SECRET

सत्यमेव जयते

YEAR 2015-2016

भागीरथी बेसिन

BHAGIRATHI BASIN

वार्षिक जल पुस्तिका (खंड-III)

WATER YEAR BOOK (VOL -III)

A COMPREHENSIVE RIVER WATER QUALITY ANALYSIS DATA

भारत सरकार

निचली गंगा मंडल-3

केन्द्रीय जल आयोग

बहरमपुर(प.ब.)

GOVERNMENT OF INDIA

LOWER GANGA DIVISION-3

CENTRAL WATER COMMISSION

BERHAMPORE (W.B.)

PREFACE

This Water Year Book compiles the Water Quality Data of Bhagirathi basin for the year 2015-16. The analysis of Water Quality of rivers is essential as it affects the socio-economic life of people as well as life of water resource structures.

The presence of Water Quality impacts the life of water resources projects like irrigation. According to the World Health Organization, about 1.0 billion people across the world lack access to clean water. India is not exception. Studies conducted have shown the link between lack of access to safe & clean water with poverty. Hence, it is very important to monitor the water quality of rivers so that people could get safe & clean water.

Accordingly, Lower Ganga Division-3, Berhampore under Hydrological Observation Circle, Maithon have collected quantitative and qualitative status of Water Quality samples of Bhagirathi Basin for the year 2015-2016 in this compilation.

I hope that planners and researchers in water resources sector will find this publication useful.

सुब्रतो 31.7.17

(सुब्रतो सरकार)

अधिशासी अभियंता

Acknowledgements

The collection, compilation and analysis of water quality data in this Water Year Book involved considerable efforts from all staff and officers of Lower Ganga Division-3, Berhampore.

Special mention has to be made with Level-II Laboratory, Beldanga and CSL staff of Lower Ganga Division-3 Office Smt Sikha Mondal, Senior Research Assistant, Shri Pankaj Kumar, JE, Shri Rangan Bhattacharya for their endeavour in bringing out this publication despite various constraints.

All Sub-Division Engineers Shri Debashish Roy, SDE, Shri T.K.Dutta, SDE and staff deployed at hydrological observation sites deserve special thanks for their efforts in successful compilation of this Water Year Book.

CONTENTS

1.0 INTRODUCTION

About 1.0 billion people lack access to safe and clean water and about 2.0 billion do not have basic sanitation facilities (WHO, 2003). Every year more children die of diarrhoea than any of other disease. As it is known diarrhoea is caused by consuming contaminated water. Water Quality measurements are vital to monitor the pollution so that safe and clean water is available to the public always. For making study on water quality, measurement and analysis of the same is important. Thus for Bhagirathi Basin under Lower Ganga Division-3, analysis of water quality parameters has been done and been compiled in the subsequent sections.

Regarding the history of this office, i.e, Lower Ganga Division-3, it is stated that Government of West Bengal on December 23, 1955 established a unit called Ganga Barrage Division (GBD) under the Ministry of Irrigation with a view to carryout survey and investigation and collection of data in connection with planning and execution of Ganga Barrage Project (New name Farakka Barrage Project). The Ganga Barrage Division was subsequently taken over by the Ganga Basin Water Resources Organization (GBWRO), set up under the Union Ministry of Irrigation and Power. In 1978, the GBWRO merged with Central Water Commission (CWC). The field unit established by Govt. of West Bengal on December 23, 1955 is now Lower Ganga Division-3 (LGD-3) under the establishment of Chief Engineer, Lower Ganga Basin, CWC, Patna / Superintending Engineer, H. O. Circle, Central Water Commission, Maithon (Jharkhand). Except the gauge observation station established during 1985 on river Bhagirathi, the hydrological observation stations under the establishment of Lower Ganga Division-3, Berhampore (WB) are tertiary in nature. Since the signing of Treaty of during 1996 between the Prime Ministers of India and Bangladesh, the Hydrological Observation station at Farakka have gained international importance. Monitoring of flow of river Ganga at Farakka by an India-Bangladesh Joint Observation Team is being carried out from 1st of January to 31st of May every year. An Index Map showing the network of Hydrological Observation stations under Lower Ganga Division-3 is given at Plate I. Lower Ganga Division-3 is primarily entrusted with responsibilities of collection and compilation of hydrological data, sediment observations, analyzing sediment composition and compilation of data and measurement of water quality of the Bhagirathi river system. This report compiles all the water quality data for the year 2015-2016.

2.0 BASIN DESCRIPTION

The river Ganga, as it enters the plains, bifurcates into branch in West Bengal with one river courses flowing through the state of West Bengal of India while the main river flowing through Bangladesh before draining into Bay of Bengal. The Basin is formed due to the Bhagirathi – Hoogly river system that branch out from the river Ganga / Padma. The river Bhagirathi also receives contributions from rivers branched out from river Ganga / Padma further down of the off-take point of river Bhagirathi. Some of the tributaries are Bhairab, Jalangi and Churni. The lower stretch of Bhagirathi beyond Kalna is known as Hooghly. On its right bank, the river Bhagirathi receives three major tributaries viz. Mayurakshi, Ajoy, Khari-Gangpur-Ghea. Thus, this is general description of the limits of Bhagirathi basin.

2.1.1 BHAGIRATHI BASIN

The river Ganga bifurcates into two channels, namely, Bhagirathi and Padma at about 25 km downstream of Farakka. The off-take point of Bhagirathi is located near Jangipur. The bed level of Bhagirathi at off-take point is higher than that of Ganga. Farakka Barrage has been constructed on the river Ganga at Farakka. A canal taking off from the Farakka Barrage joins Bhagirathi near Jangipur to augment its flow. At low stages of the river Ganga, the water level in Bhagirathi is higher than that of Ganga at Jangipur as a result of Feeder Canal flow and hence water tends to flow back to Ganga. To prevent this, a barrage has been constructed across Bhagirathi just upstream of outfall of the Feeder Canal into Bhagirathi at Jangipur.

