

BEFORE THE HON'BLE NATIONAL GREEN TRIBUNAL  
SOUTHERN ZONE, CHENNAI

IN

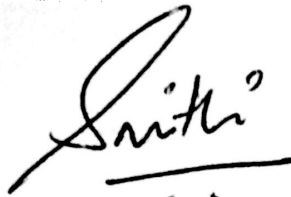
ORIGINAL APPLICATION NO. 137 of 2024

Petitioner: Suo Moto

Versus

Respondent(s): The Principal Secretary to Govt of Kerala, Environment Department,  
Thiruvananthapuram and others

REPORT FILED BY THE ENVIRONMENTAL ENGINEER, REGIONAL OFFICE,  
ERNAKULAM FOR AND ON BEHALF OF THE KERALA STATE POLLUTION  
CONTROL BOARD



Adv. Rema Smrithi.

ADDITIONAL STANDING COUNSEL FOR THE RESPONDENT 5

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Dated this the 08th Day Of July 2024

**Rema Smrithi, Advocate**  
**ADDITIONAL STANDING COUNSEL FOR THE RESPONDENT**

BEFORE THE HON'BLE NATIONAL GREEN TRIBUNAL  
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IN

ORIGINAL APPLICATION NO. 137 of 2024

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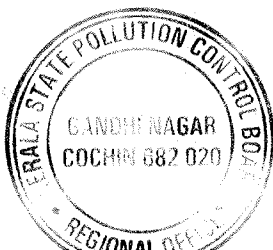
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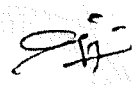
Respondent(s) : The Principal Secretary to Govt of Kerala, Environment Department,  
Thiruvananthapuram and others.

**REPORT FILED BY THE SENIOR ENVIRONMENTAL ENGINEER, REGIONAL  
OFFICE, ERNAKULAM FOR AND ON BEHALF OF THE KERALA STATE  
POLLUTION CONTROL BOARD**

1) I, Sajeesh Joy, aged 48 years, S/o V.A. Joy, residing at Ernakulam, working as Environmental Engineer, Kerala State Pollution Control Board, Legal Cell, Ernakulam, do hereby solemnly affirm and state as follows:

The Hon'ble NGT vide order dated 14-05-2024 in O.A. No.137/2024 mentioned as follows "*The learned counsel appearing for the Kerala State Pollution Control Board would represent that based on the report filed in the Original Application No.45 of 2024 (SZ) [Tribunal on its own motion Suo Motu based on the News Item in Malayalam Daily Mathrubhumi Dt. 24.01.2024 titled "Garbage is dumped in areas including Kadambayyar by*

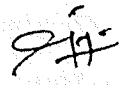


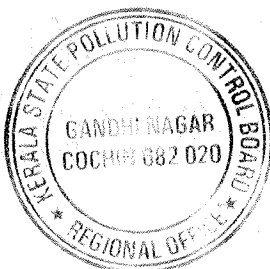
  
SAJEESH JOY  
Environmental Engineer

*the mafia, which contracts to remove waste from big companies"]*, this issue is cropped up".

Board has already filed a similar report in the Original Application No.45 of 2024 (SZ) Tribunal on its own motion Suo Motu based on the News Item in Malayalam Daily Mathrubhumi Dt. 24.01.2024 titled "Garbage is dumped in areas including Kadambrayar by the mafia, which contracts to remove waste from big companies".

The Kadambrayar river in the eastern part of Ernakulam District, Kerala, originates from Arackapady in Vengola Panchayat of Kunnathunadu Taluk and extends approximately 27 km downstream. The river has a catchment area of approximately 115 km<sup>2</sup>, and the major stretch of this river passes through the rapidly urbanizing and industrialized area of Ernakulam. Natural canals namely Palakuzhy Thodu, Chandakkadavu Thodu, Valiyathodu, Papparakkadavu thodu, Vanachirathodu, Mundampalam, Pazhangattuchalu, Kunnipadam etc. are tributaries to the river. It passes through the Panchayat Edathala, Kizhakkambalam, Kunnathunad and Thrikkakara Municipalities and joins with the Chithrapuzha near Ambalamugal. The sources of water in Kadambrayar are mainly wetlands & fields. The major drains towards the Kadambrayar river are Manakkakadavu Thodu, Edachira Thodu and canal joining Kadambrayar near Infopark Phase-2. The river has the influence of tidal effect. During summer season, temporary sand bunds are constructed near the confluence point of Chitrapuzha for preventing saline water intrusion in the Kadambrayar River. The river plays a vital role as a host for drinking water in adjacent urban areas.

  
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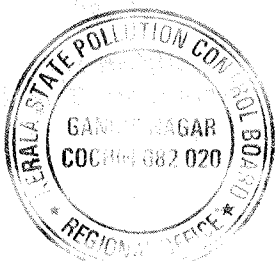
Kadambrayar river flows through urban zone comprising tourist destinations, agricultural areas, industries, residential zones, educational institutions, commercial parks and a municipal solid waste (MSW) plant. The Edachira drain flows through residential areas and major industrial zones, where commercial parks such as KINFRA, Infopark Phase-1, Phase-2, Smart City and Cochin Special Economic Zone (CSEZ) and industries such as Nitta Gelatin India Ltd, Philips Carbon Black, Wonderla, Cochin Kadaalas etc. are situated and it later joins the river at the Kadambrayar Bridge.

#### **Kadambrayar river- The present scenario**

The availability of water is high during the rainy season. During summer season the entire flow gets restricted due to less quantity of water and excessive growth of vegetation in the river. The primary pollution challenge facing the Kadambrayar river stems from the proliferation of water hyacinth, which restricts the river's flow. This obstruction leads to water stagnation, facilitating the accumulation of nutrients, particularly phosphates and nitrates in the riverbed. The excessive deposition of these nutrients fosters the growth of algae and water hyacinth. As the algal blooms flourish, they eventually decay, turning the river's color black and depleting oxygen levels in the water. This oxygen depletion is a significant contributor to the increased organic loading, measured as Biological Oxygen Demand (BOD), in the river.

#### **Major Pollution Sources**

The major pollution problem is due to discharge of domestic effluent from townships, households etc, if any, through drains, creeks etc that are reaching the river stretch. The Brahmapuram dumping yard is also situated



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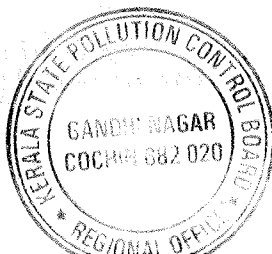
on the banks of Kadambrayar River. The discharge of leachate if any, from the Brahmapuram plant and the flow restrictions due to growth of water hyacinth increases the intensity of pollution issue. The industrial belt such as KINFRA, CSEZ, IT parks of Infopark Phase-1, Phase-2 and Smart city are operating near river bank. Many apartments, hotels and other establishments are also situated near the River.

#### **Intervention of Hon'ble NGT**

The Hon'ble NGT in O.A No. 673/2018 had directed that all States and Union Territories shall prepare action plan for bringing all the polluted river stretches to a quality to fit at least for bathing purposes (i.e BOD < 3 mg/L and FC < 500 MPN/100 ml). As per the direction of Hon'ble NGT in O.A. No.673/2018, CPCB identified Polluted River Stretches (PRS) considering Bio-Chemical Oxygen Demand (BOD) as a criteria parameter. For identification of PRS, the water quality data for river monitoring locations with respect to Biochemical Oxygen Demand (BOD) parameter is considered. The stretches of rivers not meeting with the criteria are identified as polluted stretches and categorized in five priority classes on the basis of maximum BOD level observed.

The criteria for prioritization of river stretches are given below:

| SL No | Priority   | Description                                                                                                                                                                                                                                                          |
|-------|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1     | Priority 1 | Monitoring locations exceeding BOD concentration 30 mg/l has been considered as the standard of sewage treatment plant and in river it appears without dilution. (River locations having water quality exceeding discharge standards for BOD to fresh water sources) |

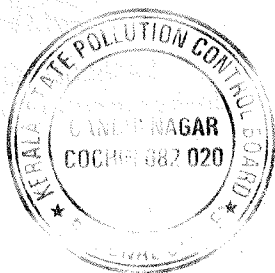


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|   |              |                                                     |
|---|--------------|-----------------------------------------------------|
| 2 | Priority II  | Monitoring locations having BOD between 20-30 mg/l. |
| 3 | Priority III | Monitoring locations having BOD between 10-20 mg/l. |
| 4 | Priority IV  | Monitoring locations having BOD between 6-10 mg/l   |
| 5 | Priority V   | Monitoring locations having BOD between 3-6 mg/l    |

As per the order of Hon'ble NGT on OA No. 673/2018; CPCB had identified 21 polluted river stretches in Kerala. Action plans for rejuvenation of all polluted river stretch including Kadambrayar (Manackkakadavu – Brahmapuram stretch under priority – IV) were developed and being implemented by different stake holders.

In compliance with the direction of the Hon'ble NGT in OA 673/2018, the State Govt. had taken stringent action to rejuvenate the polluted stretches so as to improve the river water quality. The state Government as per G.O(Rt) No.135/2018/Envr dated 12.12.2018 constituted River Rejuvenation Committee (RRC) comprising of Director, Environment Department, Urban Department, Industries Department, Member Secretary, Kerala State Pollution Control Board for monitoring the action plans for rejuvenating the identified polluted river stretches. As per G.O (Ms) No.12/2019/WRD Dated 30.04.2019, a District Level Technical Committee (DLTC) comprising of representatives from Irrigation department (Chairperson), Pollution Control Board (Convener), members from Industries department, LSGD, Representative from District Collector etc. was constituted for preparing a detailed Action Plan for the Rejuvenation of polluted river stretches. Since the natural water bodies have got to be used

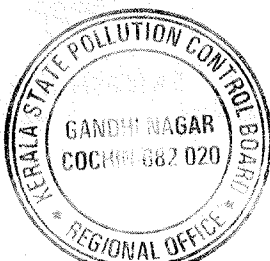


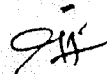
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for various competing as well as conflicting demands, the objective of the action plan is aimed at restoring and/or maintaining natural water bodies or their parts to such a quality as needed for their best uses. The DLTC had prepared an action plan which has been approved by CPCB. At present the action plan is under the implementation stage. The action plan mainly includes the following measures:

- a) Cleaning of river by removing water hyacinth, silt etc. for maintaining minimum flow in river;
- b) Identification of polluting sources such as industries/ flats/ hotels/ waste dumping/ unauthorized discharges to river and closing of all illegal outlets;
- c) Installation of STPs etc.
- d) Installation of solid waste and liquid wastes management facilities
- e) Installation of cameras, strengthening surveillance etc for preventing illegal dumping

The copy of action plan is submitted herewith **Annexure-1**. The DLTC is convening meeting periodically to monitor the progress in implementation of action plan. The DLTC had issued several directions to the departments concerned to take immediate action for the implementation. It is informed that, some projects are delayed because of not obtaining AS/TS to the projects. The DLTC had conducted physical verification of the projects undertaken by the departments to verify the status of implementation of action plan. A joint inspection conducted by Irrigation Department (Chairman DLTC) and Board (Convener DLTC) on 04.01.2024. It was noted that Kochi Corporation had taken steps to complete bio-mining in Brahmapuram dump yard. Bio-mining had been started and was found to



  
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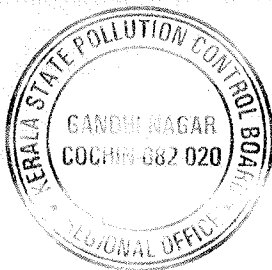
be progressing. Installation of new bio waste processing plant using Black Soldier Fly (BSF) also started. Progress in implementation of projects of Thrikkakkara Municipality has to be improved. The action plan implementation of Thrikkakkara Municipality is pending and much progress is to be effected. Direction had been issued to Secretary, Thrikkakara Municipality in this regard on 21.02.2024. Copy of the communication is attached as **Annexure 2**. The minutes of meeting of DLTC February 2024 stating the status of implementation of action plan of Kadambrayar River and physical verification report of DLTC is enclosed as **Annexure-3 and 4**.

#### **Present River Water Quality**

The Central Pollution Control Board (CPCB) is monitoring the water quality in India under National Water Quality Monitoring Programme. Under the above program, Board is monitoring river water quality on monthly basis. The samples are collected from the fixed locations of river (Manackakadvau and Brahmapuram) in every month.

The Board is also conducting monthly monitoring of river water quality. The average value of the parameters for the last two years is reported as below.

| Parameters         | River- Kadambrayar |
|--------------------|--------------------|
| BOD                | 2.54 mg/l          |
| Total Coliform     | 11363 MPN/100ml    |
| Fecal Coliform     | 4182 MPN/100ml     |
| Fecal Streptococci | 585 MPN/100ml      |



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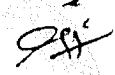
The report shows the BOD value in the river are less than 3mg/L average compared to previous BOD value of 6mg/L. The analysis reports of the water samples collected from river shows that the river quality is improved from that of priority IV to Priority V with respect to BOD. As per Polluted River Stretches for Restoration of water quality – 2022 by CPCB, Kadambrayar is reprioritized as V from IV. The report shows there is no reduction in the coliform level in the water body which reveals that the contamination of river with domestic effluent. The River water quality including coliform can be improved only after implementation of major works such as installation of STPs, solid wastes processing units etc. The local bodies shall initiate immediate action to install Common Sewage Treatment Plant (CSTP) and Faecal Sludge Treatment Plant urgently for ensuring safe disposal of sewage and septage so as to improve the water quality of waterbodies.

