyar River and Edappally canal, near PMRA/15A, Paruthelil lane, Kalamasserv.	10°1'29.41"	76°18'37.41"
8.	EC-02A	Located at 0.13 km downstream of the DoEC-02A and 2.74 km downstream of the confluence of the Periyar River and Edappally canal, Near Marottichuvadu Thoppil Road.	10° 1 '23.49"	76°18'37.86"
9.	EC-03	Located at 0.36 km downstream of the EC-02A and 3.12 km downstream of the confluence of the Periyar River and Edappally canal.	10° 1'11.97"	76°18'40.48"
10.	EC-04	Located at 1.90 km downstream of the EC-03 and 4.02 km downstream of the confluence of the Periyar River and Edappally canal.	10° 0'38.64"	76°19'11.19"
11.	DoEC-04A	Located at 1.36 km downstream of the EC-04 and 5.38 km downstream of the confluence of the Periyar River and Edappally canal.	10° 0' 17 .11"	76°19'33.06"
12.	DoEC-04B	Located at 1.41 km downstream of the EC-04 and 5.84 km downstream of the confluence of the Periyar River and Edappally canal, near KRA/21, MK lane.	10° 0'22.25"	76°19'34.74"
13.	DoEC-04C	Located at 1.65 km downstream of the EC-04 and 6.46 km downstream of the confluence of the Periyar River and Edappally canal, near Moolepadam Padamugal Road.	10° 0'12.20"	76°19'46.46"

14.	EC-05	Located at 2.12 km downstream of the EC-04 and 6.77 km downstream of the confluence of the Periyar River and Edappally canal.	9°59'58.66"	76°19'50.17"
15.	DoEC-05A	Located at 1.35 km downstream of the EC-05 and 8.12 km downstream of the confluence of the Periyar River and Edappally canal, near Moolepadam Padamugal Road.	9°58’.51"	76°20'14"
16.	EC-06	Located at 2.38 km downstream of EC-05 and 0.1km upstream of the Chambakkara canal.	9°58'51"	76°20'14"
Chambakara River				
17.	CHR-01	Located at 0.38 km eastern side of the EC-03.	9°58'50.51”	76°20'22.68"
Thevara-Perandoor Canal/Drain (TPC)				
18.	TPC-01	Located at 0.1 km upstream of the interconnection of the Thevara Canal near the Thevara Railway line.	9°56’46”	76°18’1”
19.	DoTPC-02	Located at 0.81 km upstream of the interconnection of the Thevara Canal near the Thevara Railway line and 0.71 km from TPC-01.	9°57'9.71"	76°17'56.96"
20.	TPC-02	Located at 0.91 km upstream of the interconnection of the Thevara canal near the Thevara Railway line and 0.1 km upstream of DOTPC-02.	9°57'12.21"	76°17'57.62"
21.	DoTPC-03	Located at 1.86 km upstream of the interconnection of the Thevara canal near the Thevara Railway line and 15 m upstream of TPC-02.	9°57'44.38"	76°17'53.39"
22.	TPC-03	Located at 1.92 km upstream of the interconnection of the Thevara Canal near the Thevara Railway line and 50m upstream of DOTPC-03.	9°57'45.61"	76°17'53.28"
23.	TPC-04	Located at 3.06 km upstream of the interconnection of the Thevara canal near the Thevara Railway line and 1.14km upstream of TPC-03.	9°58’11”	76°17’41”
24.	DoTPC-04	Located at 3.078 km upstream of the interconnection of the Thevara canal near the Thevara Railway line and 15.8 m upstream of TPC-04.	9°58'11.42"	76°17'41.69"
25.	TPC-05	Located at 4.87 8km upstream of the interconnection of the Thevara canal near the Thevara Railway line and 1.80 km upstream of D0TPC-04.	9°58'58.67"	76°17'28.35”
26.	TPC-06	Located at 6.278 km upstream of the interconnection of the Thevara canal near the Thevara Railway line and 1.40 km upstream of TPC-05	9°59’43”	76°17’24”
27.	TPC-07	Located at 7.02 km upstream of the interconnection of the Thevara canal near the Thevara Railway line and 1.43 km upstream of TPC-06	10° 0'16.15"	6°17'14.23"
28.	DoTPC-07	Located at 7.721 km upstream of the interconnection of the Thevara canal near the Thevara Railway line and 12.5 m upstream of TPC-07	10° 0'16.53"	76°17'14.19"