The basin plan of Bhagirathi is enclosed at Appendix-1. The drainage area of the Bhagirathi is 25,830 sq. km. including the drainage area of the sub-basins. As the flows of Khari-Gangpur-Ghea drain into both Bhagirathi and Hooghly, the drainage area of these sub-basins are also included in the drainage area of sub-basins given below:

Sl.No.	Major Tributaries	Drainage Area (sq.km)
1	Mayurakshi	11,655
2	Ajoy	5,960
3	Khari-Gangur-Ghea	5,400
4	Jalangi	4,700
5	Churni	755

The details of the water quality observation stations maintained by respective Sub-Divisions are given below in the following table.

Division	Sub-Division	River / Site	Status Of The Site
LOWER GANGA DIVISION-3 BERHAMPORE (W.B.)	Lower Ganga Sub-Division, Farakka.	Ganga/Farakka CS - 97A	GDSQ
		Feeder Canal/ HR Farakka	GDSQ
		Mahananda / EnglishBazar	GDQ
		Mahananda / Labha	GDQ
	Bhagirathi–Jalangi Sub-Division, Krishnanagar.	Bhagirathi/Berhampore	GDSQ
		Bhagirathi/ Katwa	GDSQ
		Bhagirathi /Kalna(Ebb) & Bhagirathi /Kalna(Flow)	GDSQ GDSQ
		Jalangi/Chapra	GDSQ
		Churni/Hanskhali	GDQ

4.0 WATER QUALITY

Sampling points in rivers are well away from any disturbing influences such as pools, stagnant zones, heavy growth of weeds or sewage fungus etc. For chemical analysis samples are usually collected at mid-depth or 1.5m from the surface whichever is less. For bacteriological analysis, samples are collected at 0.5m below the water surface.

The bed slope of the river between Jangipur to Kalna is about 0.057 metre per kilometer. The average annual rainfall in the basin area is in the range of 1200-1400mm.The river runs across thickly populated areas and through fertile land along its entire reach. The middle and lower reaches, particularly in the Murshidabad and Nadia districts are prone to floods during monsoon season because of higher discharge from the tributaries, flat terrains and the absence of well-defined high banks.

The river Ajoy originates from the low hills near Punasi in Deoghar district of Jharkhand and flows in southeast direction. After entering the State of West Bengal, the flow of the river is generally in eastern direction and outfalls into river Bhagirathi near Katwa in the district of Burdwan. The total length of the river from its source to outfall is about 290 km out of which the lower reach of about 142 km is in the State of West Bengal.

The bed slope of the river varies considerably in different reaches and is shown below:

River Reach	Bed Slope (m per km)
Up to Jamtara	1 in 725
Jamtara to Pandabeshwar	1 in 700
Downstream of Pandabeshwar	Varies between 1 in 725 to 3025

The average annual rainfall in the basin is 1210 mm. The total Catchments area is about 5960 sq. km. The shape of the Catchment is long and narrow. The river flows over alluvium in the lower reaches and spills even during moderate discharges. The character of the river is flushy in nature and generally due to heavy rainfall in the upper reach in Jharkhand causes floods in the surrounding area of the lower reach.

3.0 SOURCES OF INFORMATION

The sites mentioned in the Table below are attached with the Bhagirathi – Jalangi Sub-Division and Lower Ganga Sub-Division under the administrative control of Lower Ganga Division-3, Berhampore is entrusted in collection, analysis and compilation of data. The samples collected are processed and evaluated at water quality Laboratory Level II at Beldanga, Murshidabad.

Water Samples for chemical analysis are collected in clean pre-rinsed bottles, which are normally filled to the brim and properly capped to avoid interference from atmosphere. A brief description of analytical methods for commonly found chemical constituents are given below:

(a) Specific Conductivity of water samples is measured by means of Standard conductivity meter using temperature compensator and the results re expressed in micro mho/cm.

(b) The Hydrogen-ion concentration of the water sample is determined by a pH meter using glass electrode and calomel reference electrode.

(c) Calcium-ion is estimated by titration an aliquot against standard EDTA using Erichrome black 1 day as indicator at a PH of 10.0 maintained by the addition of 2-3 cc of (NH_4Cl+NH_4OH) buffer solution. The results of Ca^{++} and Mg^{++} are reported as mg/L of respective metals.

(d) Alkali metals like sodium and potassium are determined by emission spectroscopy using a flame photometer. The concentration of Na^{+} and K^{+} are reported in mg/L.

(e) Iron and Aluminium metals are estimated gravimetrically by precipitating these ions as hydroxides using NH_4OH in presence of NH_4Cl and igniting the precipitated hydroxides to the oxides of the metals at 600-800C ate determination of Iron is made by absorption spectroscopy using calorimeter. The blood red colour developed with potassium Thiocyanate is measured at 490m/e wavelength. The concentration of Al^{+++} is then calculated by subtracting iron concentration from the total concentration of iron and Aluminium. The results are reported as mg/; of Fe^{+3} and Al^{+3}.

(f) Sulphate is estimated gravimetrically as Baruim Sulphate by precipitating with $BaCl_2$ in the presence of HCl.

(g) Carbonate and bicarbonate salts are estimated by titrating an aliquot against standard HCl. The end point with phenolphthalein as indicator is read at pH 8.3-10.0 carbonates and with methyl orange as indicator at 2.9-4. 6 for bicarbonates.

(h) Chloride is estimated by argentometric titration.

(i) Nitrate ion is normally available in trace quantity in natural waters.

(j) Silica is dehydrated from the aliquot y treatment with concentrated HCl and the precipitate of silica obtained is ignited in a platinum crucible at 800-900 degree C.

(k) Boron is estimated colormetrically by developing the rosecyanic dye with alcoholic solution of curcumin and titrating the dye in alcohol.

(l) Turbidity of the sample is measured by NT Meter using hydrozinc sulphate and hexamethylene teramine reagent.

