

**REPORT OF JOINT COMMITTEE ON-  
“FROTHING OF CHEMICAL FOAM IN RIVER  
THENPENNAI”**

**in Compliance to  
Directions of the Hon’ble Tribunal (SZ), Chennai  
(in the matter of O. A. No. 111/2020)**



**November, 2020**

**CENTRAL POLLUTION CONTROL BOARD  
Ministry of Environment, Forest and Climate Change  
Govt. of India**

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## CHAPTER – 1

### BACKGROUND

Hon'ble National Green Tribunal, Southern Zone, Chennai in the matter of O.A No. 111 of 2020; Tribunal on its own motion based on the News Item in Tamil Newspaper Dinamalar Chennai Edition dated 13.07.2020, "Frothing of Chemical Foam in the River Thenpennai" Vs The Principal Secretary to Government, Public Works Department, Chennai &Ors., passed orders dated 20.07.2020. Copy of Hon'ble NGT Orders dated 20/07/2020 is appended as **Annexure I**.

Excerpts of the News Item in Tamil Newspaper Dinamalar Chennai Edition dated 13.07.2020, "Frothing of Chemical Foam in the River Thenpennai" is given below:

- (i) On 13<sup>th</sup> July, 2020 about 640 Cusecs water was discharged from Kelavarapalli Reservoir, Hosur and huge amount of chemical foam was found in Thenpennai River.
- (ii) The flow of water into the reservoir increased gradually from 320 cusecs (09<sup>th</sup> July, 2020) to 480 cusecs (11<sup>th</sup> July, 2020) due to heavy rainfall in the catchment area.
- (iii) In general, whenever the flow of water increases in Kelavarapalli reservoir the domestic sewage and industrial effluent from Karnataka mixes into the river in huge quantity.
- (iv) On the day of 13<sup>th</sup> July, 2020, a huge quantity of sewage/effluent were discharged into Thenpennai and therefore, chemical froth/foam were found floating on the surface of water flowing in Kelavarapalli and near thattakalapalli bridge.

Hon'ble Tribunal(SZ), Chennai vide its orders dated 20.07.2020 appointed a Joint Committee to inspect the area in question and submit status as well as action taken report, if there is any violation found. The Hon'ble Tribunal has also issued following directions to the committee;

- (i) To ascertain the water quality and also ascertain the sources of pollution and take action against the person who are responsible in accordance with law including imposing of environmental compensation.
- (ii) To submit a long term and short term action plan with shorter time lines to protect the water body against pollution. If there is any contamination caused, the committee is also directed to suggest ways and means to remedy the same.

Hon'ble Tribunal vide aforesaid orders directed the committee to submit the report within a period of two months i.e., on or before 05.10.2020.

The Joint Committee submitted interim report on 01.10.2020 and informed the Hon'ble NGT that the report of the joint committee requires six weeks time and the report would be submitted after incorporating the analysis results of samples collected in River Thenpennaialongwith action plan. In this regard, Hon'ble NGT accepted the interim report and vide order dated 05.10.2020 directed that, "*... some more time can be given to the committee to submit the report as directed by this Tribunal...*"

*The Committee is directed to submit the report on or before 26.11.2020..."*

Copy of the Hon'ble NGT Order dated 05.10.2020 is appended as ***Annexure II.***

## CHAPTER – 2

### CONSTITUTION OF JOINT COMMITTEE AND MEETINGS

In compliance to the aforesaid orders dated 20/07/2020 of Hon'ble Tribunal (SZ), Chennai, a Joint Committee comprising of following members has been constituted by Central Pollution Control Board (Nodal Agency) vide its Office Memorandum No. Tech 39/Legal(NGT)/RDS/2020-21/466-474 dated 24.08.2020 and 16.09.2020. Copy of the said Office Memorandum is appended as **Annexure III& IV**.

1.	Sh. Gunasekaran Revenue Divisional Officer & Sub Divisional Magistrate Hosur Division, Tamilnadu	Member
2.	Sh. N Suresh Superintending Engineer, WRO Public Works Department Tiruvannamalai, Tamilnadu	Member
3.	Sh B H Manjunath* Superintending Engineer Public Works Department Bangalore Circle, Karnataka	Member
4.	Sh. N Nagaraj Superintending Engineer Minor Irrigation & Ground Water Development Circle, Jayanagar Bangalore, Karnataka	Member
5.	Dr M Senthil Kumar District Environmental Engineer Tamilnadu Pollution Control Board Hosur District, Tamilnadu	Member
6.	Sh. M K Prabhudev Chief Environmental Officer – 2 Karnataka Pollution Control Board Bangalore, Karnataka	Member
7.	ShShivanna M G Assistant Commissioner (South) Bangalore Urban Karnataka	Member
8.	Smt. Selvi P K Scientist D, Regional Directorate Central Pollution Control Board Bangalore	Nodal Officer & Member

*\*Subsequent to transfer of Sh. K Durugappa, Superintending Engineer vide Government of Karnataka Order dated 28-08-2020, Sh B H Manjunath, Superintending Engineer, PWD, Bangalore has been nominated as a member of the above Joint Committee.*

Three meetings were organized by Central Pollution Control Board, Bangalore (Nodal Agency) with the members of Joint Committee on 20.08.2020, 04.09.2020 and 18.09.2020 and minutes were circulated for necessary actions. First and Second Meeting of the Joint Committee were conducted on 20.08.2020 & 04.09.2020 to discuss about the preliminary information to be collected before conducting Monitoring and Sampling of River Thenpennai. Therefore, the joint committee decided to collate following information from the concerned departments to carry out further investigations in the matter;

<b>S.No</b>	<b>Information Required from concerned Departments / Organisations in Tamilnadu and Karnataka</b>
<b>A.</b>	<b>Minor irrigation and Water Resources Organisations</b>
1.	Drainage River Map of Thenpennai.
2.	Details of Water Quality Monitoring locations (viz., drainage (flow), length, velocity etc.) in the entire stretch of river from origin till Kelavarapalli Reservoir.
3.	Designated use of water flowing in the river stretch
4.	Quantity of water discharged from the river stretch for irrigation and other purposes.
5.	Annual Rainfall and Rainfall details for August, September, October 2020
6.	Custodian of the river to preserve the quality of water to be pristine.
<b>B.</b>	<b>State Pollution Control Boards</b>
7.	Details of Water Quality Monitoring Locations and water quality data of the River in terms of DO, BOD, COD, TC, phosphates & others for the last three years.
8.	Major Sources of pollution (industrial and domestic) – (a) Status of list of industries with its type/category/classification, Effluent generation, characteristics, treatment, discharge details etc. (b) Details of domestic effluent generation, treatment, discharge options etc. (c) Status of Operation of Sewage Treatment Plants with its performance evaluation. (d) Information regarding open dumping of solid or biomedical or hazardous waste, open burning of waste and illegal encroachment or other activities along the river bed etc.
<b>C.</b>	<b>Public Works Department</b>
9.	Status of sewage discharge and sewerage networking plan in the unsewered area.
10.	About Kelavarapalli dam and designated use of dam water.

Subsequently, it was discussed and decided to collect the following information from Bangalore Water Supply and Sewerage Board (BWSSB), Bangalore Development Authority (BDA) and Bangalore BruhatMahanagaraPalike (BBMP) in the second meeting of the Joint Committee conducted on 04.09.2020;

- (a) Status of Sewage Treatment Plants (STPs) (existing & operational, under construction and proposed) in Koramangala&ChallaghattaValley and Hebbal Valley
- (b) Drainage map / layout showing locations of STPs with capacity and sewerage networking in those valleys
- (c) Details of flow of domestic sewage measured at inlet and outlet (after treatment) of each of the STPs
- (d) Performance of STPs based on its operational capacity, Waste water generated vs actual quantity treated, gap analysis and treated waste water quality (w.r.t discharge standards of STP) in Real Time Monitoring stations installed etc.
- (e) Quantum of untreated sewage flowing in Koramangala&Challaghatta and Hebbal valley with its proposed Underground Drainage network plan and others
- (g) Details of plan for diversion of treated wastewater to Kolar, Chikaballapur and other districts of Karnataka
- (h) Details of Rejuvenation of lakes and water bodies in Bengaluru etc.

Third meeting of the Joint Committee was conducted on 18.09.2020 to discuss and review the status of Action taken on the defaulters followed by Action Plan for compliance etc.

Subsequent to the orders of the Hon'ble NGT dated 05.10.2020, two meetings were organized with the state functionaries of Karnataka (BWSSB and KSPCB) on 08.10.2020 and 22.10.2020 to discuss & collate the information about the details of industries located in Karnataka near the River basin of Thenpennai and status of STPs located in Koramangla&Challaghatta and Hebbal Valley.

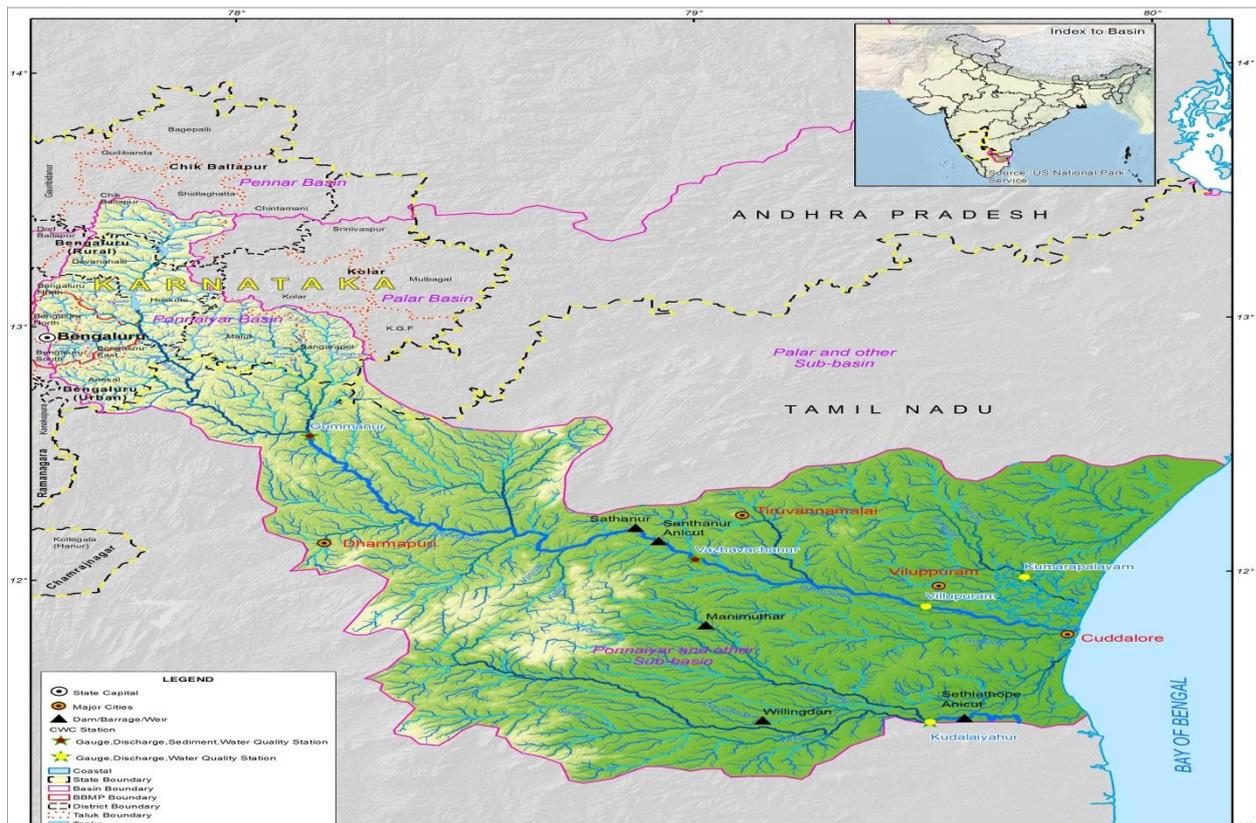
## CHAPTER 3

### ABOUT RIVER THENPENNAI

Thenpennai River also known as South Pennar or DakshinaPinakini is an interstate River. The River originates on the south eastern slopes of Chennakesava Hills, northwest of Nandidurg of Chikaballapur district in Karnataka State at an altitude of 1000m above mean sea level, which flows in the southern direction through Chikkaballapura, Bengaluru Rural and Bengaluru Urban districts in Karnataka state and descends to Tamilnadu near Hosur.

Thenpennairiver basin is one of the largest rivers of the state of Tamil Nadu. The river has supported many a civilizations of peninsular India in supplying precious water for drinking, irrigation and industry to the people of the states of Karnataka, Tamil Nadu and Pondicherry. The total length of Ponnaiyar River is 432 km, of which 112 km lies in Karnataka state, 180 km in Dharmapuri and Krishnagiri, 34 km in Thiruvannamalai and 106 km in Cuddalore, Kallakurichi and Villupuram districts of Tamil Nadu before joining Bay of Bengal. En route, its tributaries are Chinnar, Markandeyanahi, Vaniar and Pambar rivers in Tamilnadu. With a total catchment of approximately 16,019 km<sup>2</sup>, it is dry for the most part of the year but swells during the north east monsoon season.

In Karnataka, the river traverses through series of zilla panchayat tanks and also Minor Irrigation tanks namely Nandi tank, Kuppalli tank, Chadalapura tank, Kothanuru tank, Kolavanahalli tank, Cikkadigenahalli tank, Bommanahalli tank, Kanithahalli tank, Muthur tank, malluru tank, Amani Bhadrakere tank in Chikkaballapur district, HosakoteDoddakere tank in Bengaluru Rural district, and YelemallappaChettytank in Bengaluru Urban District. Drainage basin of River Thenpennai or South Pennar flowing in Karnataka & Tamilnadu is given as **Figure 1**.



**Figure 1. Drainage River Basin of Thenpennai or South Pennar**

The stretch of the river is mostly dry to scanty from Origin (Nandi) towards Chikkaballapur, Kolar district, Bangalore Urban District and Hoskote taluk of Bangalore Rural districts of Karnataka. Before descending the interstate border into Tamilnadu, overflow of water from Bellandur and Varthur lakes carrying domestic sewage of Koramangala & Challaghatta and Hebbal valleys of Bangalore adds to the flow in river Thenpennai thereby causes frothing in the river stretch.

## CHAPTER – 4

### PRELIMINARY JOINT COMMITTEE SURVEY AND INVESTIGATION

#### 4.0 Preliminary Reconnaissance Survey and Observations

The Joint Committee conducted a preliminary survey during 28.08.2020 and 01.09.2020, in order to investigate the current scenario of River flowing in both the states (Karnataka and Tamilnadu). The findings of the preliminary reconnaissance survey of Chikkaballapur, Kolar districts, Bangalore Urban District and Hoskote taluk in Bangalore rural districts in Karnataka are given below:

**(A) Chikkaballapur District:** South Pinakini river flows in Chikkaballapur, Siddlaghatta and Chintamani (border) taluks in Chikkaballapur District.

- The basin of the river is very small and for majority of the period in a year, the river basin remains dry.
- Since this river connects many tanks, water flow can be seen only when the tanks overflow.
- Under Chikkaballapur district jurisdiction, on the banks of this river, no major industries can be seen.

Photographs of the river between Bommanahalli tank and Kanithahalli tank in Chikkaballapur taluk is given below as **Figure 2**.



