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KERALA STATE POLLUTION CONTROL BOARD
കേരള സംസ്ഥാന മലിനീകരണ നിയന്ത്രണ ബോർഡ്
Pattom P.O., Thiruvananthapuram – 695 004
പട്ടം പി.ഒ., തിരുവനന്തപുരം - 695 004

PCB/HO/EE3/NGT/673/2018/VOL.V/22/2019 Date: 18.02.2020

From

The Member Secretary

To

The Excutive Director(Technical)
National Mission for Clean Ganga
Ministry of Jal Shakti
Major Dhyan Chand National Stadium
India Gate, New Delhi-110002

Sub:- Format for Submission of Monthly Progress Report in Hon'ble NGT Order dated 06.12.2019 in OA No. 673 of 2018

Ref:- 1. E-mail from Jal Shakti dated 06.02.2020
2. Hon'ble NGT order dated 20.09.2018 in OA No.673/2018
3. Hon'ble NGT order dated 08.04.2019 in OA No.673/2018
4. Hon'ble NGT order dated 06.12.2019 in OA No.673/2018
5.Letter no. F No-A-14011/OA 673/2020-WQM-I/11983 dated 31.01.2020 received from Central Pollution Control Board

Sir,

Kind attention is invited to the e-mail received vide ref (1); Wherein the information on the monthly progress reports for ensuring compliance to the Hon'ble NGT Order vide ref (4) in the desired format was sought. It may kindly be noted that there are 21 polluted river stretches in Kerala as per the Hon'ble NGT order vide ref(2). The action plan of 21 polluted river stretches were submitted to Hon'ble NGT & Central Pollution Control Board.Out of this the action plan of Karamana river (Priority I) was approved by the Hon'ble NGT vide ref (3). Also vide ref (5), the Central Pollution Control Board has instructed to revise the action plan of river stretches under Priority IV. Hence the details of approved action plan of Karamana river in the specified format is enclosed for kind information and further necessary action.

Yours faithfully,

Sd/-

MEMBER SECRETARY

Encl: As above

National Mission for Clean Ganga

Format for Submission of Monthly Progress Report by States/ UTs

(Hon'ble NGT in the matter of OZ No. 673/2018 dated 06.12.2019)

Sl.No.	Activity to be monitored	Timeline	Submission of Progress by State/UT-Compliance Status
1.	Ensure 100% treatment of sewage at least in situ remediation		
	Commencement of setting up of STP s and connecting all the drains and other sources of generation of sewage to the STP s must be ensured		
2.	Timeline for completing all steps of action plans including completion of setting up STPs and their commissioning	31.03.2021	In the action plan of Karamana river, short term and long term measures are proposed. During the review meeting it was understood that more than 50 % of short term action plan were completed and the various department are in the process of implementing long term measures.
5.	Chief Secretaries may set up appropriate monitoring mechanism at State level Specifying accountability of nodal authorities not below the Secretary level Chief Secretaries may have an accountable person attached in their office for this purpose		VideG.O.(Rt)No.93/2020/WRD dated 28/01/2020 Government of Kerala nominated Deputy Secretary (Projects),Water Resource Department as the nodal authority Government of Kerala for monitoring the compliance of the directions in the order on fortnightly basis and to maintain record of progress and to act as an accountable person to the Chief Secretary fot the purpose.
	Monitoring at State level must take place	Fortnightly	
6	Progress report may be furnished by the States/ UTs to Secretary, Ministry of Jal Shakti Member Secretary, CPCB	Monthly (preferably before 20th of every month)	In the action plan of Karamana river, short term and long term measures are proposed. During the review meeting it was understood that more than 50 % of short term action plan were completed and the various department are in the process of