5.0 EXPLANATORY NOTES

The explanatory notes described here under are designed to assist in the interpretation of hydrological parameters contained in the data presented subsequently. The notes are, therefore valid in so far as data presented in this book is concerned.

i) Water Year ranges from June 1st of one calendar year to May 31st of the succeeding calendar year and covers one complete hydrological cycle.

ii) Discharge is given in cubic metre per second.

iii) Discharges given are daily observed flows (starting at 0800 hrs)

iv) Discharges are rounded off to,

a) Nearest full integer when more than 1000.

b) Nearest first decimal figures when between 100-999.

c) Nearest two decimal figures when between 10-99.

d) Nearest three decimal figures when less than 10.

v) The name of the division is abbreviated by taking first alphabet of each co-ordination. For example "Lower Ganga Division-3 "is denoted by "LGD-3".

vi) Along with the river water samples, ground water samples are also collected from near by selected well for obtaining information on chemistry of ground water in the proximity.

vii) The other water quality parameters are analysed at the respective divisional laboratory

viii) Chemical Indices, namely Hardness number, Sodium percentage, Sodium absorption ratio and residual Sodium Carbonate are calculated as follows:

(a) Hardness Number is calculated by adding the total Ca^{++} and Mg^{++} in the sample expressed as equivalent parts of $CaCO_3$.

(b) Sodium Percentage (S.P.) = $(Na^{+} \times 100)/Ca^{++} + Mg^{++} + Na^{+} + K^{+})$

(c) Sodium Absorption Ratio (S.A.R) = Na+/((Ca++ + Mg++)/2)^0.5)

(d) Residual Sodium Carbonate R.S.C.= $(CO_3^{-} + HCO_3^{-})-(Ca^{++} + Mg^{++})$, where concentration of all the ions being in me/L

ix) Based on specific Conductance and S.A.R. the water samples have been classified as per U.S. Salinity Laboratory Standards.

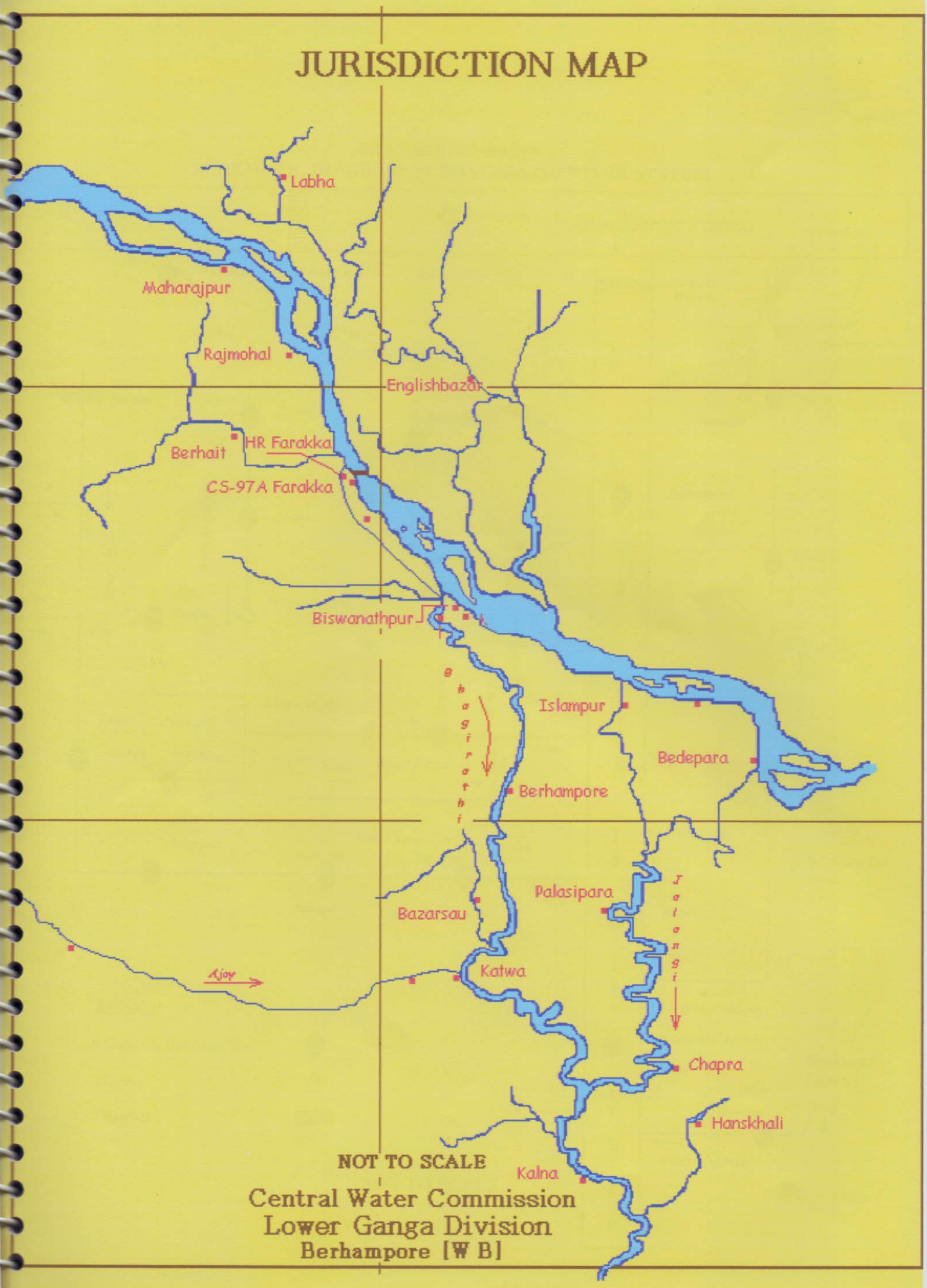
6.0 METHOD OF PRESENTATION

The water quality data includes Monthly River water parameter analysis table.