#### **Action taken by the Board**

Kadambrayar is monitored monthly by surveillance team of Regional Office, Ernakulam under the National Water Quality Monitoring Programme (NWMP) scheme by Board at 4 locations, i.e. at Rajagiri Bund, Brahmapuram, Kadambrayar Upstream, and Manakkakadavu. Periodical monitoring of Manakkakadavu drain, Canal joining Kadambrayar near Infopark phase-2 and Edachirathodu.

The Board is conducting inspections in the various establishments directly or indirectly connected with Kadambrayar, which includes the KINFRA industrial park, Infopark Phase -1, Phase -2, Smartcity, industries in Cochin Special Economic Zone (CSEZ) located near to Kadambrayar River, township of Thrikkakara Municipality, panchayaths such as Puthencruz, Kizhakkambalam



  
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and Kunnathnad. Board is periodically inspecting the effluent generating industries and verifying whether their Effluent Treatment Plant (ETP) are operational and operating effectively.

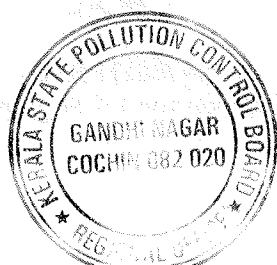
Following are the details of the major effluent generating industries/establishments.

**Details of Industries /establishments operating in the Infopark phase-2**

| Sl. No. | Name of the unit   | Type of industrial sector | Whether ETP/STP exists or not | ETP/STP operational status |
|---------|--------------------|---------------------------|-------------------------------|----------------------------|
| 1       | Cognizant          | IT park                   | Yes                           | Operational                |
| 2       | Transasia          | IT park                   | Yes                           | Operational                |
| 3       | GEMS International | School                    | Yes                           | Operational                |
| 4       | Jyothirmaya        | IT park                   | Yes                           | Operational                |

**Details of Other Industries /establishments operating in the catchment area of Kadambay River**

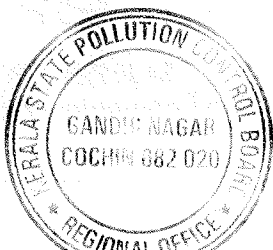
| Sl. No. | Name of the unit                | Type of industrial sector | Whether ETP/STP exists or not   | ETP/STP operational status |
|---------|---------------------------------|---------------------------|---------------------------------|----------------------------|
| 1       | Eurotech Maritime               | Educational Institution   | Yes                             | Operational                |
| 2       | Cochin Birth Village            | Maternity Hospital        | Septic tank-Soak pit facilities | Operational                |
| 3       | Samaritan Hospital              | Hospital                  | Yes                             | Operational                |
| 4       | Cochin Arts and Science College | Educational Institution   | Yes                             | Operational                |
| 5       | Hotel Hill Heights              | Restaurant/Hotel          | Yes                             | Operational                |
| 6       | Wonderla                        | Amusement park            | Yes                             | Operational                |
| 7       | Confident leo III               | Flats/Apartments          | Yes                             | Operational                |
| 8       | Sanjeevanam Ayurvedic Hospital  | Hospital                  | Yes                             | Operational                |



*[Signature]*  
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| 9  | Asset- E-scape | Flats/Apartments | Yes                                                                                                                                                                          | Operational |
|----|----------------|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| 10 | Kent Mahal     | Flats/Apartments | STP not adequate. As per the direction of the District Collector, collection and analysis of treated effluent samples done monthly. Closure intention notice has been issued |             |

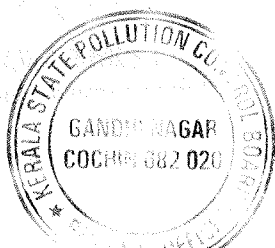
Industries such as M/s Nitta Gelatin India Pvt Ltd inside KINFRA, effluent generating industries inside CSEZ etc are the major industries. M/s. Nitta Gelatin is permitted to discharge their treated effluent to river. The industry is discharging treated effluent at the confluence point of Chitrapuzha at the downstream of sand bund. M/s.Nitta Gelatin had installed ETP and is complying with the discharge standards prescribed by the Board. M/s Nitta Gelatin had also installed online continuous effluent monitoring system (OCEMS) to ensure the discharge standards. The CSEZ had installed new Common Effluent Treatment Plant (CETP) which is operational. All the effluent generating industries inside CSEZ are diverting the effluent to the CETP. New CETP is having preliminary, primary, secondary and sophisticated tertiary treatment unit such as Multiple Effect Evaporator (MEE), Reverse Osmosis Plant (RO), softener etc. The new plant is installed with an intention to achieve Zero Liquid discharge (ZLD) so as to reuse the entire treated effluent. Presently, the treated water is being discharged to drain ultimately reaching Chitrapuzha. The Board had convened a meeting on 12.02.2024 and directed the CSEZ authorities and industries to take immediate action to reuse the entire treated effluent so as to achieve the Zero Liquid Discharge (ZLD). Copy of meeting minutes is attached as Annexure- (5). If ZLD is achieved, the Board can ensure that no effluent is being discharged to the water body. Based on the Board's directions, the CSEZ authority had initiated action for achieving ZLD. The industries started to use the treated water for reusing in

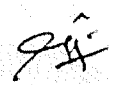


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the plant.

Brahmapuram Municipal Solid Waste Plant (MSW) is located adjacent to the Kadambrayar River. To clean up the legacy waste (waste lying in Brahmapuram for a prolonged period of time) in Brahmapuram, work for biomining/rehabilitation the wastes has already been awarded to Bhumi Green Energy by Kochi Municipal Corporation for biomining 3000 MT waste and biomining activities are currently ongoing. At present around 3.75 lakh MT of waste excavation, turning and stabilization is completed. Nearly 2.63 lakh MT waste processing is also completed as on 23-05-2024. 35387 MT quantity RDF has been supplied to RDF Cement factories. At present, the bio mining process at Brahmapuram plant is being carried out in a scientific manner. The leachate from the plant is collected in the leachate tank constructed with baffles similar to a septic tank for effecting a first level of treatment. Kochi Municipal Corporation has awarded contract to two agencies for handling of 50 TPD biodegradable waste of Kochi Municipal Corporation. In these plants, Biodegradable waste is converted to fertilizer using Black Soldier fly. Segregated waste will be collected using covered vehicles and will be pulverized with high speed pulverizer without dewatering. Pulverized material, below 10mm size is directly pumped to plastic trays using slurry pumps. Then newly hatched larvae are then introduced to these trays and larvae convert the pulverized biodegradable waste into compost in less than 12 days. Larvae are then harvested using mechanical method washed and dried using electric dryers. Larvae are then sold to feed companies and the compost to fertilizer company. Board is conducting monthly inspection in Brahmapuram Septage Treatment Plant. The Septage treatment plant was operational at the time of inspections. The Board also instructed Kerala Water Authority and Kochi Corporation for ensuring the continuous proper functioning of all existing

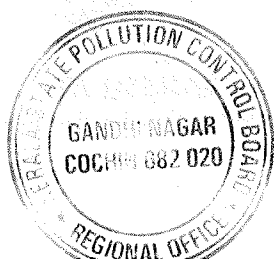


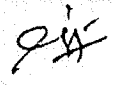
  
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FSTPs/CSTPs. A copy of the letter No. KSPCB/322/2022-EE-3 dated 15-3-2024 is submitted herewith as Annexure 6. During the inspection conducted on 11-06-2024 by Board officials, the Septage Treatment Plant and vicinity seems to be in an unhygienic condition. Leachate from the the sludge drying facility was seen flowing to the nearby land. Moreover, adequate roofing was not provided for the sludge drying bed. Based on the inspection findings a Show Cause Notice was issued to Kochi Municipal Corporation. A copy of the Show Cause Notice dated 22-06-2024 is attached herewith as Annexure 7.

As per the order dated 09/02/2024 in Original Application No. 45 of 2024 of the Hon'ble NGT (SZ), Board was directed "to conduct a spot inspection and report as to who is responsible for the said illegal act, what action has been taken against them by the authorities and what are all the proposed actions to be taken by the Kerala SPCB to prevent such things happening in future". On the basis of this, inspection was conducted by the Board officials on 18/03/2024 and 19/03/2024 in the establishments/industries located near the Kadambrayar river (Pazhanganad-Manakkakadavu stretch, Morakkala- Infopark phase-2 stretch, Brahmapuram stretch). Based on the site inspection, STP/ETP provided in these units was found to be operating satisfactorily.

During the inspection, it was found that 44 numbers of villa projects named Flair Waterface Villa project, bank of the river Kadambrayar, Manakkakadavu, are operating without the consent of the Board. Necessary direction was given to Panchayats vide letter dated 04/04/2024 for providing the details/list of buildings for residential purpose having area greater than 2000 m<sup>2</sup> and effluent generation greater than 50 KLD, and to obtain Consent from the Board for operating these residential buildings. A reminder letter was sent on 05-07-2024 to Panchayat regarding the same. It



  
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has also been informed in DLTC Committee that LSGD will install CCTV camera near Manakkakadav Bridge to prevent illegal dumping of septage.

The Board is also inspecting apartments, the commercial complexes, IT parks etc for ensuring that the buildings are operating the STP properly. In light of the above, it is humbly submitted that Board is taking sincere efforts to address the issues related to Pollution of Kadambrayar.

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

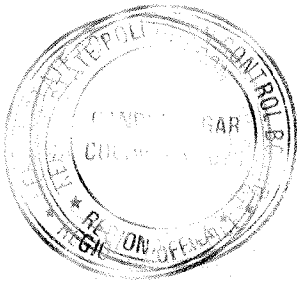
Dated this 08<sup>th</sup> day of July 2024

For and on behalf of the Kerala State Pollution Control Board



Environmental Engineer

SAJEESH JOY  
Environmental Engineer





**BEFORE THE HON'BLE NATIONAL GREEN TRIBUNAL  
SOUTHERN ZONE, CHENNAI  
IN  
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Petitioner: Suo Moto.

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Dated this the 8th Day Of July 2024

**Rema Smrithi**, Advocate  
ADDITIONAL STANDING COUNSEL FOR 2<sup>nd</sup> RESPONDENT

# ACTION PLAN FOR RESTORATION OF POLLUTED STRETCH (MANCKAKADAVU \_ BRAHMAPURAM) OF RIVER KADAMBAYAR (PRIORITY-IV)

## Comprehensive Report on Prevention and Control of Pollution in Kadambayar River: An Action Plan for Rejuvenation



**ACTION PLAN FOR RIVER KADAMBRAYAR – KERALA**  
**(OA No.673/2018)**

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## EXECUTIVE SUMMARY

The draft action plan of Kadambrayar was submitted before Hon'ble NGT earlier on 15-12-2019.

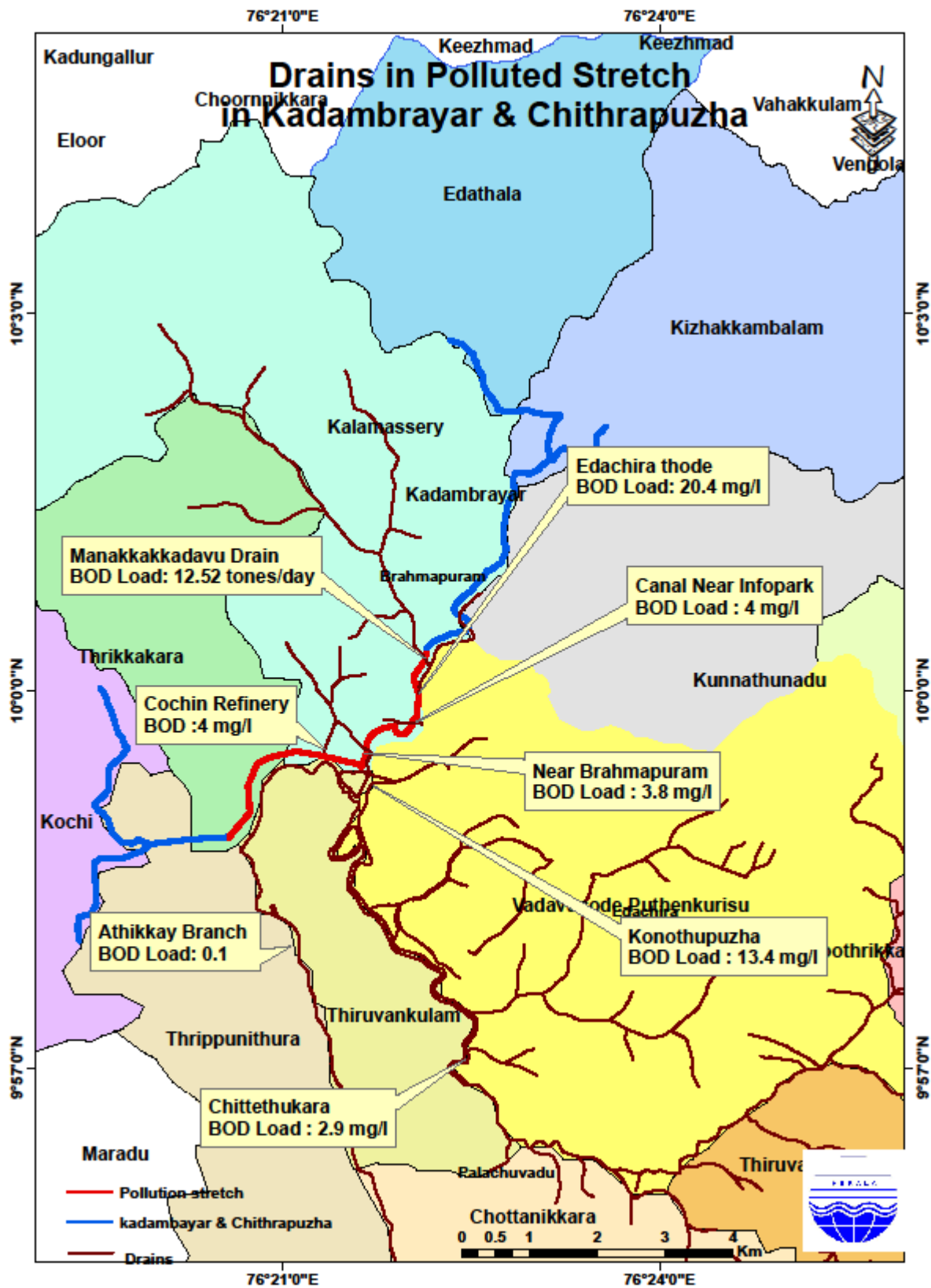
The modified action plan is given below.