			implementing long term measures.
	Activity	**Time line**	**Present Status**
6.1	Progress Report Pertaining to Karamana River (Priority-1) are given below may be comprised of details along with completion timelines on:		
	Pumping lines from the terminal pumping stations namely Kuriyathi, Pattoor, Kannammoola and Enchakkal pumping stations are to be connected directly to STP at Muttathara	May 2019	Work of Pumping lines from the terminal pumping stations namely Kuriyathi, to be connected directly to STP at Muttathara is Completed and commissioned.
	Rehabilitation/upgradation of Thaliyal and Aranoor Sewerage Pumphouse by rehabilitation of existing well, construction of new well and grit chamber, installation of new pump sets	May 2020	Tender sanction obtained for Thaliyal. No offer received for Aranoor. To be retendered.
	5 MLD sewage treatment plant at Medical College	May 2020	Work started. The progress of work is slow due to lack of permission for dumping excavated earth.
	Installation of adequate pumps in Mudavanmughal and Enchakkal pumping stations	March 2020	No response to tender. Presently retendered.
	DG sets in all lift and pumping stations – Mudavanmughal, Aranoor, Thaliyal, Kuriyathi, Pattoor, Kannammola, Pattom,Murinjapalam and Enchakkal	May 2020	AS issued by Government in State Plan 2019-20 Bharat Heavy Electrical Limited has submitted their report and the report is under scrutiny.
	Reconnect sewer at Rajaji Nagar, stop outflow of sewage into Amayizhanchanthodu, control stormwater entry into sewer to avoid overflow in Thampanoor area Sewage generated in Rajaji Nagar shall be diverted to main	Dec 2019	Work cannot be proceeded since foundation of the bus terminal falls in the alignment. The scope of the work to be revised by rerouting the pipeline through main road.

	sewerline Sewage generated in Thoppil area shall be diverted main sewerline.		
	Discharge of sewage in Parayilkadavu shall be stopped as there is overflow of sewage reaches in houses having sewerage connection and this may lead to discharge of sewage into River Karamana		Completed
	Divert the sewer line from the School compound of Government Karamana High School	May 2020	Agreement executed. Request for tar cutting submitted on 12.07.2019. Permission not granted due to monsoon.
	Rehabilitation by laying new lines increasing size of undersized main and reconstruction by dilapidated manholes for the last 3 years Total works in progress (59No.) Works in tendering (19No.)	May 2020	Works completed-23 No.(Rs.3.58 cr.) In progress-36 No.(Rs.11.3 cr) Tender /To be tendered -19 No.(Rs.4.6 cr)
	Extension of sewer network wherever technically feasible in new areas of existing blocks In progress(19 No.) Tendering(10 No.)	May 2020	Works completed - 11 No. (Rs. 1. 68 cr.) In progress – 10 No. (Rs. 4.63 cr.) Tendered/To be tendered – 10 No. (Rs. 18.78 cr.)
	Procurement of sewer cleaning machines and equipment maintenance	May2020	Work tendered. No response to first tender. Work retendered.
	Around 155 houses in Kurukuvilakom, Kannettumukku shall be provided with septic treatment system.	-	Not technically feasible to connect to existing sewer system. Septic tanks may be provided by Corporation.
		May 2020	Works completed - 1 No. (Rs. 2.28 cr.) In progress – 7 No. (Rs. 69.12 cr.)

			Tendered/To be tendered – 12 No. (Rs. 41.52 cr.)
	Establishment of six additional blocks in uncovered areas In Progress (8 nos.) Tendering (12 nos)		
Solid Waste Management Action Plan			
	Slaughter house and poultry waste	March 2021	**Slaughter House**- Re Tendered, Tender opening date 19.12.2019 **Poultry waste**- TMC starts collecting poultry waste coming under jurisdiction of 10 HI Office from 1st November 2019 on pilot basis with online tracking of vehicles. User fee with respect to poultry waste collection is also through online payment system. Entire functioning of system is managed by green Trivandrum Software and its link is provided in corporation website. The entire poultry waste generated in whole Corporation area will come under its network by the end of December 2019.
	Sanitation facility and Treatment of waste water in the markets of Pangode, Kumarichan da,Kannettumukku	Dec 2019	Kumarichanda: STP Plant (Bio membrance bioreactor Technology) is installed and its functioning. **Pangode:** Steps were taken to clean existing septic tank and an estimate amount of 40 lakhs prepared for establishing modern STP and placed before council. **Kannettumukku:** New market complex construction is on going
	Provide facility for the treatment of sewage, sullage and garbage generated		