7.0

Schematic Diagram of Bhagirathi River System

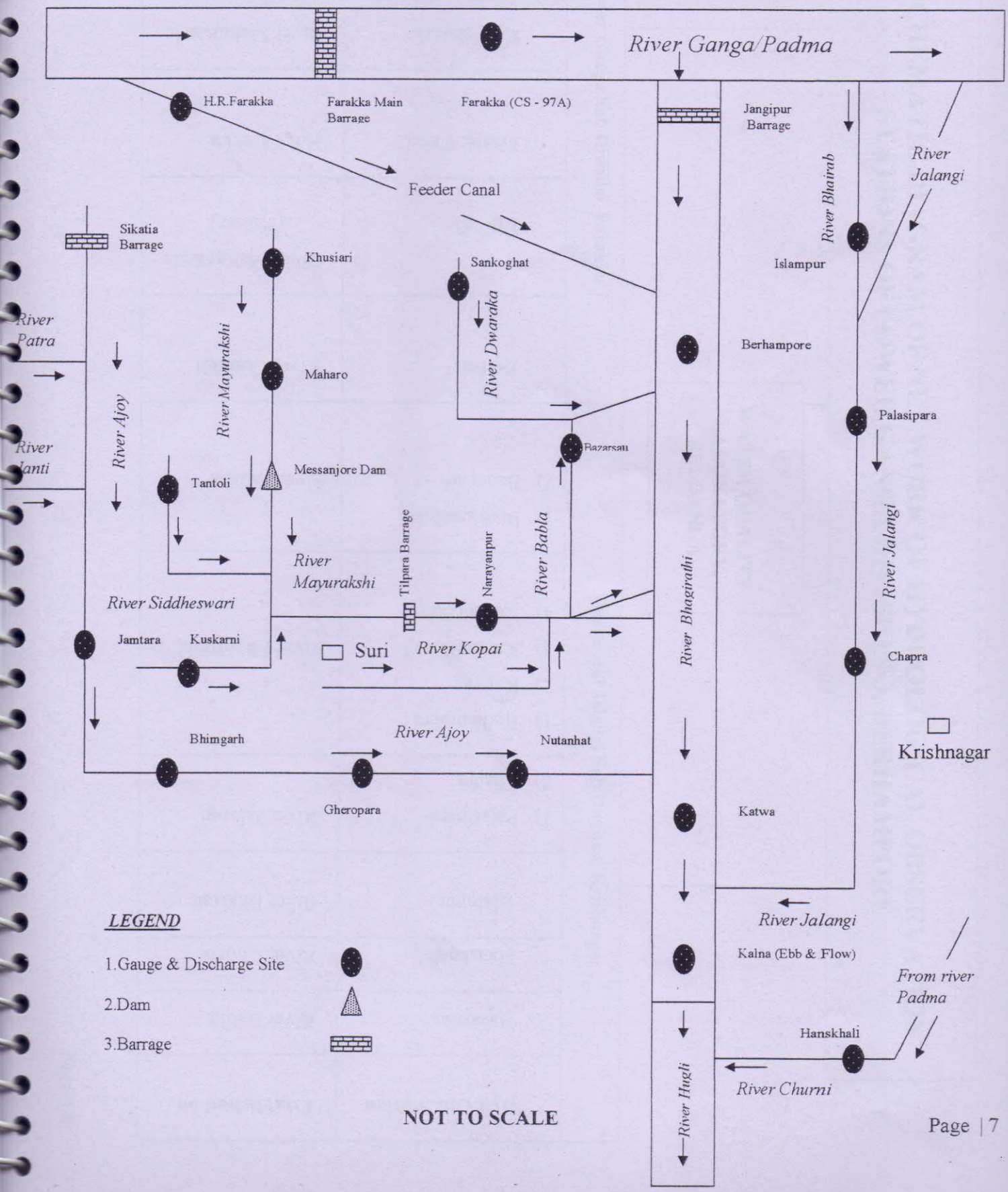
JURISDICTION MAP



NOT TO SCALE

Central Water Commission
Lower Ganga Division
Berhampore [W B]

BHAGIRATHI BASIN
SCHEMATIC DIAGRAM OF BHAGIRATHI RIVER SYSTEM



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SCHEMATIC DIAGRAM OF NET WORK OF HYDROLOGICAL OBSERVATION STATIONS OF LOWER GANGA DIVISION-3, BERHAMPORE

WATER QUALITY LABORATORY, BELDANGA

Bhagirathi Jalangi Sub Division, Krishnagar							Lower Ganga Sub Division, Farakka			
Hyd.Obs.Station	Bazarsau	Hanskhali	Islampur	1) Palasipara 2) Chapra	1) Berhampore 2) Katwa 3) Kalna (Flow) 4) Kalna (Ebb)	1) Biswanathpur 2) Bedepara	Berhait	Labha	Feeder Canal	Englishbazar	1) Farakka(CS - 97A) 2) Rajmahal
Established on	River Babla	River Churni	River Bhairab	River Jalangi	River Bhagirathi	River Padma	River Gumani	River Mahananda [Fulhar]	H.R.Farakka	River Mahananda	River Ganga