29.	TPC-08	Located at 9.83 km downstream of the interconnection of the Thevara canal near the Thevara Railway line and 2.11 km upstream of DoTPC-07	10° 1'12.22"	6°16'55.86"
30.	DoTPC-08	Located at 9.93 km downstream of the interconnection of the Thevara canal near the Thevara Railway line and 60m upstream of TPC-08	10° 1'12.65"	76°16'57.69"
Pallikalar River (PKR)				
	PKR-01	Located at 0.5 km downstream of PC-01.	9° 3'4.28"	76°32'45.02"
Patolithot Canal/Drain (PTC)				
31	PTC-01	Located at 0.1 km upstream of the Pallikal River.	9° 3'20.01"	76°32'38.72"
32.	DoPTC-01	Located at 0.25 km upstream of the PC-01.	9° 3'22.45"	76°32'43.12"
33.	PTC-02	Located at 0.9 km upstream of the Pallikal River	9° 3'41.48"	76°32'36.39"
34.	PTC-03	Located at 1.7 km upstream of the Pallikal River	9° 4'8.31"	76°32'26.05"
35.	PTC-04	Located at 2.9 km upstream of the Pallikal River.	9° 4'42.39	76°32'11.10"
36.	PTC-05	Located at 3.4 km upstream of the Pallikal River.	9° 4'55.62"	76°32'6.25"
37.	PTC-06	Located at 3.75 km upstream of the Pallikal River.	9° 5'5.22"	76°32'5.40"
38.	PTC-07	Located at 5.17 km upstream of the Pallikal River.	9° 5'49.22"	76°32'5.29"
39.	PC-08	Located at 6.07 km upstream of the Pallikal River.	9° 6'12.41"	76°32'16.62
40.	DoPTC-09	Located at 6.135 km upstream of the Pallikal River.	9° 6'14.63"	76°32'16.55"
41.	PTC-09	Located at 6.15 km upstream of the Pallikal River.	9° 6'14.63"	76°32'16.55"
42.	PTC-10	Located at 7.30 km upstream of the Pallikal River.	9° 6'49.10"	76°32'17.20"
Valiyath Canal/Drain (VC)				
43.	VC-01	Located at 0.1 km upstream of the Pallikal River.	9° 3'25.04"	76°32'30.56"
44.	VC-02	Located at 0.75 km upstream of the Pallikal River.	9° 3'38.09"	76°32'23.61"
45.	VC-03	Located at 1.10 km upstream of the Pallikal River.	9° 3'46.10"	76°32'17.59"
46.	VC-04	Located at 1.30 km upstream of the Pallikal River.	9° 3'51.00"	76°32'19.00"
47.	VC-05	Located at 1.80 km upstream of the Pallikal River.	9° 4'8.17"	76°32'14.20"
48.	VC-06	Located at 3.0 km upstream of the Pallikal River.	9° 4'38.76"	76°32'2.30"
49.	VC-07	Located at 3.5 km upstream of the Pallikal River.	9° 4'52.67"	76°31'55.76"
51.	VC-08	Located at 4.6 km upstream of the Pallikal River.	9° 5'24.78"	76°31'43.70"
52.	VC-09	Located at 5.88 km upstream of the Pallikal River.	9° 6'0.98"	76°31'26.53"

7.0 Meeting and Discussions with KSPCB

The meeting was held between the officers of Kerala State Pollution Control Board, Ernakulam, Kollam, and Trivandrum, and CSIR-NEERI, Nagpur on February 7, 11, and 13, 2025, respectively, to discuss the third round of monitoring, collection of secondary data, and the way forward for the finalization of the report. The list of the required Kochi wards in the study area of Thevara-Perandoor and Edappally canals was handed over to the officer. This data will help to forecast the population and determine the hydraulic load for the proposed sewage treatment plants.

The meeting was also held between CSIR-NEERI, Nagpur, and various stakeholders, such as the Karunagapally Municipality, the Revenue Department, and the Statistical Department, including the Kerala State Pollution Control Board (KSPCB) Kollam, on February 12, 2024, for the collection of secondary data. The officers of Karunagapally Municipality informed us that the Detailed Project Report (DPR) for the proposed Faecal Sludge Treatment Plant of the 25 KLD is in the final stage of preparation. He agreed to email the soft copy of the DPR, administrative boundary and ward maps, and the population data of the study area (Valiyat and Patolithot) within a week. Secondary data from the office of Karunagapally Municipality has not been received till date. Revenue Department, Karunagapally WhatsApp sketches of the canals under review. The officer of the Statistical Department, Karunagapally, handed over the population data (2024) of the nearby wards of the canals, which is also under review.

8.0 Secondary Data Required for Final Report Preparation

The following are the secondary data needed from the KSPCB for report finalization:

- The water flow data from the irrigation department at different locations of the four canals, Edappally, Thevara-Perandoor, Patolithot, and Valiyat.
- Watershed maps of the three canals, Thevara-Perandoor, Patolithot, and Valiyat, and the wards under the watersheds.
- Population data of the ward coming under the watersheds of the four canals.
- Details of the space available under Government Bodies for constructing the new proposed STPs for treating the incoming and flowing wastewater from the identified canals/drains.

- Details of identified four canals/drains concerning depth, width, length, and wastewater flow.
- Details of 0.45 and 0.75 MLD sewage treatment plants, ward covers, and population.
- Details of the proposed sewage treatment plants within the study areas.