**Figure 2. Bommanahalli tank and Kanithahalli tank in Chikkaballapur District**

**(B) Kolar District:** South Pinakini river flows in Kolar, Malur and Bangarpet taluks in Kolar District.

- The basin of the river is very small and for majority of the period in a year, the river basin remains dry.
- Since this river connects many tanks, water flow can be seen only when the tanks overflow.
- Under Kolar district jurisdiction, Markandeya major tank in Bangarpet taluk (the catchment area is in Malur taluk) discharged water only 15 years back and the tank is having a flood discharge of 8,200 Cusecs. Catchment area is 113.14 Sq miles with tank's total capacity of 807

Units which irrigates the total irrigation area of about 847 acres. At the time of discharge, water flow through this valley joins at Yarragolu dam. Water will be used for drinking purpose by people in 3 taluks namely Kolar, Bangarpet, Malur. Finally, the discharge of Yarragolu dam water joins the valley of south pennar of Krishnagiri district in Tamilnadu state.

Photograph of the river flowing in Markandeya tank of Bangarpet taluk is given as **Figure 3**.



**Figure 3. Markandeya tank in Kolar District**

**(C) Hoskote Taluk:** South Pinakini river flows in Hoskote taluk in Bangalore Rural district.

- The basin of the river is very small and for majority of the period in a year, the river basin remains dry.
- Water flow can be seen only when the tanks overflow in Hoskote taluk.
- Under Hoskote jurisdiction, on the banks of this river, no major industries can be seen.

Photograph of Hoskote tank in Hoskote taluk is given as **Figure 4**.



**Figure 4. Hoskote tank in Hoskote taluk**

River also flows down in Anekal (border) in Bangalore Urban District.

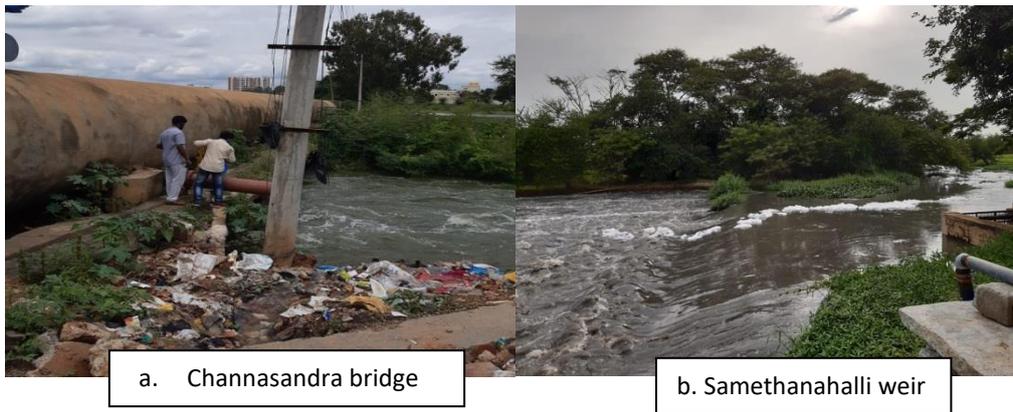
In addition to above, preliminary reconnaissance survey of River basin of South Pennar flowing in Bangalore district was also conducted and the observations are given below;

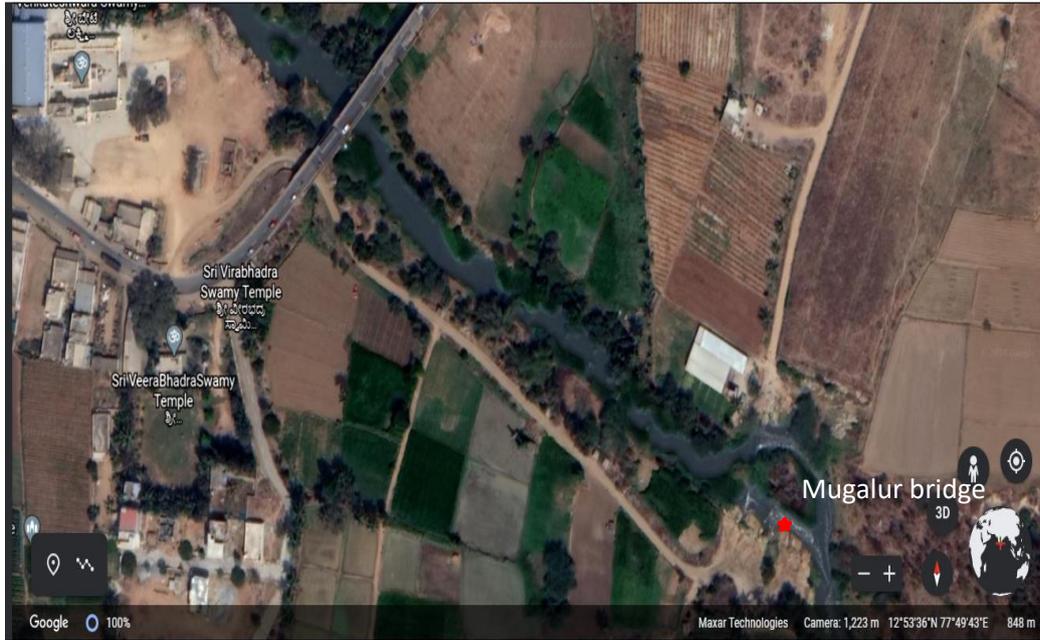
**(D) Bangalore District:** Survey was carried out in the areas of River South Pennar drainage basin covering Hebbal Valley and Koramangla / Chalghatta Valley, wherein series of lakes/tanks namely, Agara, Bellandur, Varthur (K & C Valley), Yellamalappachetty lake, Kadugodi bridge, Channasandra bridge (Hebbal), Hoskote tank, Mugalur bridge followed by few industries in Samethanahalli and Thiruvaranga were also visited and found dismantled/closed.

- i. Water was found to be flowing clear from Agara lake to the storm water drain, however domestic sewage and solid waste was found mixing down the drain near Agara lake.
- ii. It was observed that due to the desilting work, temporary diversion channels were created on the outer ring of the tanks in Bellandur and Varthur for enabling flow of water through the tanks. Color of water was found to be flowing greyish in varthur as compared to Bellandur lake and it was informed that untreated domestic sewage from about 110 villages/hamlets in Bangalore joins varthur (sewerage networking is under progress and same will be completed by 2023).
- iii. Two weirs of Hoskote tanks were observed to be having less water and no flow was found during the visit.
- iv. Further, water flowing in Mugalur (KSPCB monitoring location) was also observed to be frothy and greyish, where few pig farming activity were found discharging washings.
- v. Some micro/small scale dyeing units were also found operational illegally and discharging untreated effluent down the drain nearly 50 m away from the river stretch in Samethanahalli weir and immediate actions were taken by Karnataka SPCB to close those units.
- vi. Also, a few other non-operational/closed and dismantled dyeing units in Samethanahalli and Thiruvaranga were also visited during the survey. In Samethanahalli, water was observed to be flowing greyish and frothy, which may be attributed to joining of sewage from K&C valley. Details of Action taken on the defaulting industries, as provided by KSPCB is discussed in Section 6.0 of chapter VI.
- vii. Washings and droppings of piggery farms located in samethanahalli and thiruvarangamay add to organic load of the River flowing in Samethanahalli.
- viii. Color of the water flowing in the tanks and course of River Thenpennai was found to be greyish in Varthur diversion channel, Agara drain, Y junction, Samethanahalli weir and Mugalur bridge.

ix. Information regarding number of STPs (operational status) and proposed STPs (capacity) of K&C Valley and Hebbal valley was explained by Bangalore Water Supply and Sewerage Board (BWSSB) during the survey with the help of layout map. Details of Sewage management in the two valleys of Bangalore is provided in section 4.4 of Chapter 4. Information about desilting work carried out in Bellandur and Varthur tanks was also shared by Bangalore Development Authority (BDA).

Photographs of the survey conducted are given as **Figure 5 (a, b, c& d)**.





d. Google Earth Image of sampling location in Mugalur bridge

**Figure 5. a) Solid Waste dumping in Channasandra bridge;b) frothy foam floating in Samethanahalli weir; c) few unauthorized micro/small scale dyeing units made to close, by KSPCB in Samethanahalli; Google Earth Image of Sampling location in Samethanahalli; d) Google Earth Image of Sampling location in Mugalur Bridge**

Then, the joint committee conducted survey in the areas of River South Pennar drainage basin flowing down south covering Sokarasanapalli (KSPCB monitoring location), Singasadanapalli (Central Water Commission monitoring location), Kodiyalam, Bagalur villages near Hosur and Kelavarapalli Reservoir in Tamilnadu.

**(E) Villages near Hosur, Tamilnadu:**

- i. Details of the villages with Population density located on Thenpennai riverine namely, singasadanapalli, kodiyalam, kooliganapalli, sokkarasanapalli, bagalur, lingapuram, ottapallithinna, kanimangalam, padathepalli, nanjapuram, sathyamangalam, muneeswararnagar, kembasandhiram, chennasandiram, kallipuram were provided as below;

S.No	Name of Village	Distance from the River bed (m)	Number of houses	Population	Population density (Sq. Km)
1.	Singasadanapalli	1000	120	660	242.50
2.	kodiyalam (kooliganapalli)	500	260	1106	217.03
3.	sokkarasanapalli	500	250	855	348.97

4.	bagalur	50	1500	11000	2534
5.	lingapuram	100	300	2000	1666.67
6.	ottapallithinna	400	35	130	97.01
7.	kanimangalam	1000	110	310	94.80
8.	padathepalli	1000	120	390	127.03
9.	nanjapuram	-	-	-	-
10.	sathyamangalam, muneeswararnagar	500	255	1390	260.787
11.	kembasandhiram	500	25	550	705.12
12.	chennasandiram	600	300	1417	885.62
13.	kallipuram	-	-	-	-
	<b>Total</b>		<b>3275</b>	<b>19808</b>	<b>7179.5</b>

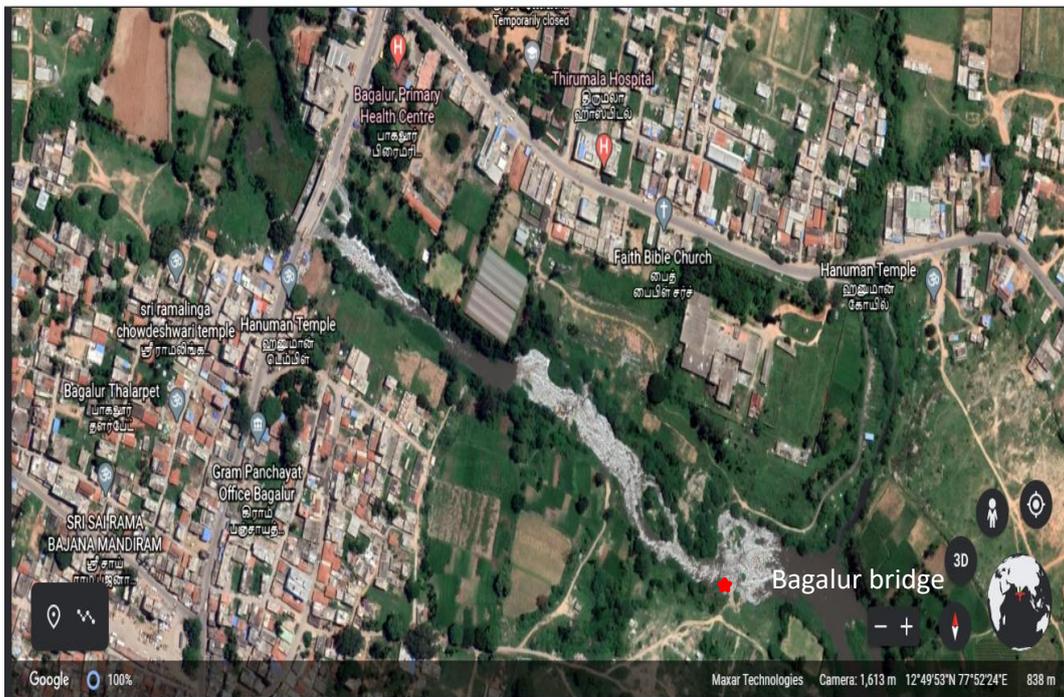
- ii. It has been informed by representative of Tamilnadu Pollution Control Board that there are no industrial discharge along the stretch of Thenpennai River in Tamilnadu and no underground sewerage lines or STPs operating near the Riverside. Further, Tamilnadu SPCB informed that following industries are located near the river stretch;

S. No	Name of the industry	Classification/ Category	Discharge Options	Details of Consent	Remarks
1.	M/s Premier VVG & SPG Mills Pvt Ltd., Belathur, Bagalur	Textile / Large /Red	Zero Liquid Discharge and there is no discharge of industrial effluent / sewage into River Thenpennai	Consent to Operate issued on 08.11.2001 valid up to 31.03.2003  Renewal of Consent issued on 20.03.2017 valid upto 31.03.2022	The unit is located at a distance of 900 meter from River Thenpennai.  Re-commissioning the dyeing and printing operation during first week of October 2020.
2.	M/s Exide Industries Ltd., Chichuruganapalli, Sevaganapalli	integrated battery manufacturing unit/ Large /Red	Zero Liquid Discharge and there is no discharge of industrial	CTO issued on 13.11.2013 valid	4 km away from river and

			effluent / sewage into River Thenpennai	up to 31.03.2014 Renewal of Consent issued on 20.12.2017 valid upto 31.03.2022	divided by undulated terrain
3.	M/s Shahi Exports Pvt. Ltd., Sevaganapalli	Textile garment unit / Large / Green	STP and treated effluent utilized for green belt and there is no discharge of Sewage into River Thenpennai	CTO issued on 22.08.2011 valid up to 31.03.2012 RCO issued on 03.07.2020 valid upto 31.03.2022	No discharge outside premises

- iii. Color of Water flowing in the River stretch was observed to be greyish in sokkarasanapalli, frothy/slight greyish in kodiyaalam, brownish to grey in Bagalur bridge and greenish in Kelavarapalli Reservoir.
- iv. Solid waste dumping and mixing of domestic sewage into the river stretch flowing through bagalur bridge was also observed and Tamil Nadu Pollution Control Board was asked to take note of the scenario for appropriate actions. Action taken report is given in section 6.0 of chapter VI.
- v. Representative of Tamilnadu Pollution Control Board has informed that sewage generation has been estimated as 0.8 MLD (approx.) from Bagalur village and 0.01 MLD to 0.15 MLD (approx.) from rest of the villages in Tamilnadu. It was also informed that the sewage generated in the above hamlets percolates within the hamlet limits and therefore may not get discharged into River Thenpennai.
- vi. Average rainfall of Kelavarapalli is about 533 mm.

Photographs of the survey conducted are given as **Figure 6 (a, b& c)**.