8.0

Presentation of Data for the Water Year 2015-2016

SITE: BERHAMPORE
SUB-DIV: BJ SUB-DIV
CODE: 008-LGD3BEH

Water Quality Datasheet for the period : 2015-2016

Station Name : BERHAMPORE — **Division : LGD, BERHAMPORE**

Local River : BHAGIRATHI

River Water Analysis

S.No	Parameterrs	Unit	Jun-15	Jul-15	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15	Jan-16	Feb-16	Mar-16	Apr-16	May-16
Date of Collection														
PHYSICAL														
1	Q (cumec)		1182.93	1229.785	1289.66	1,320.80	1230.827	1191.28	1,206.45	1064.71	924.46	752.3	838.9	610.74
2	Weather													
3	Colour-Code(-)													
4	EC- GEN(micro mho/cm)		290	184	245	300	255	290	345	325	356	225	425	394
5	Odour - Cod(-)		Odurless											
6	pH-GEN (pH units)		8.20	7.80	7.80	7.50	7.40	8.00	8.30	8.30	8.40	8.50	8.50	8.30
7	Tempareture	C°	31.00	30.00	30.00	30.00	30.50	28.50	25.50	18.00	18.00	25.00	28.00	31.00
CHEMICAL														
9	Alk-Phen (C_aCo_3)	miligram/liter												
10	Alk-Tot (as CaCo3)													
11	Boron													
12	Calcium		1.20	1.89	1.72	1.46	1.81	2.06	1.72	2.06	2.06	1.81	2.98	1.98
13	Chloride		0.42	0.37	0.42	0.47	0.44	0.52	0.52	0.50	0.47	0.55	0.63	0.55
14	Carbonate		0.004	0.003	0.00	0.00	0.00	0.00	0.00	0.002	0.003	0.004	0.004	0.003
15	Fluoride													
16	Iron													
17	Bicarbonate		0.126	0.082	0.118	0.125	0.148	0.131	0.148	0.113	0.113	0.118	0.121	0.111
18	Potassium		0.06	0.09	0.09	0.07	0.07	0.09	0.08	0.09	0.11	0.11	0.09	0.09
19	Magnesium		1.20	0.52	0.95	0.43	1.12	1.2	1.29	1.46	1.29	1.2	1.38	1.03
20	Sodium		0.87	0.34	0.26	0.22	0.17	0.44	0.48	1.00	0.93	0.91	1.00	0.88
21	Amonia as N													
22	No2+No3 as N													
23	Nitrate as N													
24	Nitrate as N													
25	Tot.Phosphate as P													
26	Silicate as Sio2													
27	Sulphate as So_4		0.67	0.48	0.31	0.58	0.19	0.29	0.40	0.31	0.38	0.38	0.5	0.35
BIOLOGICAL/BACTERIOLOGICAL														
29	BOD5-20°C	mg/l												
30	COD													
31	Dissolved Oxygen													
32	DO-SAT %	%												
33	Tota Coliform	MPN/1ml												
34	Fecal Coliform													
35	E.Coli													
TRACE & TOXIC														
37	Arsenic	microgram/litre												
38	Cadmium													
39	Chromium													
40	Coper													
41	Lead													
42	Mercury													
43	Zinc													
CHEMICAL INDICES														
45	Ca-Hardness	(mg/l)												
46	Tot-Hardnes		95.52	40.92	75.03	34.11	88.71	95.52	102.32	175.29	166.82	149.69	166.76	154.78
47	Na% (%)	%	0.04	0.084	0.116	0.099	0.186	0.086	0.074	21.69	21.180	22.58	22.47	22.110
48	RSC(-)		Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
49	SAR(-)		0.790	0.310	0.230	0.230	0.140	0.340	0.390	0.75	0.72	0.74	0.770	0.72
50	PESTICIDES													

WATER YEAR BOOK-III
SITE: KALNA(FLOW)
SUB-DIV: BJ SUB-DIV
CODE: 014-LGD3BEH

LGD-3, CWC, BERHAMPORE

2015-16

Water Quality Datasheet for the period : 2015-2016

Station Name : KALNA (FLOW)
Local River : BHAGIRATHI
Division : LGD, BERHAMPORE

River Water Analysis

S.No	Parameterrs	Unit	Jun-15	Jul-15	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15	Jan-16	Feb-16	Mar-16	Apr-16	May-16
Date of Collection														
PHYSICAL														
1	Q (cumec)		983.00	2,431.00	2,720.00	2208	1,511.00	1,312.00	1331.00	1142.00	843.00	789.00	588.20	706.00
2	Weather													
3	Colour-Code(-)													
4	EC- GEN(micro mho/cm)		258	185	95	305	160	300	340	368	340	215	410	389
5	Odour - Cod(-)							Odurless						
6	pH-GEN (pH units)		8.10	7.80	6.80	7.40	7.00	8.20	8.30	8.20	8.40	8.30	8.40	8.50
7	Tempareture	C°	34.00	31.00	32.00	32.00	32.50	29.50	27.00	20.00	21.00	27.00	31.00	31.00
CHEMICAL														
9	Alk-Phen (C_aCo_3)													
10	Alk-Tot (as CaCo3)													
11	Boron													
12	Calcium		1.20	1.29	1.12	1.72	0.95	2.06	1.89	1.98	2.06	1.89	2.06	2.15
13	Chloride		0.42	0.34	0.42	0.37	0.37	0.47	0.52	0.55	0.52	0.55	0.55	0.52
14	Carbonate		0.003	0.003	0.00	0.00	0.00	0.00	0.00	0.002	0.002	0.003	0.004	0.004
15	Fluoride													
16	Iron													
17	Bicarbonate		0.125	0.115	0.057	0.128	0.082	0.141	0.144	0.117	0.117	0.120	0.126	0.111
18	Potassium		0.07	0.09	0.09	0.07	0.08	0.09	0.08	0.10	0.10	0.10	0.09	0.09
19	Magnesium		0.95	0.43	1.03	1.03	0.69	0.60	1.29	1.38	1.20	1.12	1.12	0.86
20	Sodium		0.87	0.43	0.26	0.22	0.17	0.43	0.44	1.02	1.00	1.00	0.96	0.87
21	Amonia as N	miligram/liter												
22	No2+No3 as N													
23	Nitrate as N													
24	Nitrate as N													
25	Tot.Phosphate as P													
26	Silicate as Sio2													
27	Sulphate as So_4		0.79	0.38	0.63	0.35	0.04	0.27	0.31	0.33	0.35	0.42	0.44	0.42
BIOLOGICAL/BACTERIOLOGICAL														
29	BOD5-20°C													
30	COD	mg/l												
31	Dissolved Oxygen													
32	DO-SAT %	%												
33	Tota Coliform													
34	Fecal Coliform	MPN/1ml												
35	E.Coli													
TRACE & TOXIC														
37	Arsenic													
38	Cadmium													
39	Chromium													
40	Coper	microgram/litre												
41	Lead													
42	Mercury													
43	Zinc													
CHEMICAL INDICES														
45	Ca-Hardness													
46	Tot-Hardnes	(mg/l)	75.03	34.11	81.83	81.83	54.60	47.72	102.32	166.76	162.59	149.76	158.36	149.92
47	Na% (%)	%	0.036	0.052	0.096	0.138	0.111	0.074	0.084	22.76	22.94	24.33	22.70	21.91
48	RSC(-)		Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
49	SAR(-)		0.84	0.460	0.25	0.19	0.19	0.37	0.35	0.79	0.78	0.82	0.76	0.71
50	PESTICIDES													