The river Kadambrayar originates from a hill at Arakkappady in Vengola Panchayat of Perumbavoor Taluk. The river flows through the panchayat Edathala, Kizhakkambalam, Kunnathunad and Thrikkakara and joins with Chithrapuzha near Ambalamugal. The total length of the river is 27 km and its catchment area is estimated as 115Km<sup>2</sup>. Kadambrayar is the source of water for the industrial zones such as KINFRA, Infopark Phase -1, Phase -2, Smartcity, Cochin Special Economic Zone (CSEZ) and for the industries such as Nitta Gelatin India Ltd, Philips Carbon, Wonderla, Cochin Kadaalas etc.

Three drains have been identified as joining the polluted stretch. The pollution load in terms of BOD were assessed. The map showing the drains and BOD load is given below.

### 1. Pollution load in drains

|   | <b>Drain</b>                                     | <b>Pollution load BOD in TPD</b> |
|---|--------------------------------------------------|----------------------------------|
| 1 | Manakkakkadavu drain                             | 12.52 TPD                        |
| 2 | Canal joining Kadambrayar near Infopark Phase II | BOD=4 mg/l                       |
| 3 | Edachira Thodu                                   | BOD=20.4 mg/l                    |



Joint inspection was conducted by KSPCB, Kerala Irrigation Department, Kerala Water Authority, Local Bodies and Suchitwa Mission and identified all drain leads to Polluted Stretches and units that are causing pollution.

## 2. Short term plan

### (1) Manakkakkadavu

| No. | Ref para No<br>:48 as per NGT<br>Order no<br>673/2018<br>dated 20.9.2018 | Activity                                                                                            | Implementing<br>agency                             | Cost<br>(Rs.<br>Cr)                                                                                                                                                       | Source<br>of fund | Time line | Expected<br>outcome                                    |
|-----|--------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|----------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|-----------|--------------------------------------------------------|
| 1   | 2.1.1<br>E                                                               | Cleaning of all the 3 upstream branches (minimum 1Km - from Manakkakkadavu bridge) (before Monsoon) | Kerala Irrigation Department                       | 0.132                                                                                                                                                                     | -                 | 6Months   | Reduced pollution load in drain leading to Kadambrayar |
| 2   | 2.1.2<br>C(ii)                                                           | Surveillance to restrict the dumping of wastes into river and its branches                          | Kunnathunadu Panchayat and with the help of Police | As the post of the Panchayat President is vacant at present, the officials informed that fund for surveillance can be intimated only after the President has been elected |                   |           | -do-                                                   |
| 3   | 2.1.3<br>A a(iv)                                                         | Periodical Monitoring                                                                               | Kerala State Pollution Control Board               | -                                                                                                                                                                         | KSPCB funds       | -         | -do-                                                   |

(2) Canal joining Kadambayar near Infopark Phase II

| No. | Ref para No<br>:48 as per NGT Order<br>no 673/2018<br>dated20.9.2018 | Activity                                                                               | Implementing agency                                            | Cost<br>(Rs.<br>Cr) | Source<br>of fund | Time<br>line | Expected<br>outcome                                                       |
|-----|----------------------------------------------------------------------|----------------------------------------------------------------------------------------|----------------------------------------------------------------|---------------------|-------------------|--------------|---------------------------------------------------------------------------|
| 1   | 2.2.1<br>E                                                           | Cleaning of thodu                                                                      | Kerala Irrigation<br>Department                                | 0.039<br>2          | -                 | 6<br>Months  | Reduced<br>pollution<br>load in<br>drain<br>leading to<br>Kadambra<br>yar |
|     |                                                                      |                                                                                        | Vadavucode –<br>Puthencruz Panchayat                           | 0.30                | Govt. Aid         | 6<br>Months  |                                                                           |
| 2   | 2.2.2<br>A a(iv)                                                     | Periodical<br>Monitoring                                                               | Kerala State Pollution<br>Control Board                        | -                   | KSPCB<br>funds    | -            | -do-                                                                      |
| 3   | 2.2.3<br>C(ii)                                                       | Surveillance to<br>restrict the<br>dumping of wastes<br>into river and its<br>branches | Vadavucode –Puthencruz<br>Panchayat with the help<br>of Police | 0.05                | Govt Aid          | 2<br>Months  | -do-                                                                      |

(3) Edachira Thodu

| No. | Ref para No<br>:48 as per NGT<br>Order no<br>673/2018<br>dated20.9.2018 | Activity                                                                                                | Implementing<br>agency       | Cost<br>(Rs.<br>Cr) | Sourc<br>e of<br>fund      | Time line | Expected<br>outcome                                                                                                                      |
|-----|-------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|------------------------------|---------------------|----------------------------|-----------|------------------------------------------------------------------------------------------------------------------------------------------|
| 1   | 2.3.1<br>A b                                                            | Identification of major pollution<br>causing units(Apartments,<br>hospitals, markets and<br>industries) | Thrikkakkara<br>Municipality | 1                   | Pla<br>n                   | 6 Months  | Inspection<br>is being<br>conducted<br>and notices<br>are being<br>issued to<br>polluting<br>units such<br>as<br>apartments<br>, hotels, |
|     |                                                                         |                                                                                                         | Pollution<br>Control Board   | -                   | KS<br>PC<br>B<br>fun<br>ds | 6 months  |                                                                                                                                          |

|   |                    |                                                                                     |                                                       |        |             |                       |                                                                                    |
|---|--------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------|--------|-------------|-----------------------|------------------------------------------------------------------------------------|
|   |                    |                                                                                     |                                                       |        |             |                       | service stations, markets, industries.                                             |
| 2 | 2.3.2<br>A(a) (iv) | Ensuring proper functioning of Sewage Treatment Plants of Units/Apartments/IT Parks | Pollution Control Board and Thrikkakkara Municipality | -      | KSPCB funds | -                     | Action will be taken                                                               |
| 3 | 2.3.3<br>C(ii)     | Surveillance to restrict the dumping of wastes into river and its branches          | Thrikkakkara Municipality with the help of Police     | 0.5    | Plan        | Periodical monitoring | Action is being taken to prepare a DPR for fencing                                 |
| 4 | 2.3.4<br>A a(iv)   | Periodical Monitoring                                                               | Kerala State Pollution Control Board                  | -      | KSPCB funds | -                     | -do-                                                                               |
| 5 | 2.3.5<br>A (b)     | Sanitation Survey                                                                   | Thrikkakkara Municipality                             | 0.25   | Plan        | 6Months               | Action is being taken to prepare a DPR which will be included in sanitation survey |
| 6 | 2.3.6<br>E         | Cleaning of Edachira thodu                                                          | Kerala Irrigation Department                          | 0.0955 | -           | 6 Months              | -do-                                                                               |

**Main Stream (Manakkadavu to Kadambrayar-Chithrappuzha Confluence point) (Provided temporary bund (Kozhichira Bund)in Kadambrayar-Chithrappuzha joining section to check salinity intrusion)**

| No. | Ref para No :48 as per NGT Order no 673/2018 dated20.9.2018 | Activity                                                                        | Implementing agency                               | Cost (Rs. Cr) | Source of fund | Time line             | Expected outcome                                       |
|-----|-------------------------------------------------------------|---------------------------------------------------------------------------------|---------------------------------------------------|---------------|----------------|-----------------------|--------------------------------------------------------|
| a   | E                                                           | Periodical Cleaning of Kadambrayar from Manakkakadavu bridge to Kozhichira bund | Kerala Irrigation Department                      | 0.403         | Plan fund      | Twice in plan         | Reduced pollution load in drain leading to Kadambrayar |
| b   | A(b)                                                        | Provide proper facilities for restricting the seepage of leachate               | Kochi Corporation                                 | 0.22          | Plan fund      | -                     | -do-                                                   |
| c   | A a(iv)                                                     | Periodical Monitoring                                                           | Kerala State Pollution Control Board              | -             | KSPCB funds    | -                     | -do-                                                   |
| d   | C(iii)                                                      | Surveillance to restrict the dumping of wastes into river and its branches      | Thrikkakkara Municipality with the help of Police | 2 lakhs       | Plan           | Periodical monitoring | Action is being taken to prepare a DPR for fencing     |
|     |                                                             |                                                                                 | Vadavucode-Puthercruz with the help of Police     | -             | -              | Periodical monitoring |                                                        |
|     |                                                             |                                                                                 | Kunnathunadu Panchayat with the help of Police    | -             | -              | Periodical monitoring |                                                        |
| e   | A(b)                                                        | Provide proper facilities for collecting and treating leachate                  | Kochi Corporation                                 | 1.27          | -              | -                     | -do-                                                   |

### 3. Monitoring

| No | Ref para No :48 as per NGT Order no 673/2018 dated 20.9.2018 | Activity                                                                                                           | Implementing agency                  | Cost                   | Source of fund                                                | Time line                   | Remarks                     |
|----|--------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|--------------------------------------|------------------------|---------------------------------------------------------------|-----------------------------|-----------------------------|
| 1  | 3.1<br>A G(iv)                                               | River water quality monitoring                                                                                     | Kerala State Pollution Control Board | Rs.11,08,000           | National Water Quality Monitoring Programme (NWMP), CPCB fund | Ongoing : monthly frequency | Monitoring of water quality |
| 2  | 3.2<br>A a(iv)                                               | Inspection and effluent quality monitoring of the flats, industrial units, service stations, hospitals, hotels etc | Kerala State Pollution Control Board | As per sampling charge |                                                               | On going                    |                             |

#### 4.ACTION PLAN BY GRAMAPANCHAYATH

| No | Name of Grama panchayath | Ref para No :48 as per NGT Order no 673/2018 dated20.9.2018 | Activity                                                                                    | Implementing agency | Cost    | Source of fund                | Time line  | Remarks |
|----|--------------------------|-------------------------------------------------------------|---------------------------------------------------------------------------------------------|---------------------|---------|-------------------------------|------------|---------|
| 1  | Edathala                 | A(b)                                                        |                                                                                             |                     |         |                               |            |         |
| 2  | Kunnathunadu             | E                                                           | Installation of CCTV camera at Manakkakadavu                                                | Grama panchayath    | 100,000 | CSR Fund of Wonderla Holidays | 30.09.2019 |         |
| 3  | Vadavukad puthenkruze    | C(ii)                                                       | Cleaning of Thodu                                                                           | Grama panchayath    | 300,000 | Govt aid & CSR fund           | 6Months    |         |
| 4  | Vadavukad puthenkruze    | C(ii)                                                       | Survivance of restrict dumping of waste to the river and branches (with the help of Police) | Grama panchayath    | 500,000 | Govt aid                      | 2Months    |         |