9.0 Activity Completed and Work in Progress

9.1 Activity Completed

The following activities of the work are completed for finalization of the report:

- Identification of the approachable and bigger size of the drains discharging into the Thevara-Perandoor, Edappally, Patolithot, and Valiyat canals.
- Identification of the origin or starting and end point of the Thevara-Perandoor, Edappally, Patolithot, and Valiyat canals. Delineation of the study area maps of the four canals.
- Three rounds of monitoring of the canals and drains discharged into the canals.
- Physicochemical, bacteriological, and heavy metals analysis of the collected water samples during the two monitoring rounds from the identified location of Thevara-Perandoor, Edappally, Patolithot, and Valiyat canals and drains discharging into the canals.
- Review of secondary data received from KSPCB before the third monitoring round.

9.2 Work in Progress

The following activities of the work in progress for report finalization:

- Physicochemical, bacteriological, and heavy metals analysis of the collected water samples during the third round of monitoring from the identified location of Thevara-Perandoor, Edappally, Patolithot, and Valiyat canals and drains discharging into the canals.
- Assessment of the existing and proposed sewage treatment plant concerning the capacity to accommodate the additional hydraulic load from the study area.
- The preparation/ delineation of the watershed and drainage maps of the four canals, along with the wards under these watersheds.
- Review and analysis of the secondary data received from the stakeholders during the third monitoring round. The information/ data on some maps, administrative

boundaries, contour maps, and flow data of the water bodies are still awaited from the stakeholders.

- Conceptual framework for pollution abatement plan for the four canals of the study area.
- Delineation of the treatment schemes for treating wastewater discharging into the Thevara-Perandoor and Edappally canals through drains and treatment schemes for wastewater flowing into the Patolithot and Valiyat canals.

10.0 Future Course of Work

Hydraulic flow and design characteristics (based on three monitoring rounds) for the proposed treatment schemes.

- Basic engineering design of the proposed treatment scheme for sewage treatment plant. Tentative cost estimate for the proposed treatment scheme.
- Recommendations/suggestions to improve the four canals' water quality.
- Project implementation strategy and schedule for Ex-situ treatment.

KSPCB, Trivandrum is required to provide the secondary data to consider the future course of work for the preparation and finalization of the report.

Minutes of the meeting convenend by Board on 22/03/2025 in connection with study conducted by NEERI for rejuvenation of Thevara-Perandoor & Edapally Canals (OA 27/2022) at Kerala State Pollution Control Board, District Office -1, Ernakulam.

The meeting started at 11.00 AM.

The meeting was convened by Smt. Sreelakshmy P.B., Environmental Engineer, District Office -1, Ernakulam. The list of participants attended the meeting is as follows:

1) Smt Sreelakshmy P.B, Environmental Engineer, KSPCB
2) Dr. Pravin Manekar, Sr. Principal Scientist, CSIR-NEERI
3) Sri Aswin V Panikar, Assistant Engineer, KSPCB
4) Smt. Parvathy K S, Assistant Engineer, KSPCB
5) Sri Syed Mohammed Saad, Project Associate, NEERI, Nagpur
6) Sri. Samreen Zade, Project Associate, CSIR-NEERI
7) Sri. Anil Kumar C, Secretary, Municipal Office, Kalamassery
8) Dr. Gopika Mohan, Assistant Engineer, Major Irrigation Section, Thripunithura.
9) Smt Gopika A B, Overseer, Minor Irrigation Section II, Ernakulam
10) Dr. Rehitha, Assistant Health Officer, Kochi Corporation
11) Sri. Ajeesh A R, Health Inspector – Gr. I, Thripuithura Municipality.

The Environmental Engineer, KSPCB welcomed all the participants to the meeting. Environmental Engineer gave a brief introduction on the Hon'ble NGT Case on OA.27/2022 and need for rejuvenation of Edappally & Thevara–Perandoor Canals. Environmental Engineer informed that the Board had deputed NEERI Nagpur to conduct a study on the feasibility of in situ treatment for the rejuvenation of the Thevara-Perandoor & Edapally Canals. Environmental Engineer also informed that the meeting is convened to have a detailed discussion on the study of NEERI and also to collect secondary datas requested by NEERI for the study. Environmental Engineer welcomed Dr Pravin Manekar, Sr. Principal Scientist, NEERI to brief about the project.

Dr. Pravin Manekar explained about the project on rejuvenation of canals and the work done by NEERI for the study and also informed that secondary data on population, catchment area, gradient, contour, watershed etc. need to be obtained for the project. Dr. Pravin Manekar informed that NEERI conducted pre and post monsoon monitoring, collected samples along the stretch of Edapally-Perandoor Canals briefed about the area, ward covered, no. of samples, data collected so far. Dr. Pravin Manekar explained about the necessity of secondary data to be collected and informed that the study report can be prepared after obtaining the datas.

Environmental Engineer presented the datas required for NEERI and the data obtained so far. Officials from minor irrigation section informed that the hydraulic flow, canal cross section details and the works of Edapally canals are not available in their office. They informed that the remaining data will be available at Major Irrigation Section, Hydrology section and with IDRB section. The officials from Kochi Corporation also discussed about the data required and informed that the data will be submitted after conveying it to the respective sections.

Environmental Engineer informed that details of secondary datas required will be intimated to the concerned departments.

Meeting ended at 1.00PM

ENVIRONMENTAL ENGINEER