NOTE :- BDL= BELOW DETECTIVE LEVEL

WATER YEAR BOOK-III
SITE: KALNA (EBB)
SUB-DIV: BJ SUB-DIV
CODE: 013-LGD3BEH

LGD-3, CWC, BERHAMPORE

2015-16

Water Quality Datasheet for the period : 2015-2016

Station Name : KALNA (EBB)

Local River : BHAGIRATHI

Division : LGD, BERHAMPORE

River Water Analysis

S.No	Parameterrs	Unit	Jun-15	Jul-15	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15	Jan-16	Feb-16	Mar-16	Apr-16	May-16
Date of Collection														
PHYSICAL														
1	Q (cumec)		1351.00	2812.00	2,873.00	2,491.00	1,492.00	1291.00	1384.00	1346	1021	823	761.4	439
2	Weather													
3	Colour-Code(-)													
4	EC- GEN(micro mho/cm)		300	188	100	305	250	300	335	365	340	280	400	380
5	Odour - Cod(-)		Odurless											
6	pH-GEN (pH units)		8.10	7.80	7.00	7.50	7.50	8.20	8.40	8.30	8.50	8.50	8.30	8.40
7	Tempareture	C°	31.00	31.00	32.50	32.00	33.00	30.00	27.00	18.00	21.50	28.00	30.00	32.50
CHEMICAL														
9	Alk-Phen (C_aCo_3)	miligram/liter												
10	Alk-Tot (as CaCo3)													
11	Boron													
12	Calcium		1.29	1.38	0.95	1.89	1.55	1.72	1.72	2.06	2.24	1.72	1.81	1.89
13	Chloride		0.52	0.37	0.44	0.39	0.44	0.52	0.47	0.65	0.47	0.52	0.6	0.57
14	Carbonate		0.00	0.003	0.00	0.00	0.00	0.00	0.00	0.001	0.001	0.004	0.002	0.002
15	Fluoride													
16	Iron													
17	Bicarbonate		0.137	0.098	0.049	0.121	0.148	0.131	0.148	0.114	0.114	0.118	0.128	0.105
18	Potassium		0.07	0.08	0.09	0.08	0.07	0.09	0.08	0.09	0.09	0.10	0.09	0.09
19	Magnesium		1.03	0.69	0.95	1.20	0.60	0.95	1.29	1.38	0.86	1.38	1.46	1.12
20	Sodium		0.87	0.39	0.26	0.23	0.17	0.43	0.50	1.00	0.96	1.00	0.96	0.88
21	Amonia as N													
22	No2+No3 as N													
23	Nitrate as N													
24	Nitrate as N													
25	Tot.Phosphate as P													
26	Silicate as Sio2													
27	Sulphate as So_4		0.75	0.38	0.65	0.29	0.17	0.31	0.27	0.38	0.38	0.42	0.48	0.42
BIOLOGICAL/BACTERIOLOGICAL														
29	BOD5-20°C	mg/l												
30	COD													
31	Dissolved Oxygen													
32	DO-SAT %	%												
33	Tota Coliform	MPN/1ml												
34	Fecal Coliform													
35	E.Coli													
TRACE & TOXIC														
37	Arsenic	microgram/litre												
38	Cadmium													
39	Chromium													
40	Coper													
41	Lead													
42	Mercury													
43	Zinc													
CHEMICAL INDICES														
45	Ca-Hardness	(mg/l)												
46	Tot-Hardnes		81.83	54.60	75.03	95.52	47.72	75.03	102.32	171.06	154.22	153.86	162.39	149.76
47	Na% (%)	%	0.037	0.065	0.086	0.148	0.141	0.074	0.072	22.08	23.13	23.81	22.22	22.11
48	RSC(-)		Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
49	SAR(-)		0.810	0.38	0.27	0.19	0.16	0.37	0.41	0.76	0.77	0.80	0.75	0.72
50	PESTICIDES													