## 5. Long term Plan

| NO | Ref para No :48 as per NGT Order no 673/2018 dated 20.9.2018 | Long term measures proposed                                                                  | Implementing agency                | Amount Required (Rs.in Crore) and Source of fund              | Time line           | Remarks                                            |
|----|--------------------------------------------------------------|----------------------------------------------------------------------------------------------|------------------------------------|---------------------------------------------------------------|---------------------|----------------------------------------------------|
| 1  | 4.1<br>E                                                     | Cultivation of paddy fields in the banks of drain joining Manakkakadavu                      | Kunnathunadu Panchayat and Revenue | -                                                             | Three years         | Not submitted                                      |
| 2  | 4.2<br>A (b)                                                 | Provide inspection bund in the banks of the Kadambayar from Manakkakadavu to Kozhichira bund | Kerala Irrigation Department       | 7.74                                                          |                     | DPR Preparation in 10 months (through consultants) |
| 3  | 4.3<br>A (b)                                                 | Demarcation of Kadambayar and laying boundary stones from Manakkakadavu to Kozhichirabund    | Kerala Irrigation Department       | 0.04                                                          |                     |                                                    |
| 4  | 4.4<br>A (b)                                                 | Additional STP requirement (if needed)                                                       | Thrikkakkara Municipality          | Associated with Brahmapuram plant                             |                     |                                                    |
| 5  | 4.5<br>C(ii)                                                 | Solid waste treatment facility at Brahmapuram                                                | Kochi Corporation                  | 300Cr (PPP Project, it is expected to start in 2 months time) |                     |                                                    |
| 6  | 4.6<br>A( b)                                                 | Restriction of illegal dumping of Septage in to the river                                    | Police                             |                                                               | As soon as possible |                                                    |

## 6. Action Plan by Ground Water Department

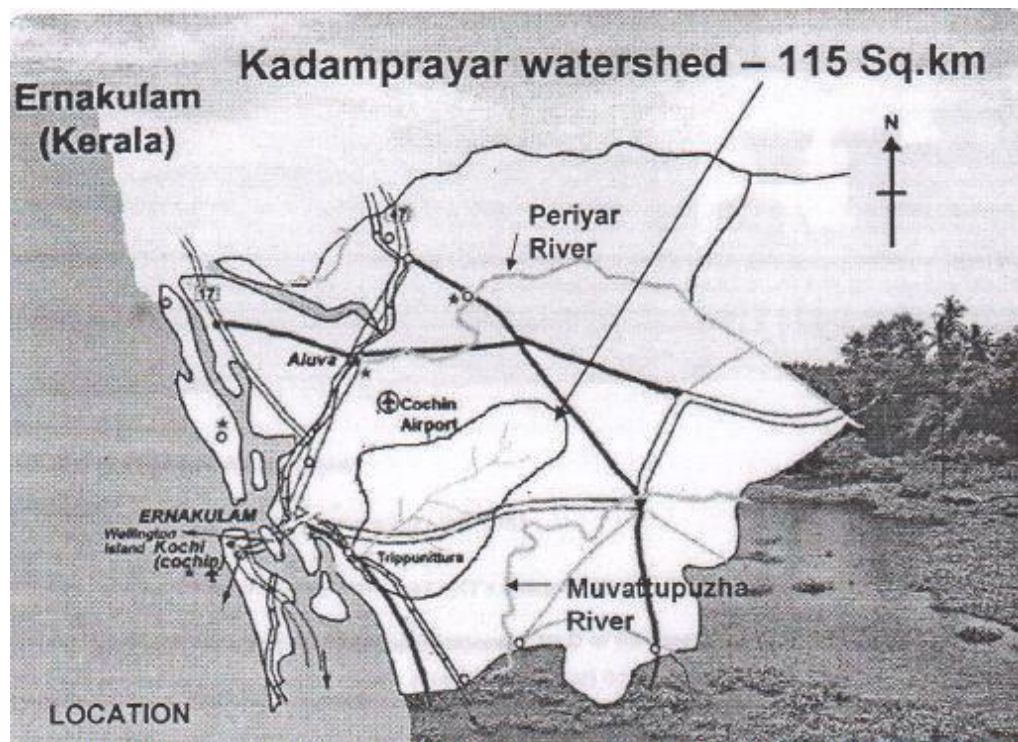
| Sl.No | Ref para No :48 as per NGT Order no 673/2018 dated 20.9.2018 | Activity                                                                                                                               | Ground Water Department                                                                                                                                                                                                                                                 |
|-------|--------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1     | B(i)                                                         | Ground Water resources and regulation of ground water extraction by industries particularly in over exploited as critical zones/blocks | As per Groundwater resources of Kerala, 2017 estimate a total number of 2 blocks (mulanthuruthi and vadavakkodu) comes under the kadambayar river basin. All the blocks in the river stretch are safe with stage of groundwater extraction ranges from 25.38% to 68.01% |
| 2     | B(ii)                                                        | Ground water recharging / rain water harvesting                                                                                        | The pre-monsoon groundwater level of the area ranges from 4.43 to 5.38 mbgl. Groundwater Department has not yet proposed any recharge structures in this area.                                                                                                          |
| 3     | B(iii)                                                       | Periodic ground water quality assessment and remedial actions in case of contaminated ground water tube wells/bore wells or hand pumps | Groundwater Department has 2 observation dug wells in this river stretch.                                                                                                                                                                                               |
| 4     | B(iv)                                                        | For regulating use of ground water for irrigation purpose, adopting good irrigation practices                                          | The total irrigation draft in the area ranges from 531.54 to 745.74 ha.m.                                                                                                                                                                                               |

## **CHAPTER 1**

### **KADAMBRAYAR**

The river Kadambrayar originates from a hill at Arakkappady in Vengola Panchayat of Perumbavoor Taluk. The river flows through the panchayat Edathala, Kizhakkambalam, Kunnathunad and Thrikkakara and joins with Chithrapuzha near Ambalamugal. The total length of the river is 27 km and its catchment area is estimated as 115Km<sup>2</sup>. Natural canals namely Palakuzhy thodu, Chandakkadavu thodu, Valiya thodu, Paapparakkadavu thodu, Vanachira thodu, Mundampalam, Pazhangattu chal, Kunnippadam etc, are tributaries to the river. Kadambrayar is the source of water for the industrial zones such as KINFRA, Infopark Phase -1, Phase -2, Smartcity, Cochin Special Economic Zone(CSEZ) and for the industries such as Nitta Gelatin India Ltd, Philips Carbon, Wonderla, Cochin Kadaalas etc.





Details of water intakes is as follows:

- KINFRA: Supply water to the industries/establishments in KINFRA [2.7MLD], Infopark Phase 1 [25MLD], Phase 2[4MLD], Smart city[1.7MLD]
- Nitta Gelatin India Ltd:4.43MLD
- CSEZ :2.25MLD
- Philips Carbon : 2MLD
- Rajagiri Institute:
- Wonderla :300KLD
- Cochin Kadalas:40KLD

### Water quality status of Kadambrayar river

Kadambrayar is monitored monthly under the NWMP scheme at two locations, ie at Brahmapuram and Manakkakadavu stations .Water quality data for the last 2 years and the current year is tabulated below:

| Parameter<br>s  | Brahmapuram |            |            | Manakkakkadavu |           |            |
|-----------------|-------------|------------|------------|----------------|-----------|------------|
|                 | 2016        | 2017       | 2018       | 2016           | 2017      | 2018       |
| pH              | 6.2 – 7.1   | 6 - 6.7    | 5.7 – 6.7  | 6.3-7          | 6.1 - 7.3 | 6 – 6.7    |
| DO[mg/l]        | 0.6 – 3.3   | 0 - 2.2    | 1 – 3.4    | 1.3-8.1        | 0 - 3.4   | 1.2 – 3.4  |
| BOD[mg/l]       | 0.2 - 2.9   | 1.6- 6.4   | 2.8-6.7    | 0.3-5.9        | 1.2- 5.2  | 2.9 – 6.5  |
| TC[MPN/ 100 ml] | 170-1540    | 900- 10000 | 1700- 7900 | 490- 1160      | 350- 9400 | 1000- 7000 |

In the year 2016, the monthly data of BOD value at Brahmapuram ranges from a minimum of 0.2mg/l to a maximum of 2.9 mg/L .In 2017, it ranges from 1.6mg/l to 6.4 mg/L and in the 2018[Value up to August] it ranges from 2.8 mg/L to 6.7mg/L.

In the year 2016, the monthly data of BOD value at Manakkakkadavu ranges from a minimum of 0.3mg/l to a maximum of 5.9 mg/L .In 2017, it ranges from 1.2mg/l to 5.2 mg/L and in the 2018[Value up to August] it ranges from 2.9 mg/L to 6.5mg/L.

### **Industrial zones in the catchment area**

The KINFRA Export promotion Industrial Park, Info Park Phase -1, Infopark phase -2, Smart city are the industrial zones established in the catchment area of the river.

#### **Details of Industries /establishments operating in the KINFRA Park is as follows:**

| Serial No | Name of the Industry            | Type of industrial sector                   | Wheter ETP/STP exists or not | ETP/STP operational status |
|-----------|---------------------------------|---------------------------------------------|------------------------------|----------------------------|
| 1         | Nitta Gelatin India Ltd         |                                             | Yes                          | Operational                |
| 2         | KeraFibreTex International      | Coir mat manufacturing including stenciling | Yes                          | Operational                |
| 3         | Central Warehousing Corporation | warehouse                                   | Not required                 | NA                         |
| 4         | Geon Air/IT Park                | IT building                                 | Yes                          | Operational                |
| 5         | A & B Toolers                   | Tool & die                                  | Not required                 | NA                         |
| 6         | Nirmal Infopark                 | IT park                                     |                              |                            |
| 7         | Bash P                          | Engineering                                 | Not                          | NA                         |

|    |                                        |                                  |                 |             |
|----|----------------------------------------|----------------------------------|-----------------|-------------|
|    | International                          | works                            | required        |             |
| 8  | Zeba lab furniture                     | Lab<br>furnitures                | Not<br>required | NA          |
| 9  | LJ international                       | Tissue<br>culture                | Yes             | Operational |
| 10 | Indosis                                | Electrical                       | Not<br>required |             |
| 11 | Koyenco IT Park                        | IT building                      | Yes             | Operational |
| 12 | Polycolors                             | Dry clean &<br>Laundry unit      | Yes             | operational |
| 13 | Tesla Electricals                      | Electrical<br>assembling         | Not<br>required | NA          |
| 14 | Classic Home<br>Furnishing Private Ltd | Coir mat<br>without<br>stencling | Not<br>required | NA          |

Major industry generating process effluent is the Nitta Gelatin India pvt.Ltd and the unit has provided full fledged ETP and treated effluent is discharged through a pipe line into Kadamprayar. For domestic effluent disposal, septic tank – soak pit facility is provided in all the establishments.



ETP- NITTA GELATIN INDIA LTD

Details of IT buildings /other establishments in the At Infopark Phase -1,is as follows:

| Serial No | Name of the Industry      | Type of industrial sector | Whether ETP/STP exists or not | ETP/STP operational status |
|-----------|---------------------------|---------------------------|-------------------------------|----------------------------|
| 1         | Carnival Infopark         | Co developer              | Yes                           | Not operational            |
| 2         | Wipro Ltd - IT Campus     | IT campus                 | Yes                           | Operational                |
| 3         | Tata Consultancy Services | IT campus                 | Yes                           | Operational                |
| 4         | Thapasya                  | IT Building by Infopark   | Yes                           | Operational                |
| 5         | Lulu Cyber tower-         | Co                        | Yes                           | Operational                |

|    |                                              |                            |     |             |
|----|----------------------------------------------|----------------------------|-----|-------------|
|    | 1                                            | developer                  |     |             |
| 6  | Lulu Cyber tower-<br>2                       | Co<br>developer            | Yes | Operational |
| 7  | Vismaya                                      | IT Building<br>by Infopark | Yes | Operational |
| 8  | World trade<br>tower[brigade<br>enterprises] | Co<br>developer            | Yes | Operational |
| 9  | Athulya                                      | IT Building<br>by Infopark | Yes | Operational |
| 10 | IBS                                          | IT campus                  |     |             |
| 11 | Hotel 4 point<br>sheraton                    | Hotel                      | Yes | Operational |

Details of IT buildings /other establishments in the At Infopark Phase -2,is as follows:

| Serial No. | Name of the<br>unit | Type of<br>industrial sector | Whether<br>ETP/STP exists<br>or not | ETP/STP<br>operational<br>status |
|------------|---------------------|------------------------------|-------------------------------------|----------------------------------|
| 1          | CTS                 | IT Company                   | Yes                                 | Operational                      |
| 2          | Trans Asia          | IT                           | Yes                                 | Operational                      |
| 3          | GEMS<br>School      | School                       | Yes                                 | Ready for<br>commissioning       |
| 4          | Jyothirmaya         | IT Building<br>by Infopark   | Yes                                 | Operational                      |
| 5          | Coagnizance         | IT building                  | Yes                                 | Operational                      |

In Smartcity ,only one office cum IT building is operating .The building is provided with adequate STP and treated effluent completely reused. Construction of IT buildings is progressing in the Smartcity.

Other than the units in the industrial zone, Cochin Kadalas and Veegaland are the other major units in the vicinity . Cochin Kadalas is completely recycling the treated effluent and Veegaland is using the treated effluent for the purpose of irrigation.