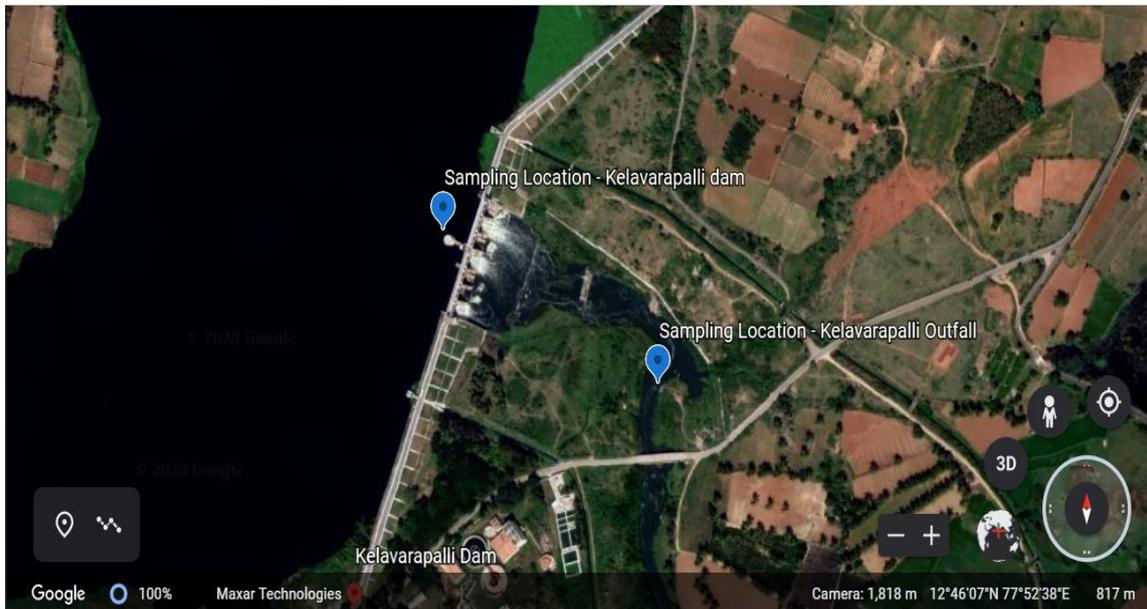
c. Google Earth Image of Sampling Location in Bagalur Bridge

**Figure 6. a) Frothy foam in Kodyalam; b) solid waste dumping near bagalur bridge; c) Google Earth image of the sampling location in Bagalur**

#### 4.1 About Kelavarapalli Reservoir

Kelavarapalli Reservoir Project was built in 1978-1995 at Krishnagiri district, Tamilnadu and the Reservoir or Dam is situated at a distance of 8 km from Karnataka and 10 km away from Hosur, Tamilnadu across the River Thenpennai, which actually originates from the eastern slopes of Chennakesava Hills in Karnataka. The dam further leads water to the districts of Dharmapuri, Tiruvannamalai, Kallakuruchi, Villupuram and

Cuddalore before joining Bay of Bengal. Google Earth image of Kelavarapalli reservoir with sampling locations are shown as **Figure 7**.



**Figure 7. Google Earth image showing sampling locations at Kelavarapalli Reservoir**

Kelavarapalli Dam is situated at the latitude of 12°52'42"N and longitude of 78°46'06" E which is located in the Northwestern part of Tamil Nadu, bordering Karnataka and Andhra Pradesh states. The Dam is operational from 10th November 2002. Salient features of the dam include:

**(a) Salient features of Dam:**

1. Type of dam : Masonry cum earthen Dam
2. Length : 665m
3. Height : 13.50m
4. FRL Water spread Area : 433.20 Hec
5. Volume : 0.481 TMC
6. Catchment area : 2442.00 Sq.Km
7. Gross Capacity : 13.61 Mcum
8. Maximum Water level : 831.50
9. FRL : 831.50
10. Water Supply Period : 1<sup>st</sup> Crop = July to December - 150 Days  
: 2<sup>nd</sup> Crop = February to May - 90 Days
11. Spillway Type : Ogee Crest Type
12. Spillway Nos : 7 Nos
13. Spillway Size : 12.20m x 6.10m
14. Crest Level : 825.40
15. Design flood Discharge : 88980 Cusecs
16. River Sluice : 1 No ( 1.20m x 1.82m)
17. Canal Sluice : 2 Nos (0.90m x 1.50m)
18. Length of Canals

Right Main Canal (RMC)	=	21.99 km
Left Main Canal (LMC)	=	25.500 km
LMC Branch canal I	=	5.40 km
LMC Branch canal II	=	3.80 km
LMC Branch canal III	=	2.78 km
LMC Branch canal IV	=	4.96 km
LMC Branch canal V	=	0.71 km
Distributaries I of B.C IV	=	1.80 km
Distributaries II of B.C. IV	=	2.00 km
Distributaries I of B.C V	=	1.48 km
Distributaries II of B.C. V	=	1.15 km

**Total = 71.57km**

19. Irrigation Area	:	3676 Hec
20. Approved Estimate	:	Rs.551.50 Lakhs
21. Revised Estimate	:	Rs.606.70 Lakhs

**(b) Present condition of Dam (as on 09.09.2020)**

1. Water level	:	12.30 m
2. Water storage level	:	343.74 Mcuft
3. Water incoming	:	400 cusecs
4. Water discharge	:	400 cusecs

Kelavarapalli Dam SIPCOT Central Water Supply Scheme provided 14.00 MLD of water to Hosur Municipality Phase I during 2015-16. Water supply of Hosur Municipality is mainly being met out from the Government of Tamilnadu's Hoganekkal water supply Project which was executed & maintained by Tamilnadu Water Supply and Drainage Board (a statutory body under Tamilnadu Government) and the other sources are from Kelavarapalli Dam, one from Perandapalli River and few local wells. At present the entire Municipality is receiving 30.39 MLD of water supply from all the above said sources. (Source: <https://www.twadboard.tn.gov.in/content/major-water-supply-schemes-1518>).

Since Thenpennai river is the sole water source in Krishnagiri, Tiruvannamalai and Cuddalore districts, it has been extensively dammed. As it enters Tamilnadu, the water is stored in the Kelavarapalli dam reservoir near Hosur. The surplus amount reaches the Krishnagiri dam, which is situated 60 km downstream.

**4.2 Excerpts of Thenpennai River Monitoring in the matter of O.S No. 2 of 2015 before Hon'ble Supreme Court & in the matter of O.A No. 125/2017 before Hon'ble NGT**

**A) In O.S No. 2 of 2015 before Hon'ble Supreme Court**

In compliance to Hon'ble Supreme Court directions in the Original Suit No. 02 of 2015, a joint monitoring Report on River Cauvery and Thenpennaiyar was submitted by CPCB, KSPCB and TNPCB, wherein the monitoring team carried out sampling of water for the period September 2017 to May 2018. The committee filed the report before the Hon'ble Court in 2018 (the case is pending before Hon'ble Supreme Court). The findings of the Report is given as below:

1. In case of River Thenpennaiyar at Sokarasanapalli, the water quality falls below designated best use Class C during all nine monitoring and the critical parameters are BOD, DO and TC. The Total Coliform was always > 5000 MPN/1000 ml and DO was <1 except during January and February 2018 showing the DO as 2.4 and 3.8 mg/l respectively. BOD also exceeded the Sewage standards notified (i.e. 20 mg/l) for all nine months showing the water is highly polluted.
2. The River Thenpennaiyar receives the outflow of treated and untreated sewage of Bellandur and varthur lake system. Comprehensive plan of restoration of these lakes along with identifying other sources of untreated sewage into the River only will help to restore the quality of the river. Government of Karnataka may prepare such plan on priority considering the pollution issues of Bellandur and varthur lake system, which contributes to the pollution of Thenpennaiyar River.

#### **B) In O.A No. 125/2017 before Hon'ble NGT**

On the subject of remedial action for restoration of Bellandur, Agara and Varthur lakes at Bangalore, including preventing discharge and dumping of pollutants, removing encroachments from catchment area and other steps for restoration, Hon'ble Tribunal, Principal Bench, New Delhi, in the matter of O.A No. 125/2017, constituted a monitoring committee headed by Justice ShSantosh Hegde, former Judge of the Hon'ble Supreme Court to oversee the execution of the action plan. In this regard, summary of Compliance Report to the observations of the Monitoring Committee in respect of BWSSB, BDA, UDD, Minor Irrigation and KSPCB was filed before Hon'ble NGT, Principal Bench on 04.08.2020, wherein Hon'ble Tribunal vide orders dated 13.08.2020 has directed that ***"...the left-over work may be expeditiously completed which may be reviewed by the Monitoring Committee. The status of compliance as on 31.12.2020 may be compiled by the Monitoring Committee and report furnished to this Tribunal by 15.01.2021..."***.

#### **4.3 Major Sources of Pollution**

Major sources of pollution to River Thenpennai appear to be from untreated/partial treated sewage from Bangalore. Sewage generated from Bengaluru is the predominant reason for deterioration of lakes and water bodies in Bangalore, which is ultimately flowing into river Thenpennai.

There are various reasons such as ageing of sewers, encroachment of sewers, damages in the sewerage system, crown corrosion of sewers etc. for direct discharges of a part of wastewater from housing colonies and such discharge is flowing through Storm Water Drains and enters lakes in Bengaluru. Lakes in Bengaluru were created for rain water harvesting and once served as sources of water supply to the city. Lakes are under the custody of various departments namely Bangalore BruhatMahanagaraPalike (BBMP), Bangalore Development Authority (BDA), Karnataka Forest Department (KFD), Lake Development Authority (LDA), Minor Irrigation and Water Resources Department.

In recent years, few lakes have been converted into built-up area owing to industrialization and urbanisation. Among all the lakes, Bellandur and Varthur are highly polluted due to discharge of untreated and partially treated sewage from the city. Bellandur lake receives nearly 40 % of Bangalore's sewage and further drains into varthur lake, then flows into Thenpennai River towards south of Bangalore. Lakes are polluted due to inadequate drainage system leading to bypassing of sewage into lakes, entry of sewage from apartments/commercial establishments into storm water drains leading to lakes, insufficient sewage treatment plants, encroachment of lakes and Rajakaluves (storm water drains), dumping of municipal solid waste, construction and demolition wastes, illegal discharge of industrial effluents etc. The foremost reason for pollution of Bellandur Lake is sewage/Sullage flowing in the storm water drains. One of the main reasons for development of foam in the waste weir is agitation of water falling over a height and due to surfactants present in sewage. Now after establishment of sluice gate and weir modification, foam formation reduced considerably, informed KSPCB. Additionally, fertilisers used by farmers of Karnataka as well as Tamilnadu may add to the pollution of river thenpennai.

#### **4.4 Status of Domestic Sewage Management in Bangalore**

Sewage is one of the major causes for poor water quality of rivers, lakes and water bodies causing adverse impacts on human health and aquatic species. Bangalore Water Supply and Sewerage Board (BWSSB) was formed in 1964 to provide Sewerage system in areas of Bangalore in a phased manner. Domestic Sewage generation in Bengaluru has been estimated as 1160 MLD which is attributed to increased urbanization and population. The actual amount of sewage generated would be higher since a large

number of private bore wells exist and there is no scientific estimate of the quantity of water withdrawn from the borewells.

Sewage flow follows the regional topography and flow down along the three principal valleys and five minor valleys ensuring free flow of sewage without any major pumping requirement. Also treated wastewater of Bangalore is also being diverted to recharge drought ridden stretch/tanks of Chikballapur and Kolar districts.

KSPCB informed that the industries have been encouraged to opt for Zero Liquid Discharge (ZLD). Further, 08 CETPs are operational for treating effluent generated from small scale industries from Bangalore. KSPCB has been directed by CPCB to make entries in the river basin module on status of ETPs in the state based on Hon'ble Supreme Court and Hon'ble NGT Orders and the same is under progress.

In compliance to Hon'ble Supreme Court directions in the Original Suit No. 02 of 2015, Chief Secretary, Government of Karnataka submitted to Hon'ble Supreme Court in 2018 that, *"...fourteen STPs of total 129 MLD for 110 villages under Japan International Cooperation Agency (JICA) Fund Scheme were proposed. It was then assessed that, with the establishment of those STPs, the total capacity of STPs to treat the sewage from Bengaluru would rise up from the existing capacity of 1050 MLD to 1575 MLD by 2020 and 1704 MLD by 2022."*

In this connection, BWSSB has now informed that fourteen STPs of total 124 MLD for 110 villages under Japan International Cooperation Agency (JICA) Fund Scheme were proposed and 3 STPs of 400 MLD capacities are under construction with the help of Megacity Revolving Fund (MCRF). It is now assessed that, with the establishment of those STPs, the total capacity of STPs to treat the sewage from Bengaluru would rise up from the existing capacity of 1182.5 MLD to 1582.5 MLD by 2021 and same would be increased to 1726.5 MLD by 2024.

Domestic sewage generation of hamlets/areas namely, Gottigere, JP Nagar, Puttenahalli, Bilekahalli, Arekere Lake, Hulimavu Lake, Madiwala lake, BTM Layout, HSR Layout, Agara Lake, Shivajinagar, Ulsoor Lake, Domlur, Indiranagar, HAL, Kalasipalya, Lalbagh Road, KH Road, Shantinagar Bus Station, National Games Village, Ejipura, Sinivagilu located in the stretch of Hebbal and K&C Valley, Bangalore is around 292 MLD & 574 MLD (total 866 MLD) respectively, of which 608 MLD (70 %) is being treated in 21 STPs (having capacity of 736.5 MLD located in the two valleys). Further, as per Action plan of BWSSB, 110 MLD of the balance sewage will be taken into sewerage network by completing the works in 2022.

BWSSB has also reported that as per the understanding with Minor Irrigation Department the treated waste water from 21 STPs are to be diverted to Kolar and Chikkaballapur districts to recharge the drought ridden tanks. Presently, it is estimated that approximately 290 MLD of treated wastewater (as against the quantity of 400 MLD as per MoU with Minor Irrigation) from 4 STPs located in K&C valley treated water is discharged to 126 minor irrigation tanks located in Kolar District. Further, it has been reported that around 100 MLD of treated wastewater from 03 STPs located in Hebbal Valley is discharged to 65 minor irrigation tanks of chikkaballapur district. The information on the quantity of treated wastewater that has been diverted for recharging the minor irrigation tanks, as provided by Minor Irrigation are given below;

<b>S No</b>	<b>District</b>	<b>No. of Tanks filled till October, 2020</b>	<b>Water Pumped (TMC)</b>
1.	Kolar	78	6.69
2.	Chikkaballapur	24	1.16
<b>Total</b>		<b>102</b>	<b>7.85</b>

The status of sewage generation, treatment and enhancement of treatment capacity plan, as reported by BWSSB, is given below:

A. Quantity of Sewage generated in Bangalore	1160 MLD
B. Quantity of Sewage generated in K&C and Hebbal Valley, Bangalore	866 MLD
C. Number of STPs in two valleys	21 Nos.
D. Treatment capacity of the 21 STPs in two valleys	736.5 MLD
E. Quantity of Sewage actually treated by 21 STPs in two valleys (on an average)	608 MLD
F. Quantity of treated wastewater diverted for irrigation to Kolar & Chikkaballapur districts	390 MLD from 07 STPs
G. Total gap in wastewater treatment in the two valleys of Bangalore	(i) Gap in installed Capacity of STPs = $866 - 736.5 = 129.5$ MLD (ii) Gap in actual treatment of wastewater in STPs = Installed capacity (736.5 MLD) - Operational Capacity (608 MLD) = 128.5 MLD  Total Gap in waste water treatment = (i) + (ii) = 258 MLD
H. Total Enhancement of Sewage	K&C valley = 150 MLD

Treatment Capacity of STPs in two valleys, Bangalore estimated by BWSSB	Hebbalvalley =133 MLD Total enhancement of capacity of STPs = 283 MLD
I. Enhancement of Sewage Treatment Capacity of STPs in entire Bengaluru (covering both the valleys) estimated by BWSSB	1582.5 MLD by 2021 1726.5 MLD by 2024

BWSSB has informed that in Hebbal valley, 02 STPs of 100 MLD capacity at Hebbal and 20MLD STP at K.R Puram is under construction and the same will be commissioned in 2021. In addition to that, construction of one STP with 07 MLD capacity is also under progress in Hebbal valley. To further enhance the sewage treatment capacity, a STP of 6MLD at Horamavu in Hebbal Valley is planned and the same will be operational by 2023. An average 59 MLD of sewage generation is estimated (which includes sewage generation from part of 110 villages in Hebbal Valley) where presently there is no sewer network.