	in the poonthura slum area between Karamana river and sea	March 2020	**Garbage**: Regarding Solid Waste Management in Poonthura slum door to door collection started and wet waste is treated in Aerobic bin and dry waste to RRC. Regarding treatment of sullage, land availability is a problem to establish a common treatment facility. So sucking tanker will be provided free of cost and will be carried to STP plant at Muttathara for safe disposal.
	The discharge of waste water from the surrounding houses to the pond at Jagathy is to be stopped	March 2020	Notice issued to household is to stop discharge of waste water to pond. Common facility will be provided for waste water treatment.
	Around 155 Houses in Kurukuvilakom, Kannettumukku shall be provided with septic and treatment system		Door to door collection facility is provided. Health Supervisor and Jagathi circle Health Inspector is authorised to issue notice on the basis of site inspection. N otice were issued to households to provide septic tank.
	Identification of illegal outlets into storm water drains and fine shall be imposed on such units		12.06 lakhs Fine collected.
	Biodegradable waste(Bio-composter)	May 2020	The component in the DPR are approved by the DPC. Tender proceeding are initiated. Regarding Kitchen bin (for wet waste management in houses) supply order issued and installation of fifty Thousand kitchen bin units is on going. DPR Sanctioned amount of State and Central share not released.
	Biodegradable waste(Thumboormuzh aerobic bins)	May 2020	Tendered and placed before council for approval

	Biodegradable waste(community biogas)	May 2020	Awaiting TS from Suchitwa Mission
	Biodegradable waste(organic waste converter)	May 2020	Re Tendered, not tender received, Quotation invited
	Biodegradable waste(portable biogas)		Awaiting TS from Suchitwa Mission
	Biodegradable waste(Portable aerobins)		Tendered Opening Date 16.12.19
	Biodegradable waste(Ring compost)		Awaiting TS from Suchitwa Mission
	Biodegradable waste(segregation bins)	May 2020	Tendered and placed before Purchase Committee.
	Biodegradable waste(RRC)		Tendered
	Biodegradab le waste(Plastic Recycling unit)		Decided to expand to RRC for plastic pre processing
	Biodegradable waste(Mobile MRF)		Design finalised and Tender process going on.
	Biodegradable waste(Electronic Weigh bridge)		EOI Invited
	Biodegradable waste(Solar electrical cart)		Specification are finalised, Tender process started
	Biodegradable waste(Swaps shops)		TS Awaiting
	Biodegradable waste(PET bottle crushing)		Tender process on going
	Biodegradable waste(Napkin destroyer)		EOI Invited, Placed before council for approve.
	Animal crematorium at Kattela	May 2020	TS Awaiting
	Urban Gardening		EOI Invited
	Upgradation of present facilities		TS received tender process started
	Capacity building & IEC		Process on going
	Viability gap fund		VGF will be issued to Harithakarmasena
	Prevent entry of Stormwater into sewer line along with KWA	May 2020	Closed monitoring is done by health Squad and all Health Inspectors are directed to issue notice and prosecution.
	Take steps to prevent the solid wastes	May 2020	Employees were placed at various spots during night to

	in sewer line as reported by KWA		prevent dumping of Solid Waste in drains and fines are being charged.
	Monitoring		
	River water quality monitoring - Killiyar, Karamana, Parvathiputhanar, Akkulam-Veli lake	Ongoing; monthly frequency	Monitoring of water quality
	Storm drains monitoring - Amayizhanchanthodu, Ulloorthodu, Pattomthodu, Kannamoolathodu, Thekkanakkara canal	Ongoing Seasonal monitoring – pre-monsoon, monsoon, post-monsoon	Notice issued to TVM Corporation
	Inspection and effluent quality monitoring of the flats, industrial units, servicestations, hospitals,hotels etc in Thiruvananthapuram Corporation area	Ongoing Interval: Red – 1 month. Orange – 3 m. Green – 6 m.	Monitoring of establishments, service stations, flats, industrial units
	1. Long term Plan **Sewerage network**		
	Long term measures proposed	Three years	AS for the proposal for engaging Consultants for preparation of Detailed Engineering Report got Administrative Sanction for Government. TS issued. Work tendered.
	Extension of sewerage system to Block F to G coastal belt		
	Extension of sewerage system to Block H to R		
	Extension of sewerage system to Newly added area of corporation		
	Providing sewerage system in Block A to E		
	Rehabilitation of existing network and pump house in block A to E		