### **Status of Other establishments observed in the catchment area**

| Sl.No. | Name of the Industry | Water Consumption (KLD) | Effluent Generation (KLD) | STP Capacity (KLD) | STP status      |
|--------|----------------------|-------------------------|---------------------------|--------------------|-----------------|
| 1      | Purva Eternity       | 480                     | 380                       | 380                | Operational     |
| 2      | Chakolas Orange Park | 109                     | 87.6                      | 100                | Operational     |
| 3      | Prakithi Green Vista | 175                     | 150                       | 150                | Not Operational |
| 4      | DD Diamond valley    | 357.6                   | 286.08                    | 290                | Operational     |
| 5      | DD Green Woods       | 61.2                    | 48.9                      | 49                 | Operational     |

|    |                                              |    |     |     |                 |
|----|----------------------------------------------|----|-----|-----|-----------------|
| 6  | Rajagiri College of Engineering & Technology |    | 240 | 240 | Operational     |
| 7  | Rajagiri College Hostel                      |    | 240 | 160 | Operational     |
| 8  | Jewel Kenningston                            | 76 | 63  | 65  | Not operational |
| 9  | Jewel Richmond                               | 86 | 70  | 70  | Operational     |
| 11 | Fort Grand                                   | 86 | 68  | 70  | Not operational |
| 12 | Fort Valley                                  | 48 | 38  | 40  | Not operational |

|    |                               |     |     |    |                                    |
|----|-------------------------------|-----|-----|----|------------------------------------|
| 13 | Olive Courtyard               | 300 | 240 |    | STP-1<br>Operational               |
|    |                               |     |     |    | STP -2<br>partially<br>operational |
| 14 | Olive Eva(Olive Nest Pvt Ltd) | 26  | 21  | 24 | Operational                        |
| 15 | Asset Ipulse                  | 30  | 25  | 25 | Not<br>operational                 |
| 16 | Heera Cyber Views             | 84  | 68  | 70 | Not<br>operational                 |
| 17 | Flair Alliance Atrium         | 80  | 64  | 65 | Operational                        |



CANAL LEADS TO EDACHIRA THODU



PIPE CONNECTED TO EDACHIRA THODU FROM THE NEARBY FLATS



DRAIN LEADS TO EDACHIRA THODU WHICH FALLS IN KADAMBRAYAR



BRAHMAPURAM PLANT – BANK OF KADAMBRAYAR

## MAIN FINDINGS AND OBSERVATIONS

The condition of the river Kadambrayar is deteriorating at present, due to depletion of Oxygen and the BOD value. The MSW Plant of Kochi Corporation at Brahmapuram is on the bank where rivers Kadambrayar and Chithrapuzha unite. As no proper scientific disposal is practiced, leachate, a black colored liquid coming out of solid waste, reaches the Kadambrayar.

Even though the consent to residential / other establishments has been issued for reusing the treated effluent to the maximum extent, certain the establishments are discharging untreated/partially treated effluent to the drain leading to the river, which is a reason for the deterioration of the water quality.

Human intervention and indiscriminate dumping of solid waste and the discharge of liquid waste has also adversely affected the water quality and flow of river . In the present circumstances it is the need of the hour to evolve an action plan to implement mitigation measures for restoring the water quality.





### **SEWAGE OUTLET OF FLATS TO DRAIN**

#### **Action plan Proposed**

- Effluent discharges from the establishments such as residential/commercial /hotel buildings into storm water drain shall conform to the prescribed standards
- Establishments which have not being brought under the consent regime of the board may be addressed and pollution control measures may be ensured

- Municipal authorities need to be vigilant against dumping of wastes into water bodies and the domestic effluent lines connected to the drains leading to the river shall be closed
- Waste to Energy plant shall be implemented with most priority
- Deepening and cleaning of the entire river stretch can improve the flow condition, thereby increasing the DO level
- District administration/local body shall ensure that no septage shall be dumped via tanker lorries into the waterbody.

**Thrikkakara Municipality initiates the following**

- Inspection conducted and notices are issued against some Apartments, Hotels, Service Stations, Markets, & Other Industries who responsible for the generation of wastes.
- Action taken to prepare a DPR for including provides fencing.
- Action taken to prepare a DPR for including sanitation survey.
- Action will be taken along with KSPCB
- Action will be taken to construct an STP, as per the land requirement.

## CHAPTER 2 ACTION PLAN



The river Kadambrayar originates from a hill at Arakkappady in Vengola Panchayat of Perumbavoor Taluk. The river flows through the panchayat Edathala, Kizhakkambalam, Kunnathunad and Thrikkakara and joins with Chithrapuzha near Ambalamugal. The total length of the river is 27 km and its catchment area is estimated as 115Km<sup>2</sup>. Natural canals namely Palakuzhy thodu, Chandakkadavu thodu, Valiya thodu, Paapparakkadavu thodu, Vanachira thodu, Mundampalam, Pazhangattu chal, Kunnippadam etc, are tributaries to the river. Kadambrayar is the source of water for the industrial zones such as KINFRA, Infopark Phase -1, Phase -2, Smartcity, Cochin Special Economic Zone (CSEZ) and for the industries such as Nitta Gelatin India Ltd, Philips Carbon, Wonderla, Cochin Kadaalas etc.

### 7. Pollution load in drains

|   | Drain                                            | Pollution load BOD in TPD |
|---|--------------------------------------------------|---------------------------|
| 1 | Manakkakkadavu drain                             | 12.52 TPD                 |
| 2 | Canal joining Kadambrayar near Infopark Phase II | BOD=4 mg/l                |
| 3 | Edachira Thodu                                   | BOD=20.4 mg/l             |

Joint inspection was conducted by KSPCB, Kerala Irrigation Department, Kerala Water Authority, Local Bodies and Suchitwa Mission and identified all drain leads to Polluted Stretches and units that are causing pollution.

## 8. Short term plan

### (4) Manakkakkadavu

| No. | Ref para No<br>:48 as per NGT<br>Order no<br>673/2018<br>dated 20.9.2018 | Activity                                                                                           | Implementing<br>agency                             | Cost<br>(Rs.<br>Cr)                                                                                                                                                       | Source<br>of fund | Time line | Expected<br>outcome                                    |
|-----|--------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|----------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|-----------|--------------------------------------------------------|
| 1   | 2.1.1<br>E                                                               | Cleaning of all the 3 upstream branches (minimum 1Km - from Manakkakkadvu bridge) (before Monsoon) | Kerala Irrigation Department                       | 0.132                                                                                                                                                                     | -                 | 6Months   | Reduced pollution load in drain leading to Kadambrayar |
| 2   | 2.1.2<br>C(ii)                                                           | Surveillance to restrict the dumping of wastes into river and its branches                         | Kunnathunadu Panchayat and with the help of Police | As the post of the Panchayat President is vacant at present, the officials informed that fund for surveillance can be intimated only after the President has been elected |                   |           | -do-                                                   |
| 3   | 2.1.3<br>A a(iv)                                                         | Periodical Monitoring                                                                              | Kerala State Pollution Control Board               | -                                                                                                                                                                         | KSPCB funds       | -         | -do-                                                   |

(5) Canal joining Kadambrayar near Infopark Phase II

| No. | Ref para No<br>:48 as per NGT Order<br>no 673/2018<br>dated20.9.2018 | Activity                                                                               | Implementing agency                                            | Cost<br>(Rs.<br>Cr) | Source<br>of fund | Time<br>line | Expected<br>outcome                                                       |
|-----|----------------------------------------------------------------------|----------------------------------------------------------------------------------------|----------------------------------------------------------------|---------------------|-------------------|--------------|---------------------------------------------------------------------------|
| 1   | 2.2.1<br>E                                                           | Cleaning of thodu                                                                      | Kerala Irrigation<br>Department                                | 0.039<br>2          | -                 | 6<br>Months  | Reduced<br>pollution<br>load in<br>drain<br>leading to<br>Kadambra<br>yar |
|     |                                                                      |                                                                                        | Vadavucode –<br>Puthencruz Panchayat                           | 0.30                | Govt. Aid         | 6<br>Months  |                                                                           |
| 2   | 2.2.2<br>A a(iv)                                                     | Periodical<br>Monitoring                                                               | Kerala State Pollution<br>Control Board                        | -                   | KSPCB<br>funds    | -            | -do-                                                                      |
| 3   | 2.2.3<br>C(ii)                                                       | Surveillance to<br>restrict the<br>dumping of wastes<br>into river and its<br>branches | Vadavucode –Puthencruz<br>Panchayat with the help<br>of Police | 0.05                | Govt Aid          | 2<br>Months  | -do-                                                                      |

(6) Edachira Thodu

| No. | Ref para No<br>:48 as per NGT<br>Order no<br>673/2018<br>dated 20.9.2018 | Activity                                                                                                | Implementing<br>agency                                            | Cost<br>(Rs.<br>Cr) | Source<br>of<br>fund       | Time line                | Expected<br>outcome                                                                                                                                                                         |
|-----|--------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|---------------------|----------------------------|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1   | 2.3.1<br>A b                                                             | Identification of major pollution<br>causing units(Apartments,<br>hospitals, markets and<br>industries) | Thrikkakkara<br>Municipality                                      | 1                   | Plan                       | 6 Months                 | Inspection<br>is being<br>conducted<br>and notices<br>are being<br>issued to<br>polluting<br>units such<br>as<br>apartments<br>, hotels,<br>service<br>stations,<br>markets,<br>industries. |
|     |                                                                          |                                                                                                         | Pollution<br>Control Board                                        | -                   | KS<br>PC<br>B<br>fun<br>ds | 6 months                 |                                                                                                                                                                                             |
| 2   | 2.3.2<br>A(a) (iv)                                                       | Ensuring proper functioning<br>of Sewage Treatment Plants<br>of Units/Apartments/IT Parks               | Pollution<br>Control Board<br>and<br>Thrikkakkara<br>Municipality | -                   | KSPCB<br>funds             | -                        | Action<br>will be<br>taken                                                                                                                                                                  |
| 3   | 2.3.3<br>C(ii)                                                           | Surveillance to restrict the<br>dumping of wastes into<br>river and its branches                        | Thrikkakkara<br>Municipality<br>with the help<br>of Police        | 0.5                 | Plan                       | Periodical<br>monitoring | Action is<br>being<br>taken to<br>prepare<br>a DPR<br>for<br>fencing                                                                                                                        |
| 4   | 2.3.4<br>A a(iv)                                                         | Periodical Monitoring                                                                                   | Kerala State<br>Pollution<br>Control Board                        | -                   | KSPCB<br>funds             | -                        | -do-                                                                                                                                                                                        |
| 5   | 2.3.5<br>A (b)                                                           | Sanitation Survey                                                                                       | Thrikkakkara<br>Municipality                                      | 0.25                | Plan                       | 6Months                  | Action is<br>being<br>taken to<br>prepare<br>a DPR                                                                                                                                          |

|   |         |                            |                              |        |   |          |                                             |
|---|---------|----------------------------|------------------------------|--------|---|----------|---------------------------------------------|
|   |         |                            |                              |        |   |          | which will be included in sanitation survey |
| 6 | 2.3.6 E | Cleaning of Edachira thodu | Kerala Irrigation Department | 0.0955 | - | 6 Months | -do-                                        |

**Main Stream (Manakkadavu to Kadambrayar-Chithrappuzha Confluence point) (Provided temporary bund (Kozhichira Bund)in Kadambrayar-Chithrappuzha joining section to check salinity intrusion)**

| No. | Ref para No :48 as per NGT Order no 673/2018 dated20.9.2018 | Activity                                                                        | Implementing agency          | Cost (Rs. Cr) | Source of fund | Time line     | Expected outcome                                       |
|-----|-------------------------------------------------------------|---------------------------------------------------------------------------------|------------------------------|---------------|----------------|---------------|--------------------------------------------------------|
| a   | E                                                           | Periodical Cleaning of Kadambrayar from Manakkakadavu bridge to Kozhichira bund | Kerala Irrigation Department | 0.403         | Plan fund      | Twice in plan | Reduced pollution load in drain leading to Kadambrayar |
| b   | A(b)                                                        | Provide proper facilities for restricting the seepage of leachate               | Kochi Corporation            | 0.22          | Plan fund      | -             | -do-                                                   |

|   |         |                                                                            |                                                   |         |             |                       |                                                    |
|---|---------|----------------------------------------------------------------------------|---------------------------------------------------|---------|-------------|-----------------------|----------------------------------------------------|
| c | A a(iv) | Periodical Monitoring                                                      | Kerala State Pollution Control Board              | -       | KSPCB funds | -                     | -do-                                               |
| d | C(iii)  | Surveillance to restrict the dumping of wastes into river and its branches | Thrikkakkara Municipality with the help of Police | 2 lakhs | Plan        | Periodical monitoring | Action is being taken to prepare a DPR for fencing |
|   |         |                                                                            | Vadavucode-Puthercruz with the help of Police     | -       | -           | Periodical monitoring |                                                    |
|   |         |                                                                            | Kunnathunadu Panchayat with the help of Police    | -       | -           | Periodical monitoring |                                                    |
| e | A(b)    | Provide proper facilities for collecting and treating leachate             | Kochi Corporation                                 | 1.27    | -           | -                     | -do-                                               |