NOTE :-

SITE: KATWA
SUB-DIV: BJ SUB-DIV
CODE: 015-LGD3BEH

Station Name : KATWA — **Water Quality Datasheet for the period : 2015-2016**

Local River : BHAGIRATHI — **Division : LGD, BERHAMPORE**

River Water Analysis

S.No	Parameterrs	Unit	Jun-15	Jul-15	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15	Jan-16	Feb-16	Mar-16	Apr-16	May-16
	Date of Collection													
PHYSICAL														
1	Q (cumec)		1,152.00	1,904.00	-	2,339.00	1,477.00	-	-	-	-	-	-	-
2	Weather													
3	Colour-Code(-)													
4	EC- GEN(micro mho/cm)		225	135	-	280	165	-	-	-	-	-	-	-
5	Odour - Cod(-)							Odurless						
6	pH-GEN (pH units)		8.10	7.90	-	7.60	7.30	-	-	-	-	-	-	-
7	Tempareture	C°	33.00	33.00	-	26.00	27.50	-	-	-	-	-	-	-
CHEMICAL														
9	Alk-Phen (C_aCo_3)	miligram/liter												
10	Alk-Tot (as CaCo3)													
11	Boron													
12	Calcium													
13	Chloride		1.20	1.46	-	1.55	1.03	-	-	-	-	-	-	-
14	Carbonate		0.50	0.34	-	0.34	0.55	-	-	-	-	-	-	-
15	Fluoride		0.003	0.003	-	0.00	0.00	-	-	-	-	-	-	-
16	Iron							-	-	-	-	-	-	-
17	Bicarbonate							-	-	-	-	-	-	-
18	Potassium		0.118	0.115	-	0.084	0.098	-	-	-	-	-	-	-
19	Magnesium		0.07	0.08	-	0.06	0.09	-	-	-	-	-	-	-
20	Sodium		1.03	0.60	-	0.17	0.69	-	-	-	-	-	-	-
21	Amonia as N		0.87	0.30	-	0.22	0.17	-	-	-	-	-	-	-
22	No2+No3 as N													
23	Nitrate as N													
24	Nitrate as N													
25	Tot.Phosphate as P													
26	Silicate as Sio2													
27	Sulphate as So_4		0.77	0.40	-	0.33	0.04	-	-	-	-	-	-	-
BIOLOGICAL/BACTERIOLOGICAL														
29	BOD5-20°C	mg/l												
30	COD													
31	Dissolved Oxygen													
32	DO-SAT %	%												
33	Tota Coliform	MPN/1ml												
34	Fecal Coliform													
35	E.Coli													
TRACE & TOXIC														
37	Arsenic	microgram/litre												
38	Cadmium													
39	Chromium													
40	Coper													
41	Lead													
42	Mercury													
43	Zinc													
CHEMICAL INDICES														
45	Ca-Hardness	(mg/l)	81.830	47.72	-	13.62	54.60	-	-	-	-	-	-	-
46	Tot-Hardnes		0.036	0.081	-	0.091	0.116	-	-	-	-	-	-	-
47	Na% (%)	%	Nil	Nil	-	Nil	Nil	-	-	-	-	-	-	-
48	RSC(-)		0.820	0.30	-	0.24	0.18	-	-	-	-	-	-	-
49	SAR(-)													
50	PESTICIDES													

SITE: CHAPRA
SUB-DIV: BJ SUB-DIV
CODE: 009-LGD3BEH

Water Quality Datasheet for the period : 2015-2016

Station Name : CHAPRA **Division : LGD, BERHAMPORE**

Local River : JALANGI

River Water Analysis

S.No	Parameterrs	Unit	Jun-15	Jul-15	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15	Jan-16	Feb-16	Mar-16	Apr-16	May-16
Date of Collection														
PHYSICAL														
1	Q (cumec)		1351.00	39.63	-	266.34	34.06	30.47	28.45	1205.00	1195.00	1137.00	1321.00	1212.00
2	Weather													
3	Colour-Code(-)													
4	EC- GEN(micro mho/cm)		300	115	230	176	254	208	200	410	325	360	305	325
5	Odour - Cod(-)							Odurless						
6	pH-GEN (pH units)		8.10	8.00	7.90	7.60	7.20	8.10	8.30	8.30	7.60	7.20	7.80	8.30
7	Tempareture	C°	31.00	30.50	29.50	31.50	32.00	30.00	24.50	19.50	20.00	26.00	30.00	32.00
CHEMICAL														
9	Alk-Phen (C_aCo_3)	miligram/liter												
10	Alk-Tot (as CaCo3)													
11	Boron													
12	Calcium		1.29	1.38	1.55	1.89	1.2	1.03	1.72	2.32	1.72	1.89	1.81	1.63
13	Chloride		0.52	0.31	0.39	0.34	0.52	0.47	0.55	0.52	0.73	0.5	0.6	0.60
14	Carbonate		0.00	0.003	0.00	0.00	0.00	0.00	0.00	0.00	0.002	0.004	0.003	0.002
15	Fluoride													
16	Iron													
17	Bicarbonate		0.137	0.115	0.121	0.082	0.139	0.102	0.098	0.146	0.179	0.196	0.18	0.18
18	Potassium		0.07	0.10	0.11	0.08	0.04	0.10	0.09	0.09	0.09	0.10	0.11	0.11
19	Magnesium		1.03	0.52	1.12	0.69	0.26	0.6	0.95	2.06	1.89	1.46	1.2	1.03
20	Sodium		0.87	0.61	0.24	0.19	0.13	0.42	0.44	0.74	0.63	0.96	0.96	1.00
21	Amonia as N													
22	No2+No3 as N													
23	Nitrate as N													
24	Nitrate as N													
25	Tot.Phosphate as P													
26	Silicate as Sio2													
27	Sulphate as So_4		0.75	0.38	0.31	-	0.33	0.27	0.33	0.48	0.38	0.81	0.85	0.9
BIOLOGICAL/BACTERIOLOGICAL														
29	BOD5-20°C	mg/l												
30	COD													
31	Dissolved Oxygen													
32	DO-SAT %	%												
33	Tota Coliform	MPN/1ml												
34	Fecal Coliform													
35	E.Coli													
TRACE & TOXIC														
37	Arsenic	microgram/litre												
38	Cadmium													
39	Chromium													
40	Coper													
41	Lead													
42	Mercury													
43	Zinc													
CHEMICAL INDICES														
45	Ca-Hardness	(mg/l)												
46	Tot-Hardnes		81.83	40.92	88.71	54.6	20.49	47.72	75.03	217.9	150.05	115.94	81.83	81.83
47	Na% (%)	%	0.037	0.043	0.126	0.150	0.125	0.051	0.073	0.070	0.069	0.046	0.043	0.038
48	RSC(-)		Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
49	SAR(-)		0.810	0.63	0.21	0.17	0.15	0.47	0.38	0.50	0.47	0.74	0.78	0.87
50	PESTICIDES													