	Additional STP requirement		
	Solid waste management Long term measures proposed		
	Acquire 58 acres of land and rehabilitate 8150 families from the banks of River	5 years	Action is being taken for the identification of land
	Desilting and development		
	Development package for ParvathyPuthanar	3 years	Desilting is done by KWIL upto Valakkadavu
	Desilting and development of AmayizhanchanThodu	1.5 years	Work in Progress
	Improvements to Thekkenekara canal and desiliting-	1 year	Work in Progress
	Karimadam tank improvements,desilting sheet piling/under preparation and providing fencing	1.5 years	Work in Progress
	Development of Karamana basin	1.5 years	Work in Progress
	Latest water quality of polluted river, its tributaries, drains with flow details and ground water quality in the catchment of polluted river;	Latest water quality of Karamana River is attached as annexure.	

1 year Karamana Result - 2019

ANNUAL DATA OF STATE WATER MONITORING PROGRAMME (SWMP) 2019

KARAMANA -PEPPARA

SL.NO.	Parameter	JAN	FEB	MARCH	APR	MAY	JUN	JULY	AUG	SEPT	OCT	NOV	DEC	Minimum	Maximum	Mean	Std.Dev
1	Temperature,0C	31	32	33	32	32	30.8	32.8	32.9	33.1	29	27	28.2	27	33.1	31.15	2.042058
2	PH	6.7	6.8	6.1	6.8	6.2	6.2	6.28	6.95	7.02	6.62	7.38	6.86	6.1	7.38	6.659167	0.392624
3	Turbidity,NTU	0.1	0.2	0.3	0.1	1.2	0.3	1	0.6	0.5	0.8	3.4	3.6	0.1	3.6	1.008333	1.2154
4	ctrical Conductivity,µ/	72	75	55	93.5	54	18	14	71	83	77	78	78	14	93.5	64.04167	24.90569
5	Dissolved Oxygen,mg/l	6.5	6.6	4.5	6.2	6	4.6	6.4	5.8	6	7.9	5.6	6.6	4.5	7.9	6.058333	0.911999
6	BOD,mg/l	0.9	0.8	3.2	5	0.9	1.3	1.7	2.1	5.5	4.6	1.9	2	0.8	5.5	2.491667	1.678992
7	NH3-N,mg/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0	0	#VALUE!	#DIV/0!
8	Free Ammonia	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0	0	#VALUE!	#DIV/0!
9	Nitrate Nitrogen,mg/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0	0	#VALUE!	#DIV/0!
10	Chloride,mg/l	60	58	60	50	18	10	10	44	24	22	14	20	10	60	32.5	20.23723
11	Phosphate,mg/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0	0	#VALUE!	#DIV/0!
12	Total Alkalinity,mg/l	45	50	52	54	20	46	35	40	26	38	44	60	20	60	42.5	11.54832
13	Total Hardness,mg/l	43	45	48	16	12	2	7	8	6	10	8	6	2	48	17.58333	17.11171
14	Calcium,mg/l	30	30	32	10	10	1	4	4	4	6	6	4	1	32	11.75	11.69402
15	Magnesium,mg/l	13	15	16	6	2	1	3	4	2	4	2	2	1	16	5.833333	5.524052
16	Sodium,mg/l	0	0	0	0	3.5	3.78	0	0	0	12.4	12.7	0	0	12.7	2.698333	4.807346
17	Potassium,mg/l	0	0	0	0	5	5.11	0	0	0	2	4.1	1	0	5.11	1.434167	2.09415
18	Boron,mg/l	BDL	BDL	BDL	BDL	BDL	BDL	0	0	0	0	0	0	0	0	#VALUE!	0
19	Sulphate,mg/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0	BDL	BDL	BDL	0	0	#VALUE!	#DIV/0!
20	SAR	BDL	BDL	BDL	BDL	BDL	BDL	0	0.2828	0	0.9612	1.1456	0	0	1.1456	#VALUE!	0.522414
21	TC,cfu/100ml	300	400	500	200	500	100	200	300	200	200	200	300	100	500	283.3333	126.7304
22	FC,cfu/100ml	100	100	200	100	100	80	100	100	100	100	100	100	80	200	106.6667	29.94945