## 9. Monitoring

| No | Ref para No :48 as per NGT Order no 673/2018 dated 20.9.2018 | Activity                       | Implementing agency                  | Cost         | Source of fund                                                | Time line                   | Remarks                     |
|----|--------------------------------------------------------------|--------------------------------|--------------------------------------|--------------|---------------------------------------------------------------|-----------------------------|-----------------------------|
| 1  | 3.1 A G(iv)                                                  | River water quality monitoring | Kerala State Pollution Control Board | Rs.11,08,000 | National Water Quality Monitoring Programme (NWMP), CPCB fund | Ongoing : monthly frequency | Monitoring of water quality |

|   |                |                                                                                                                    |                                      |                        |  |          |  |
|---|----------------|--------------------------------------------------------------------------------------------------------------------|--------------------------------------|------------------------|--|----------|--|
| 2 | 3.2<br>A a(iv) | Inspection and effluent quality monitoring of the flats, industrial units, service stations, hospitals, hotels etc | Kerala State Pollution Control Board | As per sampling charge |  | On going |  |
|---|----------------|--------------------------------------------------------------------------------------------------------------------|--------------------------------------|------------------------|--|----------|--|

#### 10. ACTION PLAN BY GRAMAPANCHAYATH

| No | Name of Grama panchayath | Ref para No :48 as per NGT Order no 673/2018 dated 20.9.2018 | Activity                                                                                                                                                    | Implementing agency | Cost      | Source of fund                | Time line  | Remarks |
|----|--------------------------|--------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|-----------|-------------------------------|------------|---------|
| 1  | Edathala                 | A(b)                                                         | Maintanance and leading channel construction Nedumthodu, Kuruvakkulam, Palakkuzhithodu, and construction & renovation of Bund Kuruvakkulam, Palakkuzhithode | Grama panchayath    | 2,865,000 | Plan (Gen)                    | 31.03.2020 |         |
| 2  | Kunnathunadu             | E                                                            | Installation of CCTV camera at Manakkakadavu                                                                                                                | Grama panchayath    | 100,000   | CSR Fund of Wonderla Holidays | 30.09.2019 |         |

|   |                          |       |                                                                                                         |                     |         |                           |         |  |
|---|--------------------------|-------|---------------------------------------------------------------------------------------------------------|---------------------|---------|---------------------------|---------|--|
| 3 | Vadavukad<br>puthenkruze | C(ii) | Cleaning of Thodu                                                                                       | Grama<br>panchayath | 300,000 | Govt aid<br>&<br>CSR fund | 6Months |  |
| 4 | Vadavukad<br>puthenkruze | C(ii) | Survivance of<br>restrict dumping of<br>waste to the river<br>and branches (with<br>the help of Police) | Grama<br>panchayath | 500,000 | Govt aid                  | 2Months |  |

## 11. Long term Plan

| NO | Ref para No<br>:48 as per NGT<br>Order no 673/2018<br>dated 20.9.2018 | Long term measures<br>proposed                                                                            | Implementing agency                   | Amount<br>Required<br>(Rs.in Crore)<br>and Source of<br>fund | Time<br>line | Remarks          |
|----|-----------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|---------------------------------------|--------------------------------------------------------------|--------------|------------------|
| 1  | 4.1<br>E                                                              | Cultivation of paddy<br>fields in the banks of<br>drain joining<br>Manakkakadavu                          | Kunnathunadu<br>Panchayat and Revenue | -                                                            |              | Not<br>submitted |
| 2  | 4.2<br>A (b)                                                          | Provide inspection<br>bund in the banks of<br>the Kadambrayar from<br>Manakkakadavu to<br>Kozhichira bund | Kerala Irrigation<br>Department       | 7.74                                                         |              |                  |

|   |              |                                                                                           |                              |                                                               |                     |                                                    |
|---|--------------|-------------------------------------------------------------------------------------------|------------------------------|---------------------------------------------------------------|---------------------|----------------------------------------------------|
| 3 | 4.3<br>A (b) | Demarcation of Kadambayar and laying boundary stones from Manakkakadavu to Kozhichirabund | Kerala Irrigation Department | 0.04                                                          | Three years         | DPR Preparation in 10 months (through consultants) |
| 4 | 4.4<br>A (b) | Additional STP requirement (if needed)                                                    | Thrikkakkara Municipality    | Associated with Brahmapuram plant                             |                     |                                                    |
| 5 | 4.5<br>C(ii) | Solid waste treatment facility at Brahmapuram                                             | Kochi Corporation            | 300Cr (PPP Project, it is expected to start in 2 months time) |                     |                                                    |
| 6 | 4.6<br>A( b) | Restriction of illegal dumping of Septage in to the river                                 | Police                       |                                                               | As soon as possible |                                                    |

## 12. Action Plan by Ground Water Department

| Sl.No | Ref para No :48 as per NGT Order no 673/2018 dated 20.9.2018 | Activity                                                                                                                               | Ground Water Department                                                                                                                                                                                                                                                 |
|-------|--------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1     | B(i)                                                         | Ground Water resources and regulation of ground water extraction by industries particularly in over exploited as critical zones/blocks | As per Groundwater resources of Kerala, 2017 estimate a total number of 2 blocks (mulanthuruthi and vadavakkodu) comes under the kadambayar river basin. All the blocks in the river stretch are safe with stage of groundwater extraction ranges from 25.38% to 68.01% |
| 2     | B(ii)                                                        | Ground water recharging / rain water harvesting                                                                                        | The pre-monsoon groundwater level of the area ranges from 4.43 to 5.38 mbgl. Groundwater Department has not yet proposed any recharge                                                                                                                                   |

|   |        |                                                                                                                                        |                                                                           |
|---|--------|----------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|
|   |        |                                                                                                                                        | structures in this area.                                                  |
| 3 | B(iii) | Periodic ground waste quality assessment and remedial actions in case of contaminated ground water tube wells/bore wells or hand pumps | Groundwater Department has 2 observation dug wells in this river stretch. |
| 4 | B(iv)  | For regulating use of ground water for irrigation purpose, adopting good irrigation practices                                          | The total irrigation draft in the area ranges from 531.54 to 745.74 ha.m. |

**KERALA STATE POLLUTION CONTROL BOARD**

DISTRICT OFFICE -1, ERNAKULAM

GANDHINAGAR, KOCHI - 682 020

**കേരള സംസ്ഥാന മലിനീകരണ നിയന്ത്രണ ബോർഡ്**

ജില്ലാ ഓഫീസ്-1, എറണാകുളം

ഗാന്ധിനഗർ, കൊച്ചി - 682 020

Phone : 0484 - 2207783,84,85,86, E-mail: [pcbdo1@gmail.com](mailto:pcbdo1@gmail.com),  
website - [kspcb.kerala.gov.in](http://kspcb.kerala.gov.in)

PCB/EKM/DO-1/GEN-37/21

Regd. Md  
Date: 21.02.2024

From,

Environmental Engineer  
District office-1, Ernakulam

To,

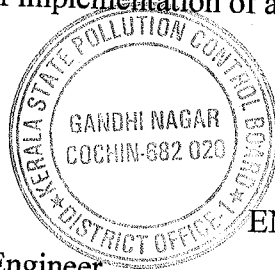
Secretary  
Thikkakara Municipality

Sub:- Non-operation of Sewage Treatment Plant (STP) -- reg

Ref: - 1) Decision of DLTC  
2) Joint inspection conducted on 04.01.2024

Sir,

As per the decision of DLTC, the Irrigation Department and KSPCB officials had conducted joint inspection in Thrikkakara Market for verifying the implementation of action plan submitted in OA 673/2018. Thrikkakara Municipality had reported to DLTC that facility for waste water treatment is installed in market. During enquiry it is noted that an FRP tank is installed in the market, but the facility is not operational. The waste water seen discharged in the premises of storage tank. The treatment facility is not operational which is non-compliance of the action plan. Note that the action plan is prepared in the year 2018 and even after 6 years no remarkable progress is noted in the project implementation by Thrikkakara Municipality. You are hereby directed to offer explanation on the non-operation of waste water treatment facility in the market and also on the failure of implementation of action plan prepared in OA 673/2018.



Yours Faithfully,

ENVIRONMENTAL ENGINEER

Copy to : 1) Chief Environmental Engineer,  
Regional Office, Ernakulam  
2) Superintending Engineer  
Irrigation Central Circle, Thrissur

**Minutes of meeting convened on 28.02.2023 by the District Level Technical Committee constituted as per the order of Hon'ble NGT in O.A No. 673/2018 for the rejuvenation of Polluted stretches of Chitrapuzha (Irumpanam to Karingachira) and Kadambayar (Manackakadavu-Bhramapuram)**

The meeting started at 11.00AM. The following members participated:

1. Sri.Ramesan S.K , Superintending Engineer, Irrigation Central Circle, Thrissur.
2. Smt. Sreelakshmy P.B, Environmental Engineer, Kerala State Pollution Control Board, District Office - 1, Ernakulam.
3. Assistant Executive Engineer, Kochi Municipal Corporation, Vytilla Zonal Office
4. Smt.Annapoorna, Assistant Engineer, Irrigation Department, Champakkara Section.
5. Junior Superintendent, Vadavucode– Puthencruz Panchayath.
6. Assistant Secretary, Kunnathnadu Panchayth.
7. Junior Health Inspector, Thripunithra Municipality.

The details of progress made by the departments is as follows

**RIVER KADAMBAYAR.**

| SL No | Activity                                                                                                                          | Implementing agency                                            | Status of Jan 2024                                                                                                                                                                                                                                                                | Status of Feb 2024                                |
|-------|-----------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|
| 1     | Surveillance to restrict the dumping of wastes into river and its branches                                                        | Kunnathnadu grama Panchayath                                   | Camera operational.                                                                                                                                                                                                                                                               | Camera operational.                               |
| 2     | Cleaning of thodu                                                                                                                 | Irrigation Department<br><br>Vadavucode– Puthencruz Panchayath | Kuzhiyanal Padam thodu cleaning and Padathikkara thodu cleaning completed.                                                                                                                                                                                                        | Action for setting of new cameras is progressing. |
| 3     | Restricting seepage of leachate of plastic dumped in the dumping yard.<br><b>(Biomining of legacy waste is to be carried out)</b> | KSIDC, Government of Kerala for Kochi Corporation              | Biomining stopped due to fire at Bhramapuram dumping yard on 02.03.2023. Tender called for new plant. Letter of intent issued to the qualified company on 14.09.2023. Legal paper work in progress. Agreement signed. Work plan submitted. Bio mining started by the new company. | Bio mining is in progress                         |
| 4     | Provide proper facilities for restricting the seepage of leachate (Leachate Treatment Plant)                                      | Kochi Corporation                                              | New composting plant using BSF (Black Soldier Fly) proposed. Land survey progressing for new plant.<br><br>Land divided and demarcated to 2 companies for setting up of plant. Site                                                                                               | Trial run of BSF Plant started                    |

|    |                                                                                                                                                                                                           |                                  |                                                                                                                                                                                                                                                                                                                                                       |                                           |
|----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|
| 5  | Provide proper facilities for collecting and treating leachate                                                                                                                                            | Kochi Corporation                | development activities for BSF plant of 50 T/day capacity which is in progressive stage. Preliminary survey completed for 120 T/day capacity BPCL plant. Leachate treatment plant included in BSF project.<br>Infrastructure development activity is progressing in the site.<br>Civil work of BSF plant completed                                    | Leachate plant included in new BSF plant. |
| 6  | Solid waste treatment facility at Brahmapuram/ <b>Waste to Energy plant</b>                                                                                                                               | Kochi Corporation                | Council approval pending.<br><br>No progress                                                                                                                                                                                                                                                                                                          | No progress                               |
| 7  | Surveillance to restrict dumping of waste to the river and branches (with the help of Police)                                                                                                             | Vadavucode–Puthencruz Panchayath | Camera operational. Proposal to install more cameras with financial support of smart city.                                                                                                                                                                                                                                                            | No progress.                              |
| 8  | Slaughter house and poultry waste Rendering plant                                                                                                                                                         | Thrikkakkara Municipality        | The land identified and the land inspected by the sub-committee. The proposal submitted for council approval. Council not approved the proposal since land value is found higher than the market value. The proposal cancelled and decided to give advertisement again. Advertisement given. No further progress reported<br><br>No progress reported | Not attended the meeting.                 |
| 9  | Sanitation facility and treatment of waste water in the markets, Treatment plant Portable aerobic bins                                                                                                    | Thrikkakkara Municipality        | Municipality informed that tender called for installing waste management facilities in market. The work awarded to M/s KEL.                                                                                                                                                                                                                           | . Not attended the meeting                |
| 10 | Provide facility for the treatment of sewage, sullage and garbage generated. Proposed places for the installation of Aerobins<br>(1) Municipal office compound<br>(2) NGO quarters<br>(3) Kakkanad Market | Thrikkakkara Municipality        | Municipality informed that tender called for installing waste management facilities in market. The work awarded to M/s KEL.<br><br>Construction in progress. Reported to complete within 1 month.<br><br>Inspected the site by DLTC committee. Only one storage tank constructed. Waste water seen discharged in the premises of market               |                                           |