In case of Koramangla&Challghatta valley, of 02 STPs, one STP at Chikkabegur has already started treating sewage and another STP (150 MLD) will be commissioned by Dec 2020. Status of Sewage Treatment Plants of K&C and Hebbal Valleys in Bangalore along with its performance in terms of capacity, as provided by BWSSB is given as **Annexure V**.

Considering 135 lpcd water supply for the population of 1062278 in 110 villages in 2019, the estimated quantum of sewage generation from 110 villages of BBMP limit in K&C and Hebbal Valley is calculated as 143.41 MLD, which remains untapped for treatment in STPs due to absence of Under Ground Drainage Network by BWSSB.

In addition to above, as per the Government of Karnataka Notification No. FEE 316 EPC 2015, Bengaluru dated 19.01.2016, KSPCB Clearance is required for the following projects:

- a) All residential group housing projects/apartments with 20 units and above or having total BUA of 2,000 sq.m including basement
- b) Commercial constructions projects (commercial complexes, office, IT related activities etc) with total built up area of 2,000 sq.m and above
- c) Educational institutions with or without hostel facility having total built up area of 5,000 sq.m and above
- d) Townships and area development projects with an area of 10 acres and above

Accordingly, KSPCB is covering apartments with 20 flats & above and commercial buildings of 2000 sq.mts and area development projects of 10 acres and above only. All the projects covered by KSPCB under consent mechanism are required to provide Sewage Treatment Plant (STP) for treating the sewage. However, sewage generated from the smaller projects like apartments with less than 20 flats, commercial buildings with less than 2000 sq.mts built up area are required to be treated by BWSSB.

KSPCB has filed two Criminal cases against BWSSB w.r.t pollution of Bellandur Lake. Further, as per the directions of Hon'ble NGT in the matter of O.A.125/2017, Karnataka State Pollution Control Board has imposed Environmental Compensation against the defaulting Apartments/Housing Associations. Few projects have approached the Hon'ble High Court of Karnataka in this matter. As per the directions of Hon'ble High Court of Karnataka, Karnataka State Pollution Control Board is following the due procedure. Details of action taken by KSPCB on the defaulting apartments/housing complexes are provided in section 6.0 of Chapter VI.

## CHAPTER V

### SAMPLING AND ANALYSIS OF SURFACE WATER FLOWING INTO RIVER THENPENNAI

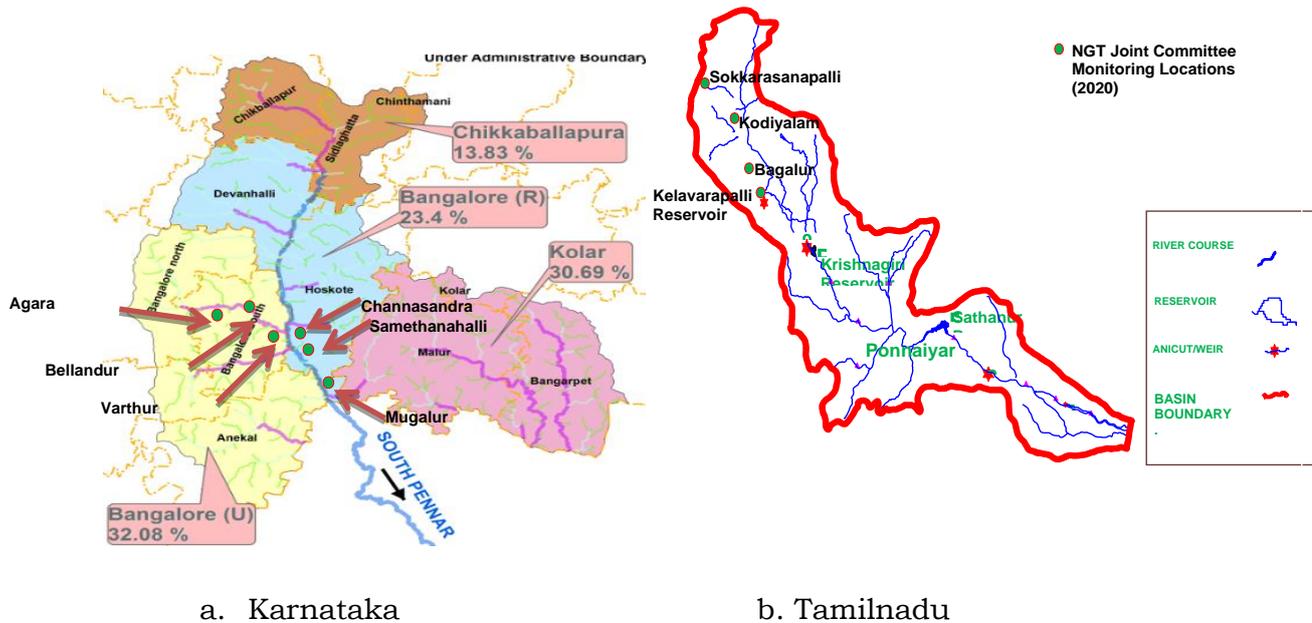
#### 5.0 Sampling Locations

The Joint Committee identified the following sampling points for collecting surface water samples based on the reconnaissance survey conducted in Tamilnadu and Karnataka during 28<sup>th</sup> August and 01<sup>st</sup> September, 2020;

S.No	State	Sampling Points (no. of samples)	Geo-Coordinates	
1.	Karnataka	i. Agara drain	12.923 °N	77.639 °E
		ii. Y junction drain (Agara/Koramangla)	12.923 °N	77.646 °E
		iii. Bellandur diversion channel		77.677 °E
		iv. Varthur diversion channel	12.931 °N	77.746 °E
		v. Channasandrabridge	12.945 °N	77.776 °E
		vi. Samethanahalli weir	12.985 °N	77.784 °E
2.	Inter State Boundary	vii. Mugalur bridge (Karnataka)	12.853 °N	77.831 °E
		viii. Sokkarasanapalli (Tamilnadu)	12.896 °N	77.831 °E
3.	Tamilnadu	ix. Bagalur bridge	12.769 °N	77.875 °E
		x. Kodiyalam	12.769 °N	77.877 °E
		xi. Kelavarapalli reservoir	12.857 °N	77.823 °E
		xii. Kelavarapalli outfall	12.831 °N	77.871 °E

Surface water samples of the above twelve locations were collected by Joint Committee on 09<sup>th</sup> and 10<sup>th</sup> September, 2020. Thenpennai River basinMap

showing the sampling locations in Karnataka and Tamilnadu are given below as **Figure 8& 9**;



**Figure 8. Sampling locations in the River Map of Thenpennai**

Geographic profile and details of the sampling locations in the sequence of the flow of River Thenpennai is provided below;

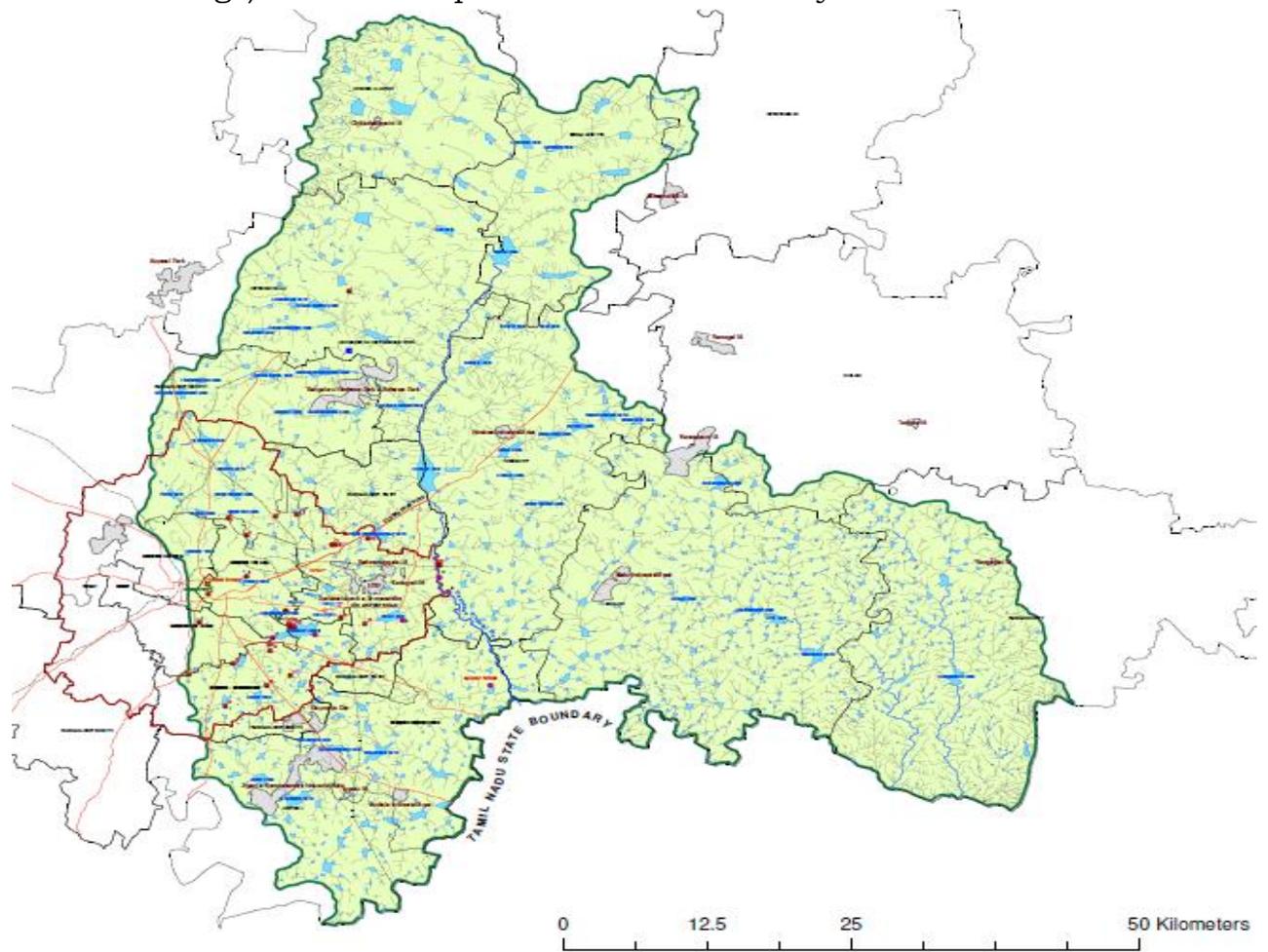
**(i) Agara drain:**

Agara lake spread over 98 acre, is located at Agara in southeast direction of Bengaluru. The lake receives outfall from the upstream Madivala lake. The excess water from Agara lake overflows through the storm water drain to Bellandur lake near southwest direction. At Agara, the flow of water was found clear and no frothing was found. However, domestic sewage and solid waste was found mixed down the drain with greyish color leading to Bellandur.

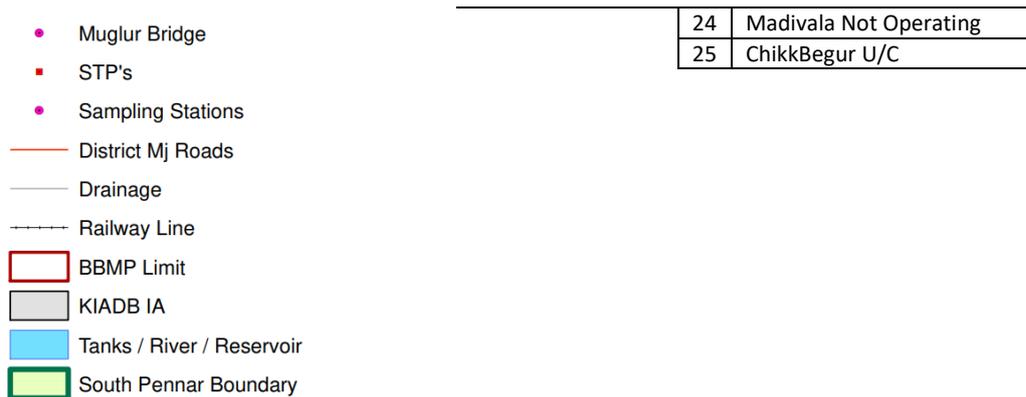
**(ii) Bellandur diversion channel:**

Bellandur Lake is located in southeast direction of Bengaluru and is the largest lake in the city and the weir flow of Agara Lake joins Bellandur lake. It was observed that, of the two Bellandur Lake weirs, water was flowing in one weir towards Southern direction (near Bellandur village, popularly called as Bellandur bridge) through channels created on the outer

ring of the lake, whereas Northern weir (near Yamalur, popularly called as Yamalur bridge) was taken up for restoration work by BDA.



Sampling Locations	STP Locations
1 Agara Lake	1 Faecal STP
2 Y Junction	2 BWSSB 6 MLD
3 BelandurKodi	3 Horamavu
4 Varthur Kere	4 Hennur
5 Channasandra	5 Hebbal Raja Canal
6 Samethanahalli	6 Cubbon Park
	7 Lalbagh 1.5 MLD
	8 Ulsoor
	9 Lidkar CETP
	10 Hulimavu
	11 Sarakki
	12 Chikkudlukere
	13 Agara
	14 K & C 60 MLD
	15 K&C 218 MLD
	16 K&C 30 MLD
	17 K&C 150 MLD
	18 BelandurAmanikere 90 MLD
	19 Kadabeesanahalli 50 MLD
	20 TC Palya 15 MLD
	21 TC Palya U/C 20 MLD
	22 YelemallappaChetty 15 MLD
	23 Koralur 5 MLD



**Figure 9. River Basin Map of Thenpennai showing locations of Industrial area and tank/reservoirs in Karnataka**

It was also observed that, the storm water drain near bellandur lake was found with lots of floating materials such as plastic bags and municipal solid waste etc. This might be due to local people residing in the area with no awareness about solid waste collection and management. There is a need for clearance of solid waste dumped in the storm water drain and lake by local authorities and monitoring by KSPCB to protect the lake from pollution. At Bellandur, the flow of water was found slightly clear and no frothing was found.

**(iii) Varthur diversion channel:**

The Varthur Lake takes the main inflow from outflow weirs of Bellandur Lake, along with some other water entry points (about 6 to 9) between outer ring road (that connects Marathalli with Sarjapura road) and Varthur, between which the Varthur Lake lies. It was seen that Varthur Lake has 02 outflow weirs viz: Northern weir near Sigma Softech Park, Ramagondanahalli (popularly called as Varthur Kodi) and Southern weir near Varthur (popularly called as Varthur Bridge).