KARAMANA-ARUVIKKARA

SL.NO.	Parameter	JAN	FEB	MARCH	APR	MAY	JUN	JULY	AUG	SEPT	OCT	NOV	DEC	Minimum	Maximum	Mean	Std.Dev
1	Temperature,0C	32	31	33	37	32	31.8	31.5	31.8	32	31	28	29	28	37	31.675	2.175535
2	PH	6.6	6.5	6	6.2	6.3	6.3	6.8	6.4	7.1	6.8	7.3	6.6	6	7.3	6.575	0.376889
3	Turbidity,NTU	BDL	BDL	60	0.5	54	0.8	1	2.2	1.2	6	2.9	6.4	0.5	60	#VALUE!	23.06281
4	ectrical Conductivity,µ/	115	125	110	101	101	186	55	123	94	80	82	102	55	186	106.1667	31.92273
5	Dissolved Oxygen,mg/l	6.3	6.6	5.4	5.9	6.5	5	6.8	6.5	6.8	7.7	7.1	6.3	5	7.7	6.408333	0.725457
6	BOD,mg/l	1.2	1.1	2.3	3	4	3.8	3.1	4.3	1.7	3.2	1.3	2.8	1.1	4.3	2.65	1.122902
7	NH3-N,mg/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0	0	#VALUE!	#DIV/0!
8	Free Ammonia	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0	0	#VALUE!	#DIV/0!
9	Nitrate Nitrogen,mg/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0	0	#VALUE!	#DIV/0!
10	Chloride,mg/l	20	21	17	16	15	35	30	32	23	18	17	18	15	35	21.83333	6.780096
11	Phosphate,mg/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0	0	#VALUE!	#DIV/0!
12	Total Alkalinity,mg/l	26	27	23	22	24	40	46	12.5	13.5	16	18	26	12.5	46	24.5	10.00682
13	Total Hardness,mg/l	43	47	32	35	32	47	54	15	16	20	22	28	15	54	32.58333	13.02067
14	Calcium,mg/l	27	29	20	23	19	40	38	9	12	12	18	24	9	40	22.58333	9.783644
15	Magnesium,mg/l	16	18	12	12	13	7	16	6	4	8	4	4	4	18	10	5.134553
16	Sodium,mg/l	7	8	7	7.7	8.9	14.3	11	11.8	7.01	4.6	4.2	4.8	4.2	14.3	8.025833	3.0636
17	Potassium,mg/l	0.8	0.9	0.8	1.1	1.8	3.7	3.1	6.1	3.8	1.5	1.16	2.5	0.8	6.1	2.271667	1.635125
18	Boron,mg/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0	0	#VALUE!	#DIV/0!
19	Sulphate,mg/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0	0	#VALUE!	#DIV/0!
20	SAR	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.7468	0.4471	0.2521	0.2329	0.3682	0.2329	0.7468	#VALUE!	0.207878
21	TC,cfu/100ml	240	180	240	250	200	600	200	300	500	300	400	500	180	600	325.8333	140.1595
22	FC,cfu/100ml	100	90	80	100	100	500	100	100	100	100	100	200	80	500	139.1667	117.5862