|    |                                                                                                                                                                                                    |                                                                   |                                                                                                                                                                                                                                                                             |                          |
|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
|    | Near Eechamukku TV-Centre Anganavadi                                                                                                                                                               |                                                                   |                                                                                                                                                                                                                                                                             |                          |
| 11 | Providing facility for restricting discharge of waste water from the surrounding houses to the river<br><br>Outlet closing procedures are going on by issuing Notices                              | Thrikkakkara Municipality                                         | Survey reported to be Progressing. 95% survey completed.<br><br>76% survey completed. 9 Notices issued. Collected Rs 1,17,000/- as fine in the month of April- May. Fine Rs 57,600/- collected. Survey progressing. Notice issued for violators. Present status not updated | Not attended the meeting |
| 12 | River water quality monitoring – Monitoring of water quality                                                                                                                                       | Kerala State Pollution Control Board                              | Monthly monitoring ongoing                                                                                                                                                                                                                                                  | Monitoring progressing   |
| 13 | Inspection and effluent quality monitoring of the flats, industrial units, service stations, hospitals, hotels etc.<br><br>Monitoring of establishments, service stations, flats, industrial units | Kerala State Pollution Control Board                              | Monitoring progressing                                                                                                                                                                                                                                                      | Progressing              |
| 14 | STP requirement                                                                                                                                                                                    | Thrikkakkara Municipality                                         | No adequate land<br>No progress.                                                                                                                                                                                                                                            | Not attended the meeting |
| 15 | Acquiring of land and rehabilitate families from the banks of River<br><br>To allot land, Govt procedures are on going.                                                                            | District Collector,<br>Thrikkakkara Municipality,<br>Revenue Dept | Action to be initiated.                                                                                                                                                                                                                                                     | Action to be initiated   |

|    |                                                                                                                                                                                                                                                                                                                                                                          |                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                          |
|----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|
| 16 | <p>Development package</p> <p>Inspection bund for Chithrapuzha and Kadambayar are included in this package. For this project, preliminary investigation of site which includes survey of land to know its availability for formation of side bund which is to be provided with tiles. The project also includes side protection work of Chithrapuzha and Kadambayar.</p> | Irrigation department | <p>FS not obtained. Minor works such as de-siltation, water hyacinth removal, etc. is completed</p> <p>The Irrigation department had issued letter to Thasildar to take action for demarcation of river boundary to find out encroachments. FS not obtained for the development package project.</p> <p>FS not obtained for development package. Soil investigation completed. Boundary demarcation need to be done. Reported the matter to District Collector.</p> | No progress                                              |
| 17 | <p>Desilting and development It includes clearing and removing water hyacinth of Kadambayar, Chithrapuzha and Edachira thodu near Infopark phase II. This is to be done periodically (every four months), depending on availability of fund.</p>                                                                                                                         | Irrigation Department | <p>Financial sanction not obtained</p> <p>De-siltation work completed through operation Vahini project. De silting and water Hayacinth removal completed</p> <p>New proposal submitted for removal of water hyacinth from Kadambayar upstream ecotourism to Kozhichira bund in Ernakulam District.</p> <p>Edachira thodu cleaning completed by Thrikkakkara Municipality. Manakkadakadavu to Kozhichira Bund cleaning completed.</p>                                | New estimate submitted.                                  |
| 18 | <p>Sheet piling &amp; providing fencing. Fencing provided in Sl.no5.3</p>                                                                                                                                                                                                                                                                                                | Irrigation Department | Financial sanction not obtained                                                                                                                                                                                                                                                                                                                                                                                                                                     | Financial sanction not obtained for development package. |
| 19 | <p>Development of river basin</p> <p>It includes cleaning and removal of water hyacinth from rivers and maintains its natural flow, depending on availability of fund.</p>                                                                                                                                                                                               | Irrigation Department | F S not obtained                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Financial sanction not obtained for development package. |

## RIVER CHITRAPUZHA

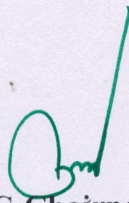
| SL No | Activity                                                                                                                    | Implementing Agency                                     | Status of January, 2024                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Status of Feb. 2024                                                                                                           |
|-------|-----------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|
| 1     | Effluent monitoring from FACT                                                                                               | KSPCB                                                   | Ongoing                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Monthly monitoring conducted at FACT, HOCL, BPCL Refinery Ambalamugal and verifying whether the ETP is operating effectively. |
| 2     | Periodical Monitoring                                                                                                       | KSPCB                                                   | Ongoing                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Ongoing                                                                                                                       |
| 3     | Surveillance to restrict the dumping of wastes into the river and its branches                                              | Vadavucode–Puthencruz Panchayat with the help of Police | Ongoing Rs. 5000 fine imposed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Ongoing                                                                                                                       |
| 4     | Sanitation Survey                                                                                                           | Vadavucode – Puthencruz Panchayat                       | Survey continuing.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Survey progressing.                                                                                                           |
| 5     | Periodical Cleaning                                                                                                         | Irrigation Department                                   | Reach I, II & III completed through Operation Vahini in August 2022. Work Completed.<br><br>New proposal submitted to CE for water hayacinth removal km stretch                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | New proposal of Kozhichira Bund to Mamala Bridge submitted.                                                                   |
| 6     | Identification of major pollution causing units(Apartments, hospitals, service stations, markets and industries)in Upstream | Thrikkakkara Municipality                               | No progress reported.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Not attended the meeting                                                                                                      |
|       |                                                                                                                             | KSPCB                                                   | Inspection progressing.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Inspection progressing.                                                                                                       |
| 7     | Surveillance to restrict the dumping of wastes into the river and its branches                                              | Thrikkakkara Municipality with the help of Police       | <b>Status as on July:</b><br>Camera installed. 40 violations identified and action initiated. Identified 52 violations. 3 persons penalized. Details of vehicles collected from RTO Office to identify the vehicle that littering wastes. Further actions will be initiated against the violators. Fine of Rs 41,240/- levied from Januray to February. 19 violation cases identified by Night Squad<br>Rs 14,090/- levied in May2023. Notices issued to 9 violators. Fine of Rs 25,000/- collected. Rs 2510/- collected for the violation identified through the surveillance cameras.<br><b>43</b><br><b>August and Sep:</b> Not attended | Not attended the meeting                                                                                                      |

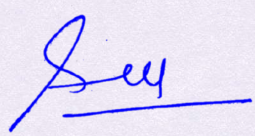
|    |                                                                                       |                                                     |                                                                                                                                                                                                                                                                                                                       |                                                                                                                     |
|----|---------------------------------------------------------------------------------------|-----------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|
|    |                                                                                       |                                                     | meeting<br><br><b>Nov:</b> Fine imposed to violations noted Direction issued to hotel to remit Rs 30,000/- for discharging waste water.<br>Reported that Rs 20000 Collected as fine in January                                                                                                                        |                                                                                                                     |
| 8  | Periodical Cleaning (Reach II,III)                                                    | Irrigation Department                               | Reach I & Reach II completed. Reach III implemented through Operation Vahini in August 2022.<br><br>Work Completed.                                                                                                                                                                                                   | Mamala bridge to Chambakkara canal cleaning done.<br><br>New proposal submitted to CE for water hayacinth removal . |
| 9  | Sanitation Survey                                                                     | Thrakkara Municipality                              | Sanitation survey progressing. Environmental Engineer, KSPCB informed the municipality to submit the report.<br>76% completed.<br><b>Sep:</b> Not attended meeting.                                                                                                                                                   | Not attended the meeting                                                                                            |
| 10 | Identifying and closing of all unauthorized outlets into the stream joining the river | Thripunithura Municipality                          | The secretary reported the action is progressing. 15 notices issued. 18 Notices issued to the violators.<br>Notices Issued to 105 apartments. Fine Of Rs. 1,12,500 collected.<br>3 additional outlets closed.<br>Rs 25000/- fine imposed. Notices Issued.<br>Fine Rs. 10000/- remitted by apartment.                  | Outlet closed- Rs 10000 fine levied                                                                                 |
| 11 | Sanitation Survey                                                                     | Thripunithura Municipality                          | Field inspections progressing. 80% work completed.                                                                                                                                                                                                                                                                    | 85% completed                                                                                                       |
| 12 | Surveillance to restrict the dumping of wastes into the river and its branches        | Thripunithura Municipality with the help of Police. | Night squad inspection progressing. 3 cases identified and notices issued. Rs. 7510/- levied. Rs. 10000/- levied by plastic squad. Rs. 35000/- for AI camera notices issued.<br>Fine of Rs. 32500/- imposed in October<br>Rs 37500/- collected by night squad<br>2 Night squad deputed and collected fine of Rs 17500 | Rs 30000 as fine levied.                                                                                            |

|    |                                                                                                                    |                                                 |                                                                                                                                                                                                                                                                                                                                              |                                                 |
|----|--------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|
| 13 | Cleaning of Konothupuzha (work Proposal already submitted by Minor Irrigation)                                     | Action initiated per OA 237/2017                | Action initiated as per OA 237/2017                                                                                                                                                                                                                                                                                                          | Action initiated as per OA 237/2017             |
| 14 | Surveillance to restrict the dumping of wastes into the river                                                      | Vadavucode - Puthercruz with the help of Police | Inspection progressing.                                                                                                                                                                                                                                                                                                                      | Inspection progressing                          |
| 15 | River water quality monitoring                                                                                     | KSPCB                                           | Conducting Monthly monitoring                                                                                                                                                                                                                                                                                                                | Conducting Monthly monitoring.                  |
| 16 | Inspection and effluent quality monitoring of the flats, industrial units, service stations, hospitals, hotels etc | KSPCB                                           | Ongoing                                                                                                                                                                                                                                                                                                                                      | Ongoing                                         |
| 17 | STP requirement                                                                                                    | Thripunithura Municipality                      | Special council meeting convened, and subcommittee constituted for identifying land for the STP. Subcommittee discussed with nearby Panchayath for installing common system with adjacent Panchayath. 2 acres land identified. Committee conducted inspection. Further action will be taken<br>Proposing 7.5MLD. DPR will be prepared by KWA | Procedure for hand overing land is progressing. |

The Environmental Engineer informed that as decided in the previous meeting, the DLTC had asked explanation from Thrikkakkara Municipality on non-compliance of project implementation found during joint inspection conducted by DLTC. The DLTC Chairman informed that the further action can be taken based on the reply of the Municipality.

The meeting came to an end by 12.00 Noon

  
**DLTC-Chairperson &  
 Superintending Engineer  
 Irrigation Central Circle,  
 Thrissur**

  
**DLTC- Convenor &  
 Environmental Engineer  
 KSPCB, District Office - 1,  
 Ernakulam**

**Report on Joint Inspection conducted by District Level Technical Committee (DLTC) (constituted as per Order of Hon'ble NGT in OA 673/2018) on 04.01.2024.**

The DLTC meeting convened on October 2023 had decided to conduct a physical verification of various projects implemented for rejuvenation of Kadambrayar and Chithrapuzha in OA 673/2018. The following officers were deputed for the physical verification on behalf of Superintendent Engineer, Irrigation dept (Chairman of the committee), Environment Engineer, KSPCB (Convener of the committee) :

1. Smt Manju N S , AEE ( Irrigation dept ),
2. Smt Chitra P , AE ( Irrigation dept ),
3. Smt Sinju P S Overseer Gr. II ( Irrigation dept )
4. Sri Aswin V Paniker ,AE ( KSPCB )

The joint verification was conducted in Thrikakara Municipality, Thripunithura Municipality and Kochi Corporation Brahmapuram plant. The findings of the joint inspection reported below

**Kochi Corporation**

Accompanied by Sri. Vinuraj, AE ( Kochi Corporation)

| SL No | Activity                                                                                                                   | Status reported in DLTC                                                                                                                                                                                | Comments of committee                                                                                                  |
|-------|----------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|
| 1     | Restricting seepage of leachate of plastic dumped in the dumping yard.<br>(Biomining of legacy waste is to be carried out) | Letter of intent issued to the qualified company on 14.09.2023.<br>Legal paper work in progress.                                                                                                       | Bio mining trial run was seen started                                                                                  |
| 2     | Provide proper facilities for restricting the seepage of leachate (Leachate Treatment Plant)                               | Site development activities for BSF plant of 15 T/day capacity which is in progressive stage. Preliminary survey completed for 120 T/day capacity BPCL plant. Leachate treatment plant included in BSF | 1.Land survey of BSF plant were almost completed<br>2.Superstructure of other compressed bio gas plants were going on. |

### Thripunithura Municipality.

Accompanied by Sri.Sanjeev Kumar Clean City Manager, Smt. Indhu C Nair Senior Public Health Inspector Gr. II, Sri. Ajeesh A R Public Health Inspector Gr. I.

| SL No | Activity                                                                              | Status reported in DLTC                                                                   | Comments of committee                                                                                                                                                                                                        |
|-------|---------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1     | STP requirement                                                                       | The land identified by the Municipality. Inspection need to be conducted by the committee | Land selected for the STP plant was inspected and paper work for the construction is progressing                                                                                                                             |
| 2     | Surveillance to restrict the dumping of wastes into the river and its branches        | Fine of Rs. 32500/- imposed                                                               | Inspected the locations in which Cameras were installed and it is noted that at some locations in which the cameras were not directly pointed to the river banks which is not effective in preventing waste dumping to river |
| 3     | Identifying and closing of all unauthorized outlets into the stream joining the river | Fine Rs. 9000/- collected from two violators                                              | One of the sites in which municipality closed the illegal outlet to drain were inspected and verified                                                                                                                        |

### Thrikakkara Municipality

Accompanied by staff from engineering section of Thrikakkara Municipality.