Even in varthur lake, water was flowing only in southern weir as the Northern weir was taken up for restoration work by BDA. It was informed that both the weir flow of the lake joins at a point at about 600 m in South Eastern direction of the Northern weir, thereafter, the stream joins the South Pennar River, through Ajjigondahalli bridge, at about 3.8 Km in east of north eastern direction. The joined streams of out flow weir of Varthur Lake flowing en route, Ajjigondahalli Bridge, represents entire wastewater / domestic effluent of Koramangla & Challaghatta Valley flowing into South Pennar River. At

varthur, the flow of water was found greyish to brown and no frothing was found.

**(iv) Channasandra bridge:**

Channasandra Bridge located on Hope Farm Junction towards Chikka Tirupathi Road, flows in Southern direction in order to further confluence with the out flow of Varthur Lake (K & C Valley).

Whereas, lakes of Hebbal Valley flows into Yelemalappa Chetty Lake (YMC Lake) located on Old Madras Road. Over flow through the outflow weir of YMC Lake joins the South Pennar River at about 4.9 Km South East of YMC Lake and flows in southern direction to join channasandra bridge. At channasandra, the flow of water was found green in color with absolutely no frothing. However, solid waste was found dumped near the bridge.

**(v) Samethanahalli weir:**

Samethanahalli is located downstream of varthur lake at south eastern direction of Bangalore outskirts. It was observed that domestic and industrial discharges of samethanahalli confluences into tributaries of South Pennar river basin and flows down to join downstream of ajjingondahalli towards Mugalur. At samethanahalli, the flow of water was greyish with froth floating over.

Few unauthorized micro/small scale dyeing units were found operational during the visit and found discharging untreated effluent down the drain. KSPCB has taken immediate action to close those units.

**(vi) Mugalur bridge:**

Mugalur Bridge is on Sarjapura – Chikka Tirupati road which is at a distance of about 11.47 Km south east of northern weir of Varthur Lake. The South Pennar River leaves Karnataka State and enters into Tamil Nadu and joins Kelavarapalli reservoir (about 7.5 Km north east of Hosur city) which is located at about 14.18 Km south east of Mugalur Bridge. At Mugalur Bridge, the flow of water was greyish to brown and it contained scanty pockets of froth here and there. Solid waste dumping and outlet of pig farming into the river was found near the area.

**(vii) Sokarasanapalli:**

Sokarasanapalli is located at interstate border of Tamilnadu and Karnataka with a distance of 500 m from the river bed.

Sokarasanapalli is an interstate water quality monitoring location being sampled by Karnataka on a quarterly basis. The flow of water in sokarasanapalli was observed as greyish and with growth of floating aquatic plants in a large area.

**(viii) Kodyalam:**

Kodiyalam is situated in north east direction of Hosur district, Tamilnadu. In kodiyalam, there is one anicut which has two sluices constructed to distributewater flowing from sokkarasanapalli for agriculture purpose. Central Water Commission, Cauvery and Southern Rivers Division monitors flow of the river at this location. Water was found to be flowing in greyish color and frothy foam was floating on the river.

**(ix) Bagalur bridge:**

Bagalur bridge is situated in north eastern direction of hosur district, Tamilnadu. Bagalur bridge was found with water flowing in brown to greyish color and solid waste was found dumped on either sides of the river bed. Cattles were also found grazingthe grass near the solid waste dumped area which could cause lethal effects due to plastics and other inert materials dumped over.

**(x) Kelavarapalli dam:**

Kelavarapalli dam is located in the Northwestern part of Tamil Nadu.400 cusecs of water was found flowing through spillway shutters with reasonablyclear water in green color on the day of visit. Also scanty pockets of froth were seen due to water flowing with force from high fall of the dam.

In the areas namely, samethanahalli, mugalur, sokkarasanapalli, kodiyalam, bagalurkelavarapalli water was found being pumped and used for agriculture in the nearby areas.

## **5.1 Sampling Protocol**

The surface water samples of the above identified 12 locations in River Thenpennai were collected during 09<sup>th</sup> and 10<sup>th</sup> September, 2020 and submitted to laboratory for analysis. The Joint Committee followed CPCB's Standard Operating Procedure for National Water Quality Monitoring Programme and Submission of data (August, 2017). The scope of the SOP is to standardise the process of sample collection, preservation, handling and analysis, preparation of data reports, etc.

## **5.2Results and Discussion:**

The River originates in Nandi Hills of Chikkaballapur district and the flow is mostly dry to scanty from Origin (Nandi) towards Chikkaballapur district, Kolar District, Bangalore Urban District and Hoskote taluk of Bangalore Rural district. Therefore, no samples could be collected till Hoskote tank.

Subsequently, it was informed by KSPCB that overflow of water from Bellandur and Varthur lakes carrying domestic sewage of

Koramangala&Challaghatta and Hebbal valleys of Bangalore adds to the flow in river Thenpennai. Accordingly, samples were collected from the diversion channels of Bellandur and Varthur lakes,Agara drain, Y Junction to ascertain the sources of pollution flowing into River Thenpennai.

The joint committee discussed that the quality of water flowing in river Thenpennaicould be assessed based on the water samples from the above four major drains/channels, river flowing in major confluence points and interstate monitoring locations identified in consultation with concerned State Pollution Control Boards such as Channasandra bridge, Samethanahalli, Mugalur bridge, Sokkarasanapalli, Bagalur bridge, Kodyalam, Kelavarapalli.

The analysis results of the samples collected from all the above 12 locations were compared with Designated Best Use (DBU) criteria and Classification notified under Environment (Protection) Rules, 1986. The categorisation and classification of water flowing in River Thenpennai is given below at **Table 1**.

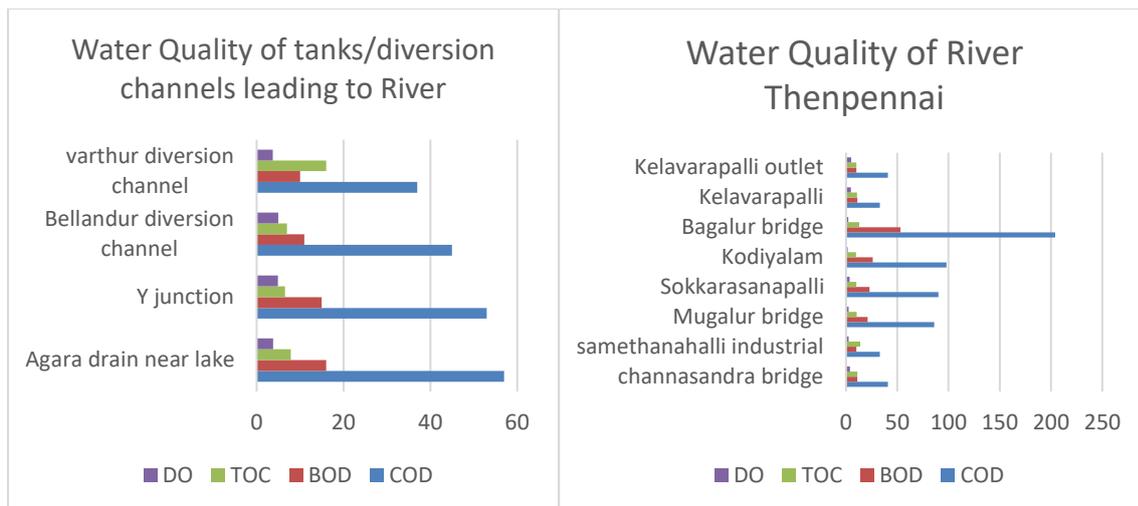
**Table 1. Classification as per Designated Best Use Criteria of Samples collected in River Thenpennai**

Sample Locations	Designated Best Use Criteria										Class
	pH	DO	SS	Turbidity (NTU)	FC (MPN /100 ml)	BO D	EC (µs/cm)	SA R	Boron	Free Ammonia	
<b>Sampling in diversion channel of Lakes / Tanks, Bengaluru – Outfall into River Thenpennai</b>											
Agara Drain	6.92	3.8	21.5	18.9	500	16	810	1.6	0.016	nil	E
Y junction	6.87	4.9	59	11.4	900	15	762	1.3	0.019	nil	D
Bellandur diversion channel	6.89	5	45	10.4	1600	11	758	1.4	0.016	nil	D
Varthur diversion channel	7.04	3.7	115	27.5	500	10	706	1.4	0.015	nil	E
<b>Sampling Locations in River Thenpennai</b>											
Channasandra bridge	7.02	3.8	171	13.8	900	11	931	2	0.017	nil	E
Samethanahalli	6.98	2.4	78	35	1600	10	825	1.8	0.015	nil	E
Mugalur Bridge	6.79	2.4	574	450	500	21	628	1.5	0.017	nil	E
Sokkarasanapalli	6.83	3.5	806	630	900	23	648	1.6	0.015	nil	E
Kodyalam	6.82	1.6	1474	997	900	26	727	1.5	0.018	nil	E

Bagalur bridge	6.92	2.2	1121	850	500	53	1111	2.2	0.019	nil	E
Kelavarapalli Reservoir	7.35	4.7	50	12.4	500	11	1069	2.4	0.019	nil	D
Kelavarapalli Outfall	7.19	5.2	10	7.5	900	10	1049	2.2	0.017	nil	D
Designated Best Use Criteria	A - Drinking Water Source without conventional treatment but after disinfection B - Outdoor bathing (Organised) C - Drinking water source after conventional treatment and disinfection D - Propagation of Wild life and Fisheries E - Irrigation, Industrial Cooling, Controlled Waste disposal										
Classification of River Thenpennai	The analysis of Water Samples collected at 12 locations joining River Thenpennai shows that the Water Quality of the River falls under the Class E as per Designated Best Use Criteria notified under Environment (Protection) Rules, 1986.										

Analysis of water quality in River Thenpennai reveal that Dissolved oxygen concentration was found be above > 4mg/l only in kelavarapalli reservoir, its outfall, Y junction, and Bellandur diversion channel. The water quality was found to be deteriorated in terms of presence of oxygen fromchannasandra bridge till Bagalur bridge of River Thenpennai and alsoinvarthur diversion channelandAgara drain. Improvedoxygen level foundinkelavarapalli reservoir may be attributed to large area of the reservoir allowing the suspended solids to settle and the water flowing through sluices with a high rise fall. Further, greenish plants/algal growth in scanty pockets seen in Kelavarapalli and Sokkarasanapalli known as Eutrophication, arises from the oversupply of nutrients (N & P), which leads to overgrowth of plants and algae. Degradation of dead algae and plants by microbes consuming dissolved oxygen in the watermay lead to the state of hypoxie.

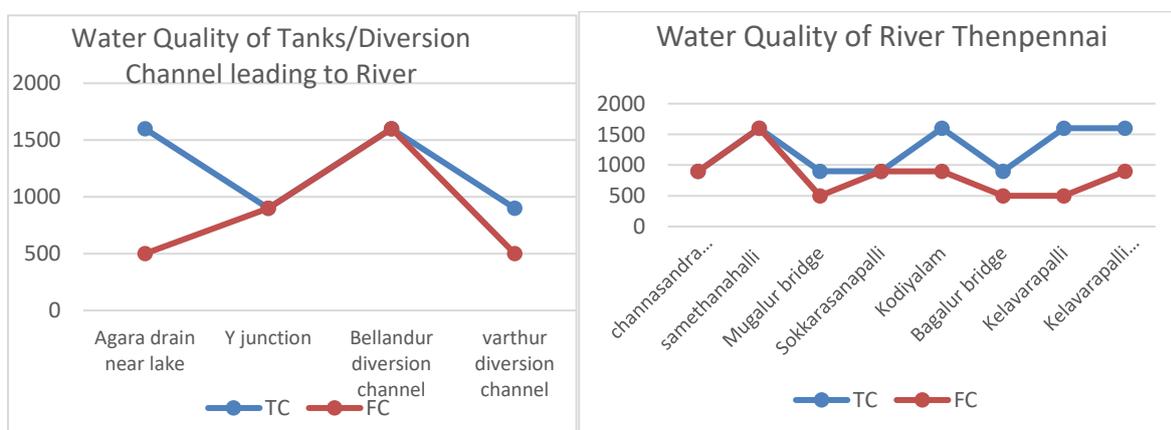
Further, BOD of the water was found to be not complying in all the sampled locations as per Designated Best Use Criteria notified under Environment (Protection) Rules, 1986. Wherein,BOD is found to be beyond the permissible limit inBagalur bridge (53 mg/l) when compared with the General Standards for discharge of Environmental Pollutants Part-A: Effluents notified under The Environment (Protection) Rules, 1986, which is also shown in Figure 10 below.



**Figure. 10 Analysis results of DO, BOD, COD and Organic load**

The total and faecal coliform analysis indicates the ‘potability’ of water & its suitability for consumption/drinking. The count measures the concentration of total coliform bacteria associated with the possible presence of disease causing organisms. The Total Coliform was found to be non complying in all the sampling points of River Thenpennai. Analysis of Faecal coliform count in River Thenpennai shows that the concentration of microbial count in the range of 500 to 1600 MPN/100 ml which may be attributed to discharge of untreated and partially treated sewage into the River.

Figure 11 gives the comparison of TC and FC in the 12 locations of River Thenpennai.

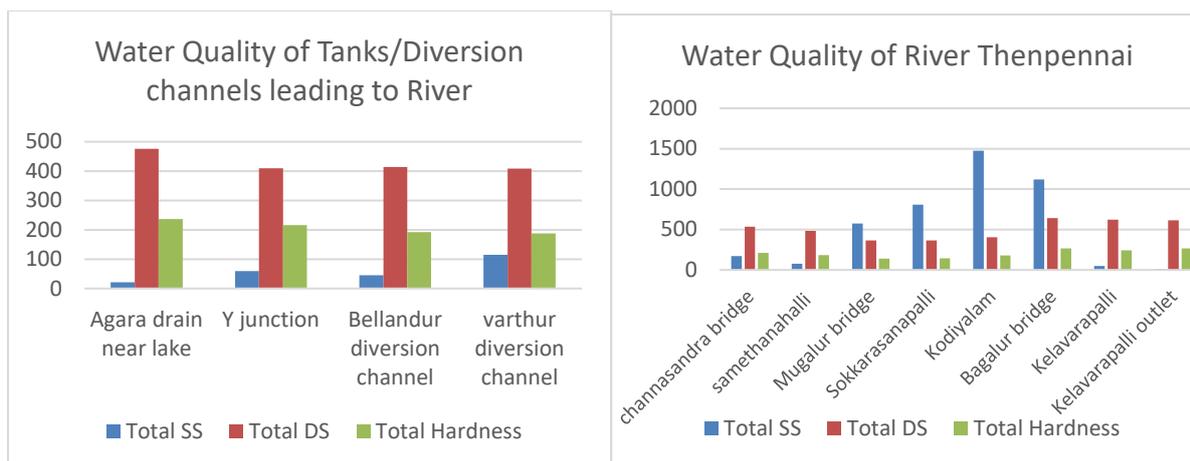


**Figure. 11 Analysis results of Total Coliform and Faecal Coliform**

Results of suspended solids in the Analysis of water quality in River Thenpennai were compared with the prescribed limits of General Standards for discharge of Environmental Pollutants Part-A: Effluents notified under The Environment (Protection) Rules, 1986, which reveal that the values were not complying in the locations viz., Varthur diversion channel, Channasandra bridge, Mugalur bridge, Sokkarasanapalli, Bagalur bridge, Kodyalam. The larger the Suspended solids, the larger shall be the presence of bacteria, protozoa and viruses. High TSS wastewater cannot be easily disinfected, as the suspended particles “hide” these microorganisms and also react with chemical disinfectants. The Physico-Chemical Parameters analysed for the samples collected in River Thenpennai is given at **Table 2**. Figure 12 below shows the comparison chart of TSS, TDS and total hardness.