KARAMANA-MANGATTUKADAVU

SL.NO.	Parameter	JAN	FEB	MARCH	APR	MAY	JUN	JULY	AUG	SEPT	OCT	NOV	DEC	Minimum	Maximum	Mean	Std.Dev
1	Temperature,0C	31	33	33	33	32.1	31	32.4	33.4	33.5	29.1	28	31.2	28	33.5	31.725	1.745709
2	PH	6.4	6.2	5.9	6.8	6.5	6.4	6.59	6.67	6.23	6.39	7.65	6.04	5.9	7.65	6.480833	0.4484
3	Turbidity,NTU	BDL	BDL	0	0	0.8	4	1.1	4.9	4.8	4	3.5	5.3	0	5.3	#VALUE!	2.123519
4	ctrical Conductivity,µ/	132	135	46	11	129	63	6.3	72	26	82	76	78	6.3	135	71.35833	44.59469
5	Dissolved Oxygen,mg/l	6.2	6.4	6.6	4.9	4.5	6.4	4.9	6.9	4.3	6	6.6	6	4.3	6.9	5.808333	0.904995
6	BOD,mg/l	4.2	1.3	1.4	4.7	2.2	1.4	3.6	2.2	3	4.9	4.1	1.7	1.3	4.9	2.891667	1.360119
7	NH3-N,mg/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0	0	#VALUE!	#DIV/0!
8	Free Ammonia	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0	0	#VALUE!	#DIV/0!
9	Nitrate Nitrogen,mg/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0	0	#VALUE!	#DIV/0!
10	Chloride,mg/l	38	40	78	26	22	24	20	60	42	60	34	48	20	78	41	17.87838
11	Phosphate,mg/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0	0	#VALUE!	#DIV/0!
12	Total Alkalinity,mg/l	55	62	68	48	40	76	68	68	36	66	60	82	36	82	60.75	13.85066
13	Total Hardness,mg/l	72	75	80	22	24	30	22	38	16	18	20	20	16	80	36.41667	24.42599
14	Calcium,mg/l	42	50	55	12	18	22	20	20	12	10	14	16	10	55	24.25	15.60958
15	Magnesium,mg/l	30	25	25	10	6	8	2	18	4	8	6	4	2	30	12.16667	9.693797
16	Sodium,mg/l	0	0	0	0	17.21	16.29	18.3	0	0	13.3	16.6	10.6	0	18.3	7.691667	8.264422
17	Potassium,mg/l	0	0	0	0	11	9.8	0	0	0	8.9	5.8	2.3	0	11	3.15	4.432422
18	Boron,mg/l	BDL	BDL	BDL	BDL	BDL	BDL	0	0	0	0	0	0	0	0	#VALUE!	0
19	Sulphate,mg/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0	0	#VALUE!	#DIV/0!
20	SAR	BDL	BDL	BDL	BDL	BDL	BDL	39	0.6164	0	0.7598	0.9342	0.6133	0	39	#VALUE!	15.68613
21	TC,cfu/100ml	1500	2000	1900	2000	600	400	1000	1000	1100	1000	1200	1100	400	2000	1233.333	521.0712
22	FC,cfu/100ml	900	800	700	300	200	300	200	200	400	200	300	400	200	900	408.3333	250.3028

KARAMANA-PALLATHUKADAVU

SL.NO.	Parameter	JAN	FEB	MARCH	APR	MAY	JUN	JULY	AUG	SEPT	OCT	NOV	DEC	Minimum	Maximum	Mean	Std.Dev
1	Temperature,0C	32	32	34	32	31.8	31	32.1	32.9	33.4	29	28	31.7	28	34	31.65833	1.692474
2	PH	6.5	6.7	6.5	7.2	6.8	6.5	6.76	6.99	6.71	6.71	7.46	6.61	6.5	7.46	6.786667	0.295952
3	Turbidity,NTU	6.2	7.1	6.9	6.8	5.6	3.5	2.1	2.5	9.6	6.8	4.8	10.5	2.1	10.5	6.033333	2.555683
4	ectrical Conductivity,µ/	102	110	120	108	60	137	139	176	53	80	79	73	53	176	103.0833	36.30542
5	Dissolved Oxygen,mg/l	5.5	5.9	5.8	5.9	0.9	2.3	0.8	2.4	1.6	4.4	3.7	4.1	0.8	5.9	3.608333	1.958412
6	BOD,mg/l	1.6	1.4	1.5	5.2	8.2	0.7	5.5	0.2	0.8	1.7	3.6	2.7	0.2	8.2	2.758333	2.41791
7	NH3-N,mg/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0	0	#VALUE!	#DIV/0!
8	Free Ammonia	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0	0	#VALUE!	#DIV/0!
9	Nitrate Nitrogen,mg/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0	0	#VALUE!	#DIV/0!
10	Chloride,mg/l	158	156	160	162	626	140	364	812	72	58	58	76	58	812	236.8333	242.9118
11	Phosphate,mg/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0	0	#VALUE!	#DIV/0!
12	Total Alkalinity,mg/l	170	175	176	180	150	68	210	122	86	132	128	150	68	210	145.5833	40.87555
13	Total Hardness,mg/l	164	166	170	196	254	88	164	158	44	36	40	40	36	254	126.6667	73.72348
14	Calcium,mg/l	100	90	95	120	134	68	102	136	38	26	36	22	22	136	80.58333	41.53959
15	Magnesium,mg/l	64	76	75	76	120	20	62	22	6	10	4	18	4	120	46.08333	37.40797
16	Sodium,mg/l	0	0	0	0	80.1	78.91	78	137.6	0	10.6	10.2	15.6	0	137.6	34.25083	46.75165
17	Potassium,mg/l	0	0	0	0	16.3	15.54	15.5	0	0	5.7	1.3	3.3	0	16.3	4.803333	6.846615
18	Boron,mg/l	BDL	BDL	BDL	BDL	BDL	BDL	0	0	0	0	0	0	0	0	#VALUE!	0
19	Sulphate,mg/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0	0	#VALUE!	#DIV/0!
20	SAR	BDL	BDL	BDL	BDL	BDL	BDL	60.9	1.2569	0	0.4473	0.04298	0.597	0	60.9	#VALUE!	24.67513
21	TC,cfu/100ml	1200	1100	1000	5000	2000	1000	2000	800	800	1000	1500	1300	800	5000	1558.333	1157.158
22	FC,cfu/100ml	600	500	600	3000	1200	600	500	600	600	700	800	700	500	3000	866.6667	697.1805