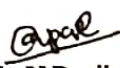
| SL No | Activity                                                                                               | Status reported in DLTC                                        | Comments of committee                                                                                                                                                                                                                        |
|-------|--------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1     | Slaughter house and poultry waste Rendering plant                                                      | No progress                                                    | Health Inspector informed that land which was identified initially is changed due to the protest from people. No further developments in the project                                                                                         |
| 2     | Sanitation facility and treatment of waste water in the markets, Treatment plant Portable aerobic bins | Construction in progress. Reported to complete within 1 month. | The construction of waste water treatment in completion stage. Noted only one storage tank installed. No other treatment units provided. The facility seems inadequate. The waste water from market seems stagnated around the storage tank. |
| 3     | Surveillance to restrict dumping of waste to the river and branches (with the help of Police)          | No progress                                                    | Health Inspector informed that none of the cameras installed are functional                                                                                                                                                                  |

### Conclusion

The statements given by the Thripunithura Municipality and Kochi Corporation in DLTC meeting is found to be correct in the joint verification. The team had noted progress in the implementation of action plan in Thripunithura Municipality and Kochi Corporation but, non compliances was noted in case of Thrikkakara Municipality. The waste water treatment plant only consists of a collection tank which seems to be unscientific. The untreated waste water was seen discharged around the waste water collection tank and foul smell.

  
Smt Manju N S , AEE, Irrigation Sub Division, Piravom

  
Smt. Chitra, AE, Irrigation Dept

  
Sri Aswin V Paniker ,AE, KSPCB, District Office-1, Emakulam



Ongoing construction of STP in Kakkanad Market



Untreated waste water is being deposited directly to the land



Trial run going on at Brahmapuram plant



Preliminary construction work of BSF plant is being going on



compressed bio gas plant construction in progress



STP Site proposed in Thripunithura Municipality

**Minutes of meeting held between CSEZ authorities and party industries  
whose effluent is connected to CETP on 12.02.2024**

**Venue- Training center, KSPCB, Kadavanthra.**

Meeting convened by P.B Sreelakshmy, Environment Engineer, KSPCB, District Office-1, Ernakulam. The meeting started at 11AM. Following are the participants of meeting.

1. Sri Pramod, Cochin Special Economic Zone Authority (CSEZA), Ministry of Commerce & Industry Govt. of India
2. Sri Dhanesh, WAPCOS (Consultant)
3. Sri. Aswin. V. Panicker, Assistant Engineer, KSPCB
3. M/s. WFB Baird & Company (India) Pvt. Ltd.,
4. M/s. Amazing Rubber Products Pvt. Ltd.,
5. M/s. TCL Ceramics Ltd.,
6. M/s. Al Badar Sea Foods Pvt Ltd.,
7. M/s. Abad Exim Pvt. Ltd.,
8. M/s. Primus Gloves (P) Ltd.,
9. M/s. Safecare Rubber Products Limited,
10. M/s. Safeshield India Rubber Products Pvt. Ltd.,
11. M/s, Royal Malabar Food Pvt. Ltd.,
12. M/s. L J International Ltd.,
13. MJs. Nikasu Frozen Foods International,
14. M/s. H T Foods Pvt. Ltd.,

Environment Engineer welcomed all the participants to the meeting and explained the intention of the meeting. Environment Engineer informed that the Board had given Consent to Establish for installing new Common Effluent Treatment Plant (CETP) in the CSEZ with new technologies for achieving Zero Liquid Discharge (ZLD). The new CETP installed with Membrane Bio Reactor technology incorporating tertiary treatment units such as Reverse Osmosis, softener, Multiple Effect Evaporator etc. The new CETP had commissioned and started operation. Board had collected samples from the CETP and found that parameters of the treated effluent are meeting the standards. Even though, the new plant is installed to achieve the ZLD, the treated water is still discharged to drain ultimately reaching Chitrapuzha River. Central Pollution Control Board (CPCB) had inspected the CETP on 29.05.2023.

Based on the inspection, CPCB had pointed out the non-compliance with respect to failure of implementing ZLD in CETP. Based on the inspection, CPCB had directed to KSPCB to implement the following CETP, CSEZ, Kochi.

- To install Online Continuous Emission Monitoring System (OCEMS) as per the CPCB guidelines and provide connectivity to CPCB/SPCB, immediately.
- To utilize the treated wastewater, recovered through ZLD system and keep a record of the same.
- To install flow measurement devices for filtration system, RO (feed, reject and permeate) & evaporator (feed, condensate & concentrate) and keeps the record of the same.
- To provide requisite system for treatment & disposal of MEE concentrate and maintain records of the same.

KSPCB on 18.10.2023 issued directions to the CSEZ authorities to comply the above directions. But, even after 4 months, no positive action is being taken by the CSEZ authorities to comply with the Board's directions. In the circumstance, the Board had convened meeting with CSEZ authorities and industries to inform the significance of achieving ZLD and also to discuss the present status of compliance of Board's directions. Environment Engineer asked the CSEZ authorities to report the current status.

Sri Pramod.S, Secretary, CSEZ have informed that the CSEZ conducted trial run for 1 year for calculating the operational cost of CETP after operating all the treatment units and the rate (amount to be remitted by each industry) was fixed based on trial run. He further pointed out that the details of rates along with the draft agreement were circulated among the industries. The industries have not responded favorably and the agreement is not being finalized and signed till date.

The Environment Engineer asked the industries to explain their concerns.

M/s. Safecare Rubber Products Limited informed that the existing CETP was meeting the standards of PCB and the new CETP was not required as the old CETP itself can be operated effectively. The construction of new CETP is the decision of CSEZ authorities. The industries do not require high quality treated water and ZLD is un-necessarily imposed over the industries. He further informed that the rate fixed by CSEZ for CETP operating cost is high and cannot be afforded by the industries.

M/s Primus Gloves (P) Ltd. also informed their concern on the rate fixed by CSEZ authorities. He also informed that the industries are unaware of the operation of new CETP. He also pointed out that the trial run of CETP was not informed to the industries and also the details of assessing rate of CETP is also not properly communicated to the industries.

M/s WFB Baird & Company (India) Pvt. Ltd also informed that being a major effluent generating industry the rate fixed for new CETP operation is very high and not economical. The industry also, expressed their concern on the quality of treated water.

M/s Amazing Rubber Products Pvt. Ltd. informed that as per CSEZ direction, they had given primary treatment for effluent generated and after providing primary treatment being diverted to CETP. The industry is spending money for primary treatment and imposing new rate for CETP operation will be burden on them.

All the industries raised their concern on the new rate fixed for CETP operation. The industries also complained that the CSEZ have not provided the split up of the cost and rates fixed for CTEP operation.

After hearing the industries and CSEZ authorities, the Environment Engineer informed that achieving ZLD for CETP is mandatory and CETP of CSEZ, Kochi cannot be exempted from achieving ZLD. The failure on achieving the directions is violation and the Board will be forced to take further actions against the industries and CSEZ authorities. The Environment Engineer further added that the industries shall co-operate with CSEZ authorities for implementing ZLD system. The concern of the industries that the cost will be high and not-economical cannot be considered as it is an environment policy and legal obligation of an industrial park. The Environment Engineer directed the CSEZ authorities to circulate the details of rate fixing for CETP operation cost. The copy of analysis report of CETP will also be provided to the industries. The Environment Engineer also informed that the issues will also be reported to the higher authorities of Board.



ENVIRONMENT ENGINEER  
KSPCB, District Office-1  
Ernakulam

☎: General: 0471- 2312910, 2318153, 2318154, 2318155 Chairperson: 2318150 Member Secretary: 2318151  
e-mail: [chn.kspcb@gov.in](mailto:chn.kspcb@gov.in); [ms.kspcb@gov.in](mailto:ms.kspcb@gov.in) FAX: 2318152 web: [www.kspcb.kerala.gov.in](http://www.kspcb.kerala.gov.in)



# KERALA STATE POLLUTION CONTROL BOARD

കേരള സംസ്ഥാന മലിനീകരണ നിയന്ത്രണ ബോർഡ്

Pattom P.O., Thiruvananthapuram – 695 004

പട്ടം പി.ഒ., തിരുവനന്തപുരം – 695 004



15/03/2024

KSPCB/322/2022-EE- 3

**MOST URGENT NGT**

From

Member Secretary

To

1. The Managing Director  
Kerala Water Authority

2. The Secretary  
Kochi Corporation

Sub:- Illegal discharge of septage in to the waterbodies in Kochi-reg

Ref:- 1. Complaint from Sri. John Daniel received through Environment Department

2. Order of the Hon'ble NGT(SZ) dated 09/02/2024 in OA No.45/2024

3. Action taken report in OA 147/2022 dated 18/08/2023 by Kochi Corporation

4. Action taken report by KWA dated 16.02.2024 on the minutes of the Chief Secretary's

Review Meeting on 27/12/23

Sir,

Attention is invited to the subject matter. Illegal disposal of septage is reported vide ref.(1) in Periyar river. Similar incidents were reported in medias regarding illegal disposal of septage/sewage in waterbodies in Kochi namely Thevara, Vyttila, Brahmapuram etc. The Hon'ble NGT has registered Suo Motu case (ref 2) based on newspaper report regarding waste dumping in areas including Kadambayar.

In Kochi, the following CSTP/FSTPs are reported as existing vide ref(3)

- 1) 5 MLD STP at Elamkulam with Co-treatment facility
- 2) 0.1 MLD FSTP at Wellington Island
- 3) 0.1 MLD FSTP at Brahmapuram
- 4) 0.9 MLD STP owned by GCDA, Marine drive Kochi
- 5) 0.7 MLD STP owned by GCDA, International Stadium Kaloor

Vide ref(4), KWA has reported that co-treatment at Elamkulam STP has been stopped temporarily due to choking. Urgent action is required to fully utilise the treatment facility at Elamkulam plant and please report the progress urgently.

Urgent necessary action shall be taken to ensure continuous proper functioning of all existing FSTP/CSTPs under your jurisdiction and to avoid illegal disposal to water bodies, which result in severe water contamination. Kochi Corporation is requested to take stringent action to ensure monitoring of agencies collecting septage waste from establishments to avoid illegal disposal. Enforcement squad may be asked to make surprise inspection of the area periodically. Action taken report & time bound proposal to avoid such incidents in future shall be submitted urgently.

Yours faithfully,

*Shweta A J*

**MEMBER SECRETARY**

Copy to: 1. The CEE, RO Ernakulam - for necessary follow up  
2. The EE ,DO Ernakulam-1/2/Esc Eloor - for necessary follow up

# KERALA STATE POLLUTION CONTROL BOARD

കേരള സംസ്ഥാന മലിനീകരണ നിയന്ത്രണ ബോർഡ്



DISTRICT OFFICE (ERNAKULAM-II), PERUMBAVOOR

ജില്ലാകാര്യാലയം (എറണാകുളം-2) പെരുമ്പാവൂർ

PMC. 20/733, Near Kallumkal Auditorium, Perumbavoor – 683 542

പിഎംസി. 20/733, കല്ലങ്കൽ ഓഡിറ്റോറിയം സമീപം, പെരുമ്പാവൂർ – 683 542

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Annexure 7

PCB/EKM/DO-2/GEN-57/18

Regd.

Despatched  
on 22/06/24

Ref: 1. Integrated Consent to Operate-Renewal No. PCB/EKM/DO-II/ICO-R/014ERNA318229/2022 dated 23/07/2022 valid up to 30/04/2027.

2. Inspection conducted by the Board officials on 11/06/2024.

## SHOW CAUSE NOTICE

WHEREAS M/s Septage Treatment Plant 100 M<sup>3</sup>/Day, Brahmapuram, Ernakulam – 682 308, comes under the purview of Air (Prevention & Control of Pollution) Act 1981, Water (Prevention & Control of Pollution) Act 1974, Environmental (Protection) Act 1986 and is bound to comply with the rules made there under;

WHEREAS the Board officials had conducted inspection on 11/06/2024;

WHEREAS during the inspection conducted on 11/06/2024, it is found that the Septage Treatment Plant is not properly maintained and found to be in dilapidated condition;

WHEREAS during inspection the following defects were found:

1. Septage Treatment Plant and vicinity seems to be in an unhygienic condition,
2. Roofing is not provided for the sludge drying shed,
3. Leachate from the sludge drying facility was seen flowing to the nearby land,
4. The temporary storage facility within the plant premises is not sufficient to accommodate the treated water;

NOW THEREFORE, you are hereby directed to show cause, if any, within 7 days of receipt of this notice, why further action shall not be taken against your unit.

Dated this 22<sup>nd</sup> day of June, 2024

For and on behalf of the  
KERALA STATE POLLUTION CONTROL BOARD



ENVIRONMENTAL ENGINEER

To

The Secretary  
Cochin Municipal Corporation  
Ernakulam  
Cochin – 682 011