Sample Locations	Table 2. Physico-chemical Parameters (mg/l) analysed in River Thenpennai																					
	TDS	COD	Total Coliform	Total Alk	Fluoride	Chloride	Sulphate	O-Phosphate as P	Total Phosphate as P	Anionic surfactant	Surface Active Agents	Ammoniacal Nitrogen	Total Hardness	Calcium	TKN	Nitrate-N	Nitrite-N	TOC	Na	K	Mg	Phenols
<b>Bengaluru diversion channel of Lakes / Tanks – Outfall into River Thenpennai</b>																						
Agara Drain	476	57	1600	227	3.8	65	41	0.53	0.68	BDL	BDL	BDL	237	69	12.3	2	0.05	7.9	57	11	16	BDL
Y junction drain	410	53	900	216	0.19	65	62	0.47	0.61	BDL	BDL	BDL	216	62	12.6	2	0.23	6.5	44	11.8	15	BDL
Bellandur diversion channel	414	45	1600	216	0.25	75	22	0.84	1.01	BDL	BDL	1.6	192	62	11.5	2	0.12	7	45	10.5	9	BDL
Varthur diversion channel	408	37	900	169	3.8	75	51	0.42	0.62	BDL	BDL	BDL	188	54	11	BDL	0.12	16	44	10.2	13	BDL
<b>Sampling Locations in River Thenpennai</b>																						
Channasandra bridge	536	41	900	216	3.8	126	49	1.06	1.38	BDL	BDL	BDL	209	69	17.3	5	0.36	11	66	12.2	9	BDL
Samethanahalli industrial zone	484	33	1600	192	2.3	100	53	1.11	1.32	BDL	BDL	BDL	184	57	11.3	4	0.3	14	56	11.3	10	BDL
Mugalur Bridge	363	86	900	137	0.23	70	57	0.53	1.73	BDL	BDL	BDL	139	41	12.1	2	0.05	10.4	41	9.3	9	BDL
Sokkarasanapalli	363	90	900	157	0.2	70	21	0.63	0.8	0.34	0.45	BDL	145	41	14.8	BDL	0.01	10	44	9	10	BDL
Kodiyalam	404	98	1600	196	0.35	100	55	0.6	1.7	BDL	BDL	BDL	180	44	19.5	2.2	0.11	9.9	47	9.5	17	BDL
Bagalur bridge	640	204	900	298	1.2	138	19	0.93	1.32	0.43	0.49	BDL	265	74	26.9	BDL	0.03	13	80	13	19	BDL
Kelavarapalli	620	33	1600	200	0.23	131	52	0.98	1.57	BDL	BDL	BDL	241	70	6.6	4.9	0.24	10.7	86	14	16	B

Reservoir																							D L
Kelavarapalli Outfall	612	41	1600	235	0.3	150	33	1.97	2.23	BDL	BDL	BDL	265	65	7.1	2.7	0.25	10	81	13.5	25		B D L
Classification of River Thenpennai	The analysis of Water Samples collected at 12 locations joining River Thenpennai reveals that characteristics of water w.r.t Fluoride is not complying with the permissible limits prescribed under Drinking Water specification of Indian Standard IS 10500:2012 and General Standards for discharge of Environmental Pollutants Part-A: Effluents notified under The Environment (Protection) Rules, 1986 in the areas viz., Agara drain, Varthur diversion channel, Channasandra bridge and Samethanahalli.																						



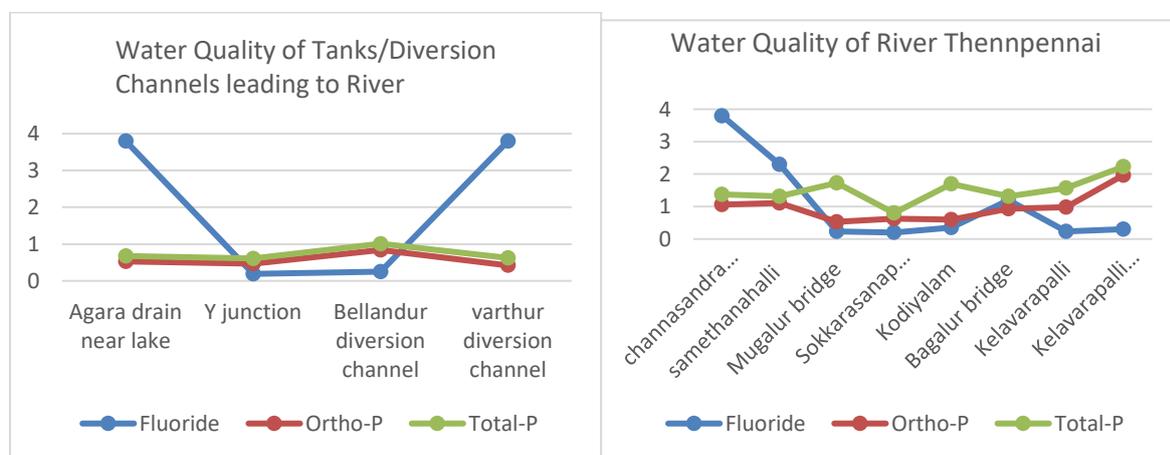
**Figure. 12 Analysis results of Suspended Solids and Total Solids**

Analysis results of heavy metals in River Thenpennai are given at **Table 3** below. Metals and heavy metals namely, Aluminium, Chromium, Manganese, Iron, Cobalt, Nickel, Copper, Zinc, Total Arsenic, Selenium, Cadmium, Mercury and Lead were analysed in all the 12 locations of River.

**Table 3. Heavy Metal Concentrations of 12 locations in River Thenpennai**

Sample Locations	Heavy Metals in mg/l												
	Al	Cr	Mn	Fe	Co	Ni	Cu	Zn	Total As	Se	Cd	Hg	Pb
<b>Sampling in diversion channel of Lakes / Tanks, Bengaluru – Outfall into River Thenpennai</b>													
Agara Drain	0.66 1	0.00 9	0.15 2	1.38 0	BL Q	BL Q	0.004	0.06 6	BLQ	BLQ	BLQ	0.001	BLQ
Y junction	0.64 0	0.00 3	0.22 1	1.40 5	BL Q	0.00 3	0.031	0.05 1	BLQ	BLQ	BLQ	0.005	0.006
Bellandur diversion channel	0.66 8	BL Q	0.18 2	1.17 4	0.00 1	0.00 3	0.010	0.04 6	BLQ	BLQ	BLQ	0.012	0.005
Varthur diversion channel	0.75 8	BL Q	0.22 5	1.63 7	BL Q	BL Q	0.013	0.04 2	0.001	BLQ	BLQ	0.005	0.005
<b>Sampling Locations in River Thenpennai</b>													
Channasandra bridge	0.17 4	BL Q	0.20 0	0.72 8	BL Q	BL Q	0.006	42.0 51	BLQ	BLQ	BLQ	0.003	BLQ
Samethanahalli weir	0.35 4	BL Q	0.11 0	0.99 0	BL Q	BL Q	BLQ	0.00 3	BLQ	BLQ	BLQ	0.006	BLQ
Mugalur Bridge	1.37 8	BL Q	0.21 9	3.14 8	BL Q	BL Q	0.024	0.04 2	BLQ	BLQ	BLQ	0.003	0.007
Sokkarasanapalli	1.79 8	BL Q	0.26 8	4.20 2	0.00 3	0.00 4	0.022	0.06 2	BLQ	BLQ	BLQ	BLQ	0.008
Kodiyalam	3.23 9	0.00 3	0.37 9	10.2 86	0.00 7	0.01 0	BLQ	0.17 2	BLQ	BLQ	0.004	BLQ	0.025
Bagalur bridge	1.51 0	BL Q	0.34 8	4.89 1	0.00 3	0.00 5	0.010	0.09 6	BLQ	BLQ	BLQ	BLQ	0.010
Kelavarapalli Reservoir	BL Q	BL Q	0.21 6	0.10 4	BL Q	BL Q	BLQ	21.4 83	BLQ	BLQ	BLQ	0.002	BLQ
Kelavarapalli Outfall	BL Q	BL Q	0.20 0	0.22 1	BL Q	BL Q	BLQ	BL Q	BLQ	BLQ	BLQ	0.002	BLQ

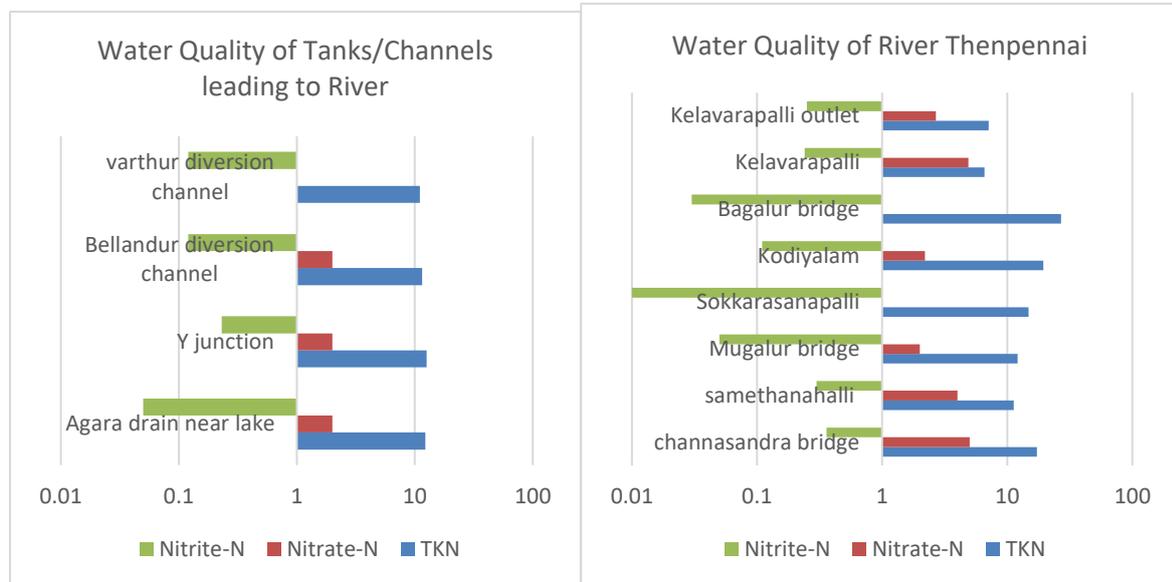
Analysis results reveal that concentration of fluoride has been found to be not complying in the locations namely, Agara drain, Varthur diversion channel, Channasandra bridge and Samethanahalli weir. The concentration of fluoride in the River Thenpennai in the above areas were reported to be in the range of 0.19 to 3.8 mg/l, which may be attributed to usage of groundwater as drinking water source along with water supplied by Bangalore Water Supply and Sewerage Board followed by untreated sewage discharge into the river. However, as reported by World Health Organisation in its report Fluoride in Drinking Water, Fluorides may also enter a river as a result of industrial discharges (Slooff et al., 1988). The maximum level of fluoride which the body may tolerate is 1.5 parts per million (ppm) which is often based on water fluoride content. The other sources for fluoride are infiltration of agricultural runoff containing chemical fertilisers, improper disposal of liquid waste from industries, alumina smelting, cement production and ceramic and brick firing. Analysis results of Fluorides, Phosphates and Nitrates are given as **Figure 13 and 14** respectively.



**Figure. 13 Analysis results of Fluorides and Phosphates**

Nitrogen and phosphorus in all forms are major rate limiting elements essential for the growth of algae and other vegetation in water bodies leading to a state called eutrophication. The greenish color water with large vegetation growth is common sight for not only lakes and ponds but also slow moving rivers. Eutrophication leads to many problems related to water

quality: • Large Dissolved oxygen variation leads to fish kills • Filling the water body with dead algae and other vegetation. • Decomposition of dead algae and vegetation at the bottom causing oxygen depletion and further release of nutrient. • Release of algal toxins and odors causing substances make the water unsuitable for human and animal consumption.



**Figure. 14 Analysis results of Nitrates**

The water quality was also analysed for the presence of pesticides namely, Anilopho, 2-4 D, Carbaryl, Beta Endosulfan, Aldrin, Dieldrin, Alpha HCH, Alpha Endosulfan, Beta HCH, Delta HCH, Endosulfan sulphate, Ethion, Gamma HCH, o,p' DDD, o,p' DDE, o,p' DDT, p,p' DDD, p,p' DDE, p,p' DDT, Methyl parathion, Malathion, Chlorpyrifos. However, no traces of pesticides was found in the samples collected in River Thenpennai and channels/drain/overflow of tanks leading to the River.

Analysis of water samples collected also reveal that no presence of Anionic Surfactants and Surface Active Agents in River Thenpennai except in Sokkarasanapalli and Bagalur bridge.

It is submitted that, there recorded an average rainfall of more than 100 mm on the previous night of sampling i.e 09.09.2020. Subsequent to the rainfall day, the locations namely, Agara drain, Y junction, Bellandur

diversion channel, Varthur diversion channel, Channasandra bridge, Samethanahalli were inspected and samples were collected on 10.09.2020.

### **5.3 Findings and Observations of the Joint Committee:**

1. The stretch of the river is mostly dry to scanty from Origin (Nandi) towards Chikkaballapur district, Kolar District, Bangalore Urban District and Hoskote taluk of Bangalore Rural district. Overflow of water from Bellandur and Varthur lakes carrying domestic sewage of Koramangala&Challaghatta and Hebbal valleys of Bangalore adds to the flow in river Thenpennai thereby causes frothing of river stretch.
2. The Joint committee has also observed that flow of Surface water in River Thenpennai carries about a portion of treated wastewater from STP i.e 300 MLD {750 (STP capacity) – 450 (Treated water diverted to Kolar &Chikkaballapur)} and untreated sewage i.e 258 MLD (i.e 866 MLD – 608 MLD) of Bangalore, as informed by BWSSB.
3. Solid Waste dumping was found in the locations including Agara drain, Bellandur diversion channel, Y Junction, Channasandra bridge, Mugalur bridge and bagalur bridge, which needs to be removed by the concerned agencies of the State Government. Tamilnadu Pollution Control Board has instructed the Block Development Officer for taking action for proper disposal of solid waste and domestic sewage in the area of investigation, which is provided in Section 6.0 of Chapter VI.
4. Frothy flow was found in locations namely, Samethanahalli, Mugalur, Kodyalam, Kelavarapalli which may be attributed to mix of industrial effluents and domestic sewage flowing from the areas. However, it is also noted that no presence of surface active agents and anionic surfactants were found in the samples collected during the monitoring except in Sokkarasanapalli and Bagalur bridge.
5. Analysis results of River Thenpennai reveals that the quality of the surface water flowing in River Thenpennai falls under Category E of the Designated Best Use Criteria notified under Environment (Protection) Rules, 1986, which is attributed to absence of

sufficient dissolved oxygen and presence of suspended solids followed by faecal coliform in all the locations. There appears deteriorated Dissolved Oxygen in the river stretches from Channasandra bridge to Bagalur bridge.