KARAMANA-THIRUVALLOM

SL.NO.	Parameter	JAN	FEB	MARCH	APR	MAY	JUN	JULY	AUG	SEPT	OCT	NOV	DEC	Minimum	Maximum	Mean	Std.Dev
1	Temperature,0C	32	31	34	36	31	31	31	32	31	30	28	29	28	36	31.33333	2.103388
2	PH	6.3	6.4	6.3	7.3	6.6	6.5	6.8	7.2	6.8	6.7	3.9	6.6	3.9	7.3	6.45	0.86287
3	Turbidity,NTU	BDL	BDL	4.4	0.6	8	9.7	1.1	1.8	2.3	9	6.4	6.9	0.6	9.7	#VALUE!	3.417536
4	ctrical Conductivity,µ/	245	248	300	330	369	393	247	734	179	190	213	412	179	734	321.6667	151.485
5	Dissolved Oxygen,mg/l	2.4	2.6	1.1	2.2	1	1.3	1.3	1.8	0	0	0	0	0	2.6	1.141667	0.979293
6	BOD,mg/l	10.8	10.6	6	7.4	7.2	1.1	7.5	6.8	3.9	3.1	14.4	18	1.1	18	8.066667	4.773284
7	NH3-N,mg/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0	0	#VALUE!	#DIV/0!
8	Free Ammonia	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0	0	#VALUE!	#DIV/0!
9	Nitrate Nitrogen,mg/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0	0	#VALUE!	#DIV/0!
10	Chloride,mg/l	62	60	73	75	80	85	51	177	42	44	42	78	42	177	72.41667	36.39545
11	Phosphate,mg/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0	0	#VALUE!	#DIV/0!
12	Total Alkalinity,mg/l	20	23	31	40	8.9	68.5	45	98	24	28	44	82	8.9	98	42.7	27.02016
13	Total Hardness,mg/l	61	65	75	80	180	110	60	230	35	46	66	132	35	230	95	58.6143
14	Calcium,mg/l	35	38	42	45	98	70	39	145	25	34	42	92	25	145	58.75	35.80027
15	Magnesium,mg/l	26	27	33	35	82	40	21	85	10	12	24	40	10	85	36.25	24.04588
16	Sodium,mg/l	24	22	24	26.5	22	27	16.6	57.4	16.01	14.5	10.2	25.8	10.2	57.4	23.83417	11.83604
17	Potassium,mg/l	1.1	1.3	12	13.5	27.6	8.9	10.9	0.8	4.8	4.3	5.8	11.2	0.8	27.6	8.516667	7.50622
18	Boron,mg/l	BDL	BDL	BDL	BDL	BDL	BDL	0	0	0	0	0	0	0	0	#VALUE!	0
19	Sulphate,mg/l	1.2	1	1.1	BDL	1.3	1.2	1.4	BDL	BDL	1.3	1.4	BDL	1	1.4	#VALUE!	0.140789
20	SAR	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.9351	0.6837	0.5438	0.3107	0.8532	0.3107	0.9351	#VALUE!	0.24947
21	TC,cfu/100ml	4500	4600	4000	4000	5000	10000	8000	6800	6500	4500	4600	4800	4000	10000	5608.333	1856.418
22	FC,cfu/100ml	2900	2800	2400	2300	2200	4800	1100	1300	1100	700	600	1100	600	4800	1941.667	1210.153

KARAMANA-MOONATTUMUKKU

SL.NO.	Parameter	JAN	FEB	MARCH	APR	MAY	JUN	JULY	AUG	SEPT	OCT	NOV	DEC	Minimum	Maximum	Mean	Std.Dev
1	Temperature,0C	32	31	34	36	32	32	31	31	31	31	28	29	28	36	#VALUE!	2.161649
2	PH	6.4	6.5	6.5	7.2	6.4	6.7	6.9	6.8	7	6.7	6.7	6.5	6.4	7.2	6.691667	0.250303
3	Turbidity,NTU	BDL	BDL	88.1	10.7	17.2	12.1	5.8	5.2	7.4	3.6	3.2	5.2	3.2	88.1	#VALUE!	25.75915
4	ctrical Conductivity,µ/	685	688	647	680	405	497	505	935	523	509	543	501	405	935	593.1667	141.4733
5	Dissolved Oxygen,mg/l	1.4	1.3	0.7	1.1	0.3	0.8	1.5	1.8	0	0	0.2	0.1	0	1.8	0.766667	0.644323
6	BOD,mg/l	9.2	10.2	3.4	6.5	7.6	6.8	4.7	5.1	4.5	2.9	6	8.8	2.9	10.2	6.308333	2.318878
7	NH3-N,mg/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0	0	#VALUE!	#DIV/0!
8	Free Ammonia	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0	0	#VALUE!	#DIV/0!
9	Nitrate Nitrogen,mg/l	1.2	1	1	BDL	1.4	1.2	1.4	1.4	1.3	1.2	1.2	1.4	1	1.4	#VALUE!	0.150756
10	Chloride,mg/l	138	140	129	135	65	68	72	198	86	87	92	87	65	198	108.0833	39.95556
11	Phosphate,mg/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0	0	#VALUE!	#DIV/0!
12	Total Alkalinity,mg/l	58	60	55	60	45	62	74	89	87	88	94	86	45	94	71.5	16.6597
13	Total Hardness,mg/l	200	204	190	193	130	74	49	171	108	119	122	123	49	204	140.25	51.15062
14	Calcium,mg/l	126	128	121	123	92	58	31	145	80	90	100	93	31	145	98.91667	32.44424
15	Magnesium,mg/l	74	76	69	70	38	16	18	26	28	29	22	32	16	76	41.5	23.50822
16	Sodium,mg/l	50	48	40.1	43	18.4	45.5	52.1	88.9	42	42.9	47.6	41.4	18.4	88.9	46.65833	15.8044
17	Potassium,mg/l	1.1	0.9	16.1	17	5.3	29.5	36	32.01	22.5	12.7	12.8	11.2	0.9	36	16.42583	11.63199
18	Boron,mg/l	BDL	BDL	BDL	BDL	BDL	BDL	0	0	0	0	0	0	0	0	#VALUE!	0
19	Sulphate,mg/l	43	41	45	BDL	42	38	35	38	24	22	22	20	20	45	#VALUE!	9.646478
20	SAR	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1.3	1.0285	1.0052	1.1215	1.4424	1.0052	1.4424	#VALUE!	0.187205
21	TC,cfu/100ml	41000	42000	43200	44000	43200	55000	8000	8600	9000	10000	12000	14000	8000	55000	27500	18395.75
22	FC,cfu/100ml	19000	18000	12500	13300	12200	13600	3100	3200	3200	3600	3800	4200	3100	19000	9141.667	6210.176