6. Faecal coliform count in River Thenpennai were found to be in the concentration of 500 to 1600 MPN/100 ml which may be attributed to discharge of untreated and partially treated sewage with night soil contamination.
7. No traces of pesticides were found in the surface water samples collected.
8. It was observed that water flowing in samethanahalli, mugalur, sokkarasanapalli, kodiyaalam, bagalur, kelavarapalli is being pumped and used for agriculture in the nearby fields/farms, which may be checked for water quality, on a regular basis by concerned authorities to ensure the water quality, as it is also being used for edible food crops. Necessary steps may be taken by the agricultural departments of respective State Governments.
9. The surface water quality needs improvement in terms of dissolved oxygen, Total Coliform/Faecal Coliform, suspended solids, dissolved solids, fluorides, nitrates, phosphates, organic pollutants and heavy metals.
10. Therefore, the joint committee recommends development of Biodiversity park and wetland as per CPCB Guidelines titled 'Guidelines for setting up of Biodiversity parks in Floodplains of Rivers of India, including River Ganga', at suitable locations and its feasibility may be identified by State Government Authorities of Karnataka and Tamilnadu as a means of remedial measures.

## CHAPTER VI

### ACTION PLAN AND REMEDIAL MEASURES

#### 6.0 Action Taken Report on Defaulters

##### A. Action taken on defaulting industries by Tamilnadu Pollution Control Board

In the matter of O.A No. 111 of 2020, Tamilnadu Pollution Control Board carried out inspections of unauthorized dyeing units on 14.09.2020 based on the telephonic message received from the public of Paduthepalli village, Hosur Taluk, Krishnagiri district. During the inspection, TNPCB made following observations;

- (i) Two unauthorized dyeing units carrying out dyeing of cotton fabric/hosieries were found operational, namely (a) M/s Veeraraj Dyeing, SF No. 156/1, Pauthepalli Village, Nanthimangalam Post, Hosur Taluk, Krishnagiri District, owned by SmtYellamma, w/o Sh Bowseruvappa and (b) M/s Moorthy dyeing, SF No. 209/3B2, Pauthepalli village, Nanthimangalam post, Hosur taluk, Krishnagiri district, owned by Smt. Sikkathayamma, w/o ShKembaiyya.
- (ii) The above units have not obtained Consent to Operate from TNPCB and permission from other Government agencies/authorities. The units were found to be drawing water from agriborewell for the dyeing activity and discharging untreated dyeing effluent into the River Thenpennai through pipeline causing pollution of River.
- (iii) The above two units were found to be located within 5 km from the Riverbed of Thenpennai, against the regulations passed by G.O Ms. No. 127/E&F/EC Dept./ECIII/ dated 08.05.1998.
- (iv) No Effluent Treatment Plant was provided for the treatment of the trade effluent generated and the untreated dyeing colored effluent was being discharged directly into River Thenpennai through pipeline.
- (v) TNPCB sought permission from DC, Krishnagiri and Chairman of District Coordination Committee for Krishnagiri district to stop the illegal discharge of effluent into water bodies/land and to take stringent action against defaulting units as per the guidelines.
- (vi) Subsequent to the approval of the Chairman, DCC dated 15.09.2020, actions were taken to disconnect TNEB power supply followed by demolishing of machineries/shed installed by the unauthorized dyeing units on 17.09.2020 by the members of DCC with police protection, to prevent any such

dyeing operations in the future. Photographs taken before and after demolishing the units are provided as Figure 15 below:



(c) Demolishing of M/s Veeraraj dyeing (d) Demolishing of M/s Moorthy dyeing

**Figure 15. Action Taken on Unauthorized dyeing units by Tamil Nadu Pollution Control Board**

**B. Water Quality Analysis of River Thenpennaiby TNPCB**

TNPCB informed that samples at sokkarasanapalli village have been continued till date. From the said analysis reports, it has been revealed that parameters such as Dissolved oxygen, Biochemical oxygen demand and Total Coliform are exceeding the standards prescribed by the Board.

It has also been submitted by TNPCB that, the industries generating trade effluent in Krishnagiri District are treating their trade effluent through Effluent Treatment Plants and the treated effluent are being either recycled back to their process or discharged on their own land for green belt development after satisfying the standards prescribed by the Board. There is no discharge of trade effluent into river thenpennai from Krishnagiri district. However, all the industries are being closely monitored by Tamilnadu Pollution Control Board. A note on the water quality analysis carried out by TNPCB is appended as **Annexure VI**.

### **C. Action Taken by TNPCB with regard to Solid Waste Management and domestic sewage management**

On the basis of field survey and investigation carried out by the joint committee in Bagalur bridge alongside River Thenpennai, the following instructions have been given to the Block Development Officer, Hosur Panchayat Union, Hosur, Krishnagiri District by TNPCB;

- (i) The Solid Waste and Biomedical waste generated from the areas viz., Bagalur covered under the local body jurisdiction shall be collected, segregated and disposed as per the provisions of Solid Waste Management Rules, 2016.
- (ii) The Solid Wastes dumped in the banks of River Thenpennai shall be cleared immediately around the river bed in Bagalur area and near Bagalur Bridge, and to dispose them in a proper scientific manner as per the provisions of Solid Waste Management Rules, 2016.

Similarly, TNPCB has given instructions to the Block Development officer of Hosur panchayat Union in Hosur, Krishnagiri District that the domestic sewage generated from the households, commercial establishments and other activities shall not be discharged into River Thenpennai, and the entire sewage shall be treated and disposed by providing suitable treatment system.

In this regard, the local body has also been instructed to submit action taken report w.r.t solid waste management and sewage management alongwith short term and long term action plan to avoid discharging of sewage into River from the inhabitants of Bagalur.

### **D. Action Taken on defaulters by Karnataka State Pollution Control Board**

#### **(i) Action taken on defaulting industries**

1. Thenpennai or DakshinaPinakini River catchment area is spread over in the following districts;
  - a. Part of Bengaluru Urban
  - b. Part of Bengaluru Rural
  - c. Part of Kolar
  - d. Part of Chikkaballapura
2. Following Industrial Areas are located in Thenpennai or DakshinaPinakini River catchment area:
  - i. Jigani
  - ii. Electronic city
  - iii. Veerasandra Industrial Area
  - iv. Bommasandra Industrial Area

- v. Old Airport and HAL Complex.
  - vi. Doddanakundi Industrial Area.
  - vii. Sadaramangala Industrial Area
  - viii. White field
  - ix. New Air Port
  - x. Aerospace park near New Air Port
  - xi. Hardware Park near New Air Port
  - xii. Software Park near New Air Port
  - xiii. Hoskote Industrial Area
  - xiv. Malur Industrial Area
3. None of the above Industrial Areas are located on the banks of Thenpennai or DakshinaPinakini River
4. All the above Industrial Areas are located away from the DakshinaPinakini River.
5. None of the industries are permitted to discharge its effluents in to Thenpennai or DakshinaPinakini River.
6. Quantity of effluent generation, treatment and utilization in Thenpennai or DakshinaPinakini River catchment area is as below: -

**(i) Generation of Domestic and trade effluents from industries**

Total No.of industries (Red+Orange)	Quantity of effluent generated/treated in MLD		Total
	Domestic	Trade	
882	27.04	19.58	46.62

**(ii) Treatment and disposal of Domestic and trade effluents from industries**

Total generation of Domestic and Trade effluent in MLD	Treatment and disposal of effluent in MLD					
	Septic Tank and Soak Pit (Domestic only)	UGD	CETP	Reuse/On land	Stream	River
46.62	1.79	0.96	0.65	43.22	00	00

*Note: As observed from the above table about 93% of treated effluents are utilized on land or reused.*

KSPCB has issued Closure Directions to 72 nos. of defaulting industries during 2018 – 2020. Out of which 29 No's of closure directions were revoked after compliance. The list and status is enclosed as **Annexure VII**. Further,

Environmental Compensation imposed on the defaulting industries are discussed in Section 6.1 below.

**(ii) Action taken by KSPCBw.r.t Sewage Management in Bangalore**

- i. Bangalore has nearly 3000 decentralized STPs. The treated sewage is proposed to be used mandatorily for the construction, gardening and Parks maintenance. KSPCB has identified the parks of City Corporation and the forest lands in the Bangalore Rural and Urban Districts and also other plantation on medians, avenues. Their GPS locations and latitude and longitude are obtained. The Excess treated sewage from the independent apartments is being connected to these usages. A user-friendly app is also being developed in the lines of aggregation of Cabs.
- ii. A Study is being conducted by the Indian Institute of Science, Bengaluru to check the safety of using the treated sewage for the construction purpose with respect to the strength and the corrosion of steel. The requirement of water for the construction alone is expected to be 52 MLD including the Ready Mix Concrete (RMC) plants and about 20 MLD for other usages.
- iii. It is proposed to introduce the Sensors for the online measurement of quality of treated sewage. The specifications have been developed in consultation with the experts and the Indian Institute of Science to make it mandatory to have these sensors to check the quality of the final treated water. This would help in making the quality treated sewage available.
- iv. On Continuous persuasion of KSPCB, online real time monitoring equipments are installed by BWSSB at 15 Nos. of STPs located in the Thenpennai or DakshinaPinakini River Catchment area. The Real time monitoring data is linked to KSPCB server and it is available in KSPCB and BWSSB websites.

Besides above, KSPCB has filed cases against 16 defaulting Apartmentsw.r.t domestic sewage management. The list and status is enclosed as **Annexure VIII**. Further, Environmental Compensation imposed on the Apartments are discussed in the section 6.1 below.

**(iii) Action taken by KSPCBw.r.t pollution of lakes**

KSPCB is monitoring the water quality of 79 lakes located in DakshinaPinakini River catchment area. The annual water quality is confirming to D/E Class of Primary Water Quality Criteria. The list of lakes and its Quality is appended as **Annexure- IX**.

Action taken by Karnataka State Pollution Control Board on pollution of lakes in Bangalore is as below;

1. The KSPCB, Regional Office, Bangalore East has filed a Criminal Case under Water Act, 1974 against BWSSB (CC No. 928/2006) w.r.t. pollution of Bellandur Lake.
2. The KSPCB, Regional Office, Bommanahalli has filed one more Criminal Case under Water Act, 1974 against BWSSB in May 2015 (CC No. 30236/2015) w.r.t. pollution of Madiwala Lake, Arakere Lake and Hulimavu Lakes which are feeder Lakes for Bellandur Lake.
3. The Board is monitoring Lake Water quality, treated water quality from BWSSB STPs & other STPs of apartment / Commercial complexes / IT Parks etc., are being regularly monitored by the Board.

**(iv) Water Quality Analysis of River Thenpennai by KSPCB**

KSPCB is monitoring the water quality of Thenpennai or DakshinaPinakini River near Mugalur bridge. The water quality is confirming to D/E Class of Primary Water Quality Criteria. The Water Quality of River Thenpennai is appended as **Annexure X**. DakshinaPinakini is not a perennial river and the flow is only treated /untreated sewage of Bengaluru. The river water quality can be improved if and only when the sewage is treated in the STPs.

**(v) Other Actions and Initiatives by KSPCB for Waste Management**

Facilities available at Bengaluru for effective management of various wastes generated:

- i. 08 No's of CETPs of total capacity of 1775 KLD are facilitating industries located in and around Bengaluru for effective treatment and disposal of effluents generated from SSI sectors.
- ii. 2 No's of TSDF are facilitating Transport, Storage, treatment and Disposal of Hazardous Wastes generated from the industries.
- iii. 5 No's of Common Bio Medical Waste Treatment Plants are facilitating Health care establishment in and around Bengaluru for effective treatment and disposal of Bio Medical Waste.
- iv. Plastic carry bags are banned in the entire State by Government of Karnataka vide Gazette Notification No.FEE 17 EPC 2012 dated 11.03.2016.
- v. For managing the solid waste, 9 land fill sites of 3350 TPD is established by BBMP. To encourage segregation at source, BBMP has established 188 Dry Waste Collection Centre. 10 mixed waste treatment facility, 7 landfill sites, 15 decentralized bio-methanation facility with 5 TPD capacity each. Further, Bulk Generators of

waste like Hotels, Restaurants, KalyanMantaps, Apartments etc., have been directed to establish a system to handle Municipal Solid Waste generated in their premises or through empanelled service providers.

- vi. Board has accorded permission to BBMP to establish solid waste processing units at 7 different locations. Board has given authorization to M/s Rock Crystals, Bengaluru of installed capacity 1000 TPD for C&D waste processing.
- vii. An Integrated Control & Command Centre has been set up at KSPCB, Bengaluru, wherein a common number (080) 2558 2559 is made available for the public. This Centre monitors the complaints until it is attended and the issue is resolved. This centre will also monitor the Emergency Response Vehicles.
- viii. KSPCB has addressed the letter to Heads of the Stake Holders viz., BBMP, BWSSB, DMA, BESCOM and Rural Development and Panchayat Raj (RDPR) to co-operate in identifying the polluting industries operating without consent of the Board and having trade license or not to prevent pollution of Water bodies. Copy of the letter is enclosed as **Annexure-XI**.
- ix. KSPCB has called expression of interest for installation CETP (Common Effluent Treatment Plant) at Peenya Industrial Area for treatment of Industrial Effluents generated from the Small Scale Surface treatment units.
- x. All the common effluent treatment plants of the state are being fitted with the sensors which monitor the key parameters and also the quantity of effluents received and treated. The movement of vehicles is also tracked through GPS. The data is synced with the Command Control Centre for effective monitoring.

The control and prevention of pollution is a continuous process. Hence, the KSPCB is making all efforts to arrest and prevent pollution both Air & Water pollution on a continuous basis. Active co-operation is being sought from other Departments like BWSSB, BBMP, BDA and local bodies, else, the task of prevention and control of pollution cannot be accomplished. The KSPCB will undertake to continue its efforts to prevent and control the pollution within the parameters laid down under the provisions of Environmental Protection Act, Air Act and Water Act and abide by any directions to be issued by the Hon'ble NGT.

## **6.1 Environmental Compensation**

### **(i) With Respect to Violations observed in Sewage Management by KSPCB**

With regard to generation of sewage by the 873 Apartments located in the catchment area of the lakes (Bellandur and Varthur), the Hon'ble NGT vide order dated 6.12.2018 having accepted the recommendations of the NGT commission directed defaulting units to pay Environmental Compensation as per the table given below:

SNo	Violations	Environmental Compensation
1	Where STP is required as per the EC/ Consent, but the facility has not constructed the STP despite generating sewage.	Rs. 10 Lakhs per month from the date of completion certificate or date of completion
2	Where actual capacity of STP is less than the capacity as shown in the EC/ Consent	Rs. 20000/per day from the date of inspection till final upgradation
3	Where the number of flats/ units actually constructed is more than the number of flats / units disclosed to KSPCB while obtaining Consent	Rs. 1 Lakh per unit per month from the date of construction until the grant of fresh requisite consent
4	Where STP is not functioning or parameters are not being met or untreated sewage is being bypassed from the STP or being otherwise diverted	Rs. 5 lakhs per default.

Thereafter, the Hon'ble NGT vide direction in its order dated 21.10.2019 in OA No. 125/2017 in Paragraph (13), Karnataka SPCB has been made responsible to collect Environmental Compensation charges towards non – compliance by the Apartments/ Township/Commercial Establishments.

In view of the above, Board had assessed and issued Environmental Compensation notice related to not providing STP and also for non-conformity/by pass/discharge of treated/untreated sewage by the defaulting units. Further, Show-Cause notice and notice of proposed directions were issued for continued violation.

In respect of the non compliances of the treated sewage, out of 376 units, 22 units have paid an Environmental Compensation (EC) amount of Rs 115 lakhs. Further, 6 Number of Petitioners have approached the Hon'ble High Court (writ petition No. 4540/2020). The Hon'ble High Court has issued interim order on 26.02.2020 directing the KSPCB to issue Show cause notice to the petitioner.

Post-COVID 19, Video Conference was done on 04.07.2020 calling all the Apartments who are due to pay the EC. After hearing them, the Board has

taken a decision and directed the defaulters to pay the Environmental Compensation Charges as assessed by the Board earlier otherwise to initiate actions under 33(A) of the Water Act and as per the direction of the Hon'ble NGT. Post the personal hearing, as no EC has been paid, and the personal hearing proceedings are being brought to the notice of the Hon'ble NGT, Hon'ble High Court and Board would initiate action and the process is initiated and shortly the closure orders will be issued for such units by Karnataka SPCB.

KSPCB has imposed EC of Rs. 288.80 Crores on 496 No's of Apartment/Commercial establishment and Rs. 1.40 crores was collected. Details of Environmental Compensation imposed and collected are appended as **Annexure- XII & XIII**.

Further, it is also submitted that in compliance with the Hon'ble Green Tribunal order dated 18.12.2019 in the matter of O.A No. 125/2017 before Principal Bench, the status and progress on sewage management (as on 15.07.2020) as submitted by Bangalore Water Supply and Sewerage Board before Hon'ble Tribunal is appended as **Annexure XIV**.

**(ii) With Respect to Violations observed in Industrial Discharge by KSPCB**

As per the directions of the Hon'ble NGT in OA 1038/2018, KSPCB has imposed Environmental Compensation in respect of 36 No's. of industries. However, the Hon'ble Supreme Court of India has stayed the process of levying of Environmental Compensation vide Civil Appeal Diary No.19271/2020 on 22.09.2020. Details of Environmental Compensation imposed by KSPCB on defaulting units are enclosed as **Annexure XV**.

With regard to industries observed to be discharging into River Thenpennai during the Joint committee monitoring, it is submitted that those units were illegally operating and the same were made to close immediately. The joint committee also observed that those units are falling under small and micro scale units operating illegally.

**6.2 Long Term and Short Term Action Plan for improving the Water Quality of River Thenpennai**

The joint monitoring team comprising of CPCB, KSPCB and TNPCB have reported in the case of Original Suit No. 02 of 2015 that, "*the River Thenpennaiyar receives the outflow of treated and untreated sewage of Bellandur and Varthur lake system. Comprehensive plan of restoration of these lakes along with identifying other sources of untreated sewage into the River only will help to restore the quality of the river. Government of Karnataka may prepare such plan on priority considering the pollution issues of Bellandur and Varthur lake system, which contributes to the Pollution of Thenpennaiyar River*". Further, Hon'ble Tribunal,

Principal Bench, New Delhi, in the matter of O.A No. 125/2017, constituted a monitoring committee headed by Justice ShSantosh Hegde, former Judge of the Hon'ble Supreme Court to oversee the execution of the action plan on remedial action for restoration of Bellandur, Agara and Varthur lakes at Bangalore.

The joint committee with due cognizance of the water quality of River Thenpennai reported in section 5.2 above and the action plan already reported by the joint monitoring team comprising of CPCB, KSPCB and TNPCB and execution of the action plan on remedial action for restoration of Bellandur, Agara and Varthur lakes at Bangalore by the monitoring committee in O.A no. 125/2017, the following long term and short term action plan has been prepared;

Action Points	Present Status	Proposed Action by the Joint Committee	Agency Responsible (Timeline)
Estimation of flow of water in River Thenpennai	<p>The outfall flow of water in major tanks/lakes located in Bengaluru leading to River Thenpennai are being estimated by BWSSB as (as on September, 2020):</p> <p>(i) Agara lake – 139.31 MLD (ii) Bellandur lake – 268.25 MLD (iii) Varthur lake – 275.25 MLD</p> <p>In the absence of flow data of the tanks/lakes and major drains whose outfall joins River Thenpennai, the flow data of River Thenpennai can not be arrived at.</p>	<ol style="list-style-type: none"> <li>1. BWSSB to measure the flow and discharge of all the tanks / lakes located in Koramangla&amp;Challaghatta, Hebbal Valleys flowing in to River Thenpennai viz., Agara, Bellandur, Varthur, Channasandra, YellamalappaChetty,samethanah alli weir Mugalur etc. Flow details of tanks in the upstream (Hoskote taluk, Bangalore rural, chikkaballapur) may also be included if overflow is detected.</li> <li>2. Flow or discharge of each of the tanks that are recharged by treated wastewater by BWSSB i.e. 126 tanks in Kolar District and 65 tanks in Chikaballapur district.</li> <li>3. Measurement of flow of all the major drains (i.e storm water drains)joining the river for estimate of flow of River Thenpennaiand maintenance of all records.</li> </ol>	<p>BWSSB and Minor Irrigation (Three months)</p> <p>Minor Irrigation (Three months)</p>

			BWSSB and Minor Irrigation (Three months)
Study of Performance evaluation of Sewage Treatment Plants in Bangalore by engaging a CSIR institute	<p>The performance of the STPs located in Koramangla and Challaghatta, Hebbal Valleys are being assessed based on its capacity utilised and characteristics by BWSSB. However, the treated waste water quality needs to be ascertained.</p> <p>Further, Water quality of water (treated water by BWSSB) diverted for irrigation to chikkaballapur and Kolar Districts through Minor Irrigation Department is required to be assessed.</p> <p>Therefore, there is need to conduct audit of the data of quantity of sewage generation, sewage treatment capacity installed vs actually operated and treated wastewater characteristics.</p>	<p>(i) BWSSB may engage a CSIR Institute like CLRI or NEERI or others for evaluating performance of STPs located in K&amp;C and Hebbal valleys. (viz., there are 32 STPs in Bangalore including 21 STPs in Koramangla&amp;Challaghatta andHebbal Valleys). The same may be supervised by KSPCB. The final report may be submitted to KSPCB for review.</p> <p>(ii) Completion of sewerage network for the villages in Koramangla&amp;Challaghatta andHebbal Valleys (of 110 villages identified by BBMP) for tapping the sewage generated, as already submitted to Hon'ble Tribunal, Principal Bench, Delhi in the matter of O.A no. 125/2017. (Next date of hearing: 15.01.2021)</p> <p>(iii) Strengthening of STP conveyance system to improve sewage getting completely tapped and treated, in order to avoid discharge into River Thenpennai.</p> <p>(iv) The outcome of the performance study of STPs may be submitted as Status of Compliance of the State Functionaries of Karnataka to the Monitoring Committee constituted in the matter of O.A 125/2017, for review and reporting.</p>	<p>BWSSB and KSPCB (Six months)</p> <p>BWSSB (as per the timeline fixed in O.A No. 125/2017)</p> <p>BWSSB(on a regular basis)</p>



	the matter of O.A No. 125/2017.	Report (DPR) for development of Biodiversity parks in Bellandur an Varthur (iii) Award of Project (iv) Completion of the Project	Authority (not more than One year or as per the timeline fixed in O.A No. 125/2017)
Environmental Compensation be imposed by SPCBs after evaluating performance of STPs and identification of defaulters upon Random Verification.	Performance evaluation of STPs by BWSSB and random inspection of industries is required to be carried out by KSPCB/TNPCB with specific reference to River Thenpennai.	EC be calculated and imposed based on the Performance Evaluation of STPs and Random Verification of Grossly Polluting Industries.  EC be calculated and imposed based on Random Verification of Grossly Polluting Industries  Calculation of EC by the three member Committee comprising of CPCB, TNPCB and KSPCB, after submission of Reports by the concerned authorities (BWSSB, KSPCB, TNPCB).	BWSSB and KSPCB (Six months)  TNPCB (Six months)  CPCB (Six months on receipt of the Study Report and recommendations/criteria for imposing EC from KSPCB and TNPCB)
Sewage and Solid Waste Management in the villages (13) adjoining River Thenpennai up till Kelavarapalli	Among the villages located near River Thenpennai, Bagalur is having population of about 11,000 and the domestic sewage generation is estimated to be 0.0715 MLD. Further, Solid Waste generation in Bagalur is estimated to be about 1.5 Tons/day.	Feasibility study for providing Sewage Treatment options (such as oxidations ponds/ diversion channels or wetlands etc.) by TNPCB followed by implementation by Local authority of the district.  Solid Waste Management Plan be devised and executed by concerned Block Development Officer, Hosur taluk to ensure the solid wastes are not disposed on the riverside and managed as per Solid Waste Management Rules, 2016.	Feasibility study by TNPCB in consultation with local authority for implementation (six months)  Concerned Block Development Officer to submit to TNPCB (six months)
Regular Water Quality Monitoring at important	Water Quality is being monitored by KSPCB by installing real	The trend of water quality and its improvement at major confluence points may be monitored for the year 2021-22 on a monthly basis	TNPCB & KSPCB (to monitor on yearly basis)

locations	time monitoring stations in Bellandur and Varthur. Further, Mugalur bridge and sokkarasanapalli is being monitored under National Water Quality Monitoring Programme.	and a report be submitted to CPCB to ensure the quality of water flowing in River Thenpennai.  Responsibility as a Custodian of Rivers/tanks in Karnataka vests with State Functionaries namely, BWSSB, BBMP, BDA, Lake Development Authority, Minor Irrigation Department. Therefore, Water Quality of the water flowing in River Thenpennai be maintained pristine and tested for its characteristics in the respective jurisdictions.	BWSSB, BBMP, BDA, Minor Irrigation Department (every year)
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### 6.3 Remedial Measures - Action Plan for Rejuvenation of Lakes

The Bellandur Lake has a catchment area of about 148 sq.km (37,000 acres) spread across Central, South, East & South East of Bangalore. The Lake receives water from three main valleys: a) Valley originating from JP Nagar, Puttenahalli, Bilekahalli, Arekere Lake, Hulimavu Lake, Madiwala lake, BTM Layout, HSR Layout, Agara Lake & finally joining Bellandur Lake; b) Valley originating from Shivajinagar, Ulsoor Lake, Domlur, Indiranagar, HAL and finally joining Bellandur Lake; and c) Valley originating from Kalasipalya, Lalbagh Road, KH Road, Shantinagar Bus Station, National Games Village, Ejipura, Sinivagilu and finally joining Bellandur Lake.

There are two outflow weirs to Bellandur Lake – One near Bellandur Village & other near Yemlur Village. Lake series joining Bellandur Lake are Sarakki Lake, Arakere Lake, Begur Lake, Madiwala Lake, Agara Lake, Ibblur Lake. Both the outflow finally joins Varthur Lake. The outflow from Varthur Lake joins South Pinakini River.

Varthur lake has a total area of 439 acres and 34 Guntas with total periphery length of 8.4 km. The lake receives water from 5 inlets and the 02 outlets. For flood control and water level management near Varthur, waste weir sluice gates are provided.

Desilting work is under progress in Bellandur and Varthur lakes as per the directions of Hon'ble NGT. Then, wetland construction will be carried out post de-silting work by Bangalore Development Authority which is shown in **Figure 16** below.



a. Varthur Lake



B. Bellandur Lake

**Figure 16. Desilting work under progress by Bangalore Development Authority**

Further, development of biodiversity parks in those lakes are also under progress. The above status has been reported by BDA in compliance to the orders of Hon'ble NGT dated 14.08.2020 in the matter of O.A No. 125/2017, to oversee the execution of the action plan on remedial action for restoration of Bellandur, Agara and Varthur lakes at Bangalore, including preventing discharge and dumping of pollutants, removing encroachments from catchment area and other steps for restoration by the monitoring committee headed by Justice ShSantosh Hegde, former Judge of the Hon'ble Supreme Court.

#### **6.4 Notification of Standards for Phosphorus in Soaps & Detergents**

Froth formation and related items are taken up by NGT in OA 125/2017 and noted that, major cause for foam formation is considered to be discharge of untreated sewage through open drains.

- i. As per directions of the Hon'ble National Green Tribunal, MoEF& CC and CPCB have been requested by KSPCB to limit the phosphorous content in Soaps & Detergents being manufactured by the industries. Since it is a Standard specified on a product, the same is to be effected by Bureau of Indian Standards. In this regard Bureau of Indian Standards has published notification during August 2020 for the following products.
  - a. Synthetic Detergents for washing woollen and silks Fabrics - Specification (Second Revision)
  - b. Household Laundry Detergent Bars- Specification (Third Revision)
  - c. Household Laundry Detergent Powders- Specification. (Fifth Revision).
- ii. The above notifications are enclosed as **Annexure- XVI**.

## CHAPTER VII

### CONCLUDING REMARKS

The causes and sources of pollution has been assessed by the joint committee based on the samples collected from 12 locations in River Thenpennai during September, 2020. It has been ascertained that, the water quality of River Thenpennai falls under the category of Class E (Irrigation, Industrial Cooling, Controlled Waste disposal) of the Designated Best Use Criteria notified under Environment (Protection) Rules, 1986. The reason being largely, the discharge of treated and untreated sewage from Bangalore, a Comprehensive plan for restoration of the quality of River Thenpennai is under consideration before Hon'ble Supreme Court in O.S No. 02 of 2015 and Hon'ble National Green Tribunal O.A No. 111 of 2020.

In cognizance of the above, the joint committee has devised an Action plan (Long Term and Short Term with timelines) under section 6.2 of Chapter VI for restoring the quality of River Thenpennai. Therefore, it is humbly prayed that, the improvement of River Water Quality would require union of orders/directions of Hon'ble NGT in O.A No. 125/2017 and in O.A No. 111/2020 alongwith directions of Hon'ble Supreme Court in O.S No. 02 of 2015.



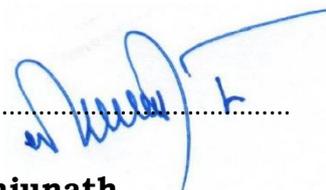
**Sh. Gunasekaran Sh M G Shivanna**

*Revenue Divisional Officer & Asst. Commissioner  
Sub Divisional Magistrate, Hosur Bangalore (South)*



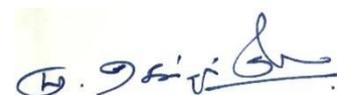
**Sh. N Suresh**

*SE, PWD, Tiruvannamalai*



**Sh B H Manjunath**

*SE, PWD, Bangalore*

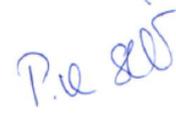


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**Sh M K PrabhudevMs. P K Selvi**  
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*Bangalore*

***(Note: The Joint Committee members have given concurrence by email and e-signatures were obtained)***