NOTE :- **BDL= BELOW DETECTIVE LEVEL**

SITE: HANSKHALI
SUB-DIV: BJ SUB-DIV
CODE: 011-LGD3BEH

Water Quality Datasheet for the period : 2015-2016

Station Name : HANSKHALI — **Division : LGD, BERHAMPORE**

Local River : CHURNI

River Water Analysis

S.No	Parameterrs	Unit	Jun-15	Jul-15	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15	Jan-16	Feb-16	Mar-16	Apr-16	May-16
	Date of Collection													
PHYSICAL														
1	Q (cumec)		25.67	50.75	101.74	86.21	44.24	32.94	23.90	21.79	22.94	18.54	34.08	30.38
2	Weather													
3	Colour-Code(-)													
4	EC- GEN(micro mho/cm)		169	165	248	280	220	180	254	410	308	315	260	280
5	Odour - Cod(-)							Odurless						
6	pH-GEN (pH units)		7.40	7.70	7.80	7.50	7.30	8.10	8.20	8.50	7.80	7.40	7.60	8.00
7	Tempareture	C°	30.50	31.00	29.50	32.00	32.00	28.00	22.00	22.00	22.50	24.50	28.50	31.50
CHEMICAL														
9	Alk-Phen (C_aCo_3)	miligram/liter												
10	Alk-Tot (as CaCo3)													
11	Boron													
12	Calcium		0.69	1.38	1.72	1.63	1.03	1.03	1.38	1.20	1.46	1.89	1.72	2.32
13	Chloride		0.39	0.34	0.47	0.34	0.42	0.37	0.39	0.31	0.73	0.55	0.63	0.52
14	Carbonate		-	0.003	0.001	0.00	0.00	0.00	0.00	-	-	0.004	0.003	0.002
15	Fluoride													
16	Iron													
17	Bicarbonate		0.09	0.123	0.125	0.116	0.131	0.085	0.154	0.08	0.13	0.20	0.194	0.15
18	Potassium		0.14	0.09	0.11	0.07	0.08	0.11	0.09	0.09	0.11	0.10	0.09	0.09
19	Magnesium		0.26	0.52	1.03	0.95	0.77	0.69	52.00	0.95	0.52	1.20	1.03	0.26
20	Sodium		0.61	0.57	0.24	0.17	0.10	0.42	0.21	0.65	0.65	1.05	1.00	1.18
21	Amonia as N													
22	No2+No3 as N													
23	Nitrate as N													
24	Nitrate as N													
25	Tot.Phosphate as P													
26	Silicate as Sio2													
27	Sulphate as So_4		0.03	0.38	0.31	0	0.19	0	0.02	0.31	0.40	-	0.42	-
BIOLOGICAL/BACTERIOLOGICAL														
29	BOD5-20°C	mg/l												
30	COD													
31	Dissolved Oxygen													
32	DO-SAT %	%												
33	Tota Coliform	MPN/1ml												
34	Fecal Coliform													
35	E.Coli													
TRACE & TOXIC														
37	Arsenic	microgram/litre												
38	Cadmium													
39	Chromium													
40	Coper													
41	Lead													
42	Mercury													
43	Zinc													
CHEMICAL INDICES														
45	Ca-Hardness	(mg/l)												
46	Tot-Hardnes		47.72	40.92	81.83	75.03	61.41	54.60	94.24	106.85	40.92	95.52	81.83	20.49
47	Na% (%)	%	0.023	0.045	0.129	0.166	0.198	0.054	0.105	0.044	0.042	0.040	0.038	0.033
48	RSC(-)		Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
49	SAR(-)		1.36	0.58	0.20	0.15	0.11	0.45	0.22	0.63	0.65	0.84	0.85	1.04
50	PESTICIDES													

NOTE :- BDL= BELOW DETECTIVE LEVEL

SITE: H/R FARAKKA
SUB-DIV: LG SUB-DIV
CODE: 004-LGD3BEH

Water Quality Datasheet for the period : 2015-2016

Station Name : H/R FARAKKA **Division : LGD, BERHAMPORE**

Local River : FEEDER CANAL

River Water Analysis

S.No	Parameterrs	Unit	Jun-15	Jul-15	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15	Jan-16	Feb-16	Mar-16	Apr-16	May-16
Date of Collection														
PHYSICAL														
1	Q (cumec)			1,017.38	1,063.67	1,071.57	1,077.36	1,146.31	1,147.89	1,109.14	891.89	735.86	995.17	950.31
2	Weather													
3	Colour-Code(-)													
4	EC- GEN(micro mho/cm)			280	230	290	260	310	345	360	355	244	410	380
5	Odour - Cod(-)							Odurless						
6	pH-GEN (pH units)			7.90	7.80	7.40	7.40	8.10	8.20	8.30	8.40	8.30	8.30	8.50
7	Tempareture	C°		31.00	29.00	29.00	28.00	26.00	24.00	22.00	18.00	24.00	26.00	29.00
CHEMICAL														
9	Alk-Phen (C_aCo_3)	miligram/liter												
10	Alk-Tot (as CaCo3)													
11	Boron													
12	Calcium			1.46	1.46	1.72	1.46	2.06	1.20	2.15	2.06	1.29	1.98	1.89
13	Chloride			0.31	0.27	0.54	0.48	0.27	0.04	0.50	0.50	0.44	0.68	0.63
14	Carbonate			0.003	0.00	0.00	0.00	0.00	0.00	0.002	0.002	0.001	0.003	0.003
15	Fluoride													
16	Iron													
17	Bicarbonate			0.098	0.121	0.134	0.131	0.154	0.161	0.112	0.113	0.064	0.125	0.103
18	Potassium			0.08	0.09	0.06	0.09	0.09	0.09	0.09	0.09	0.08	0.10	0.09
19	Magnesium			0.43	0.43	0.86	0.26	1.20	0.69	1.03	1.55	0.26	1.36	0.77
20	Sodium			0.28	0.24	0.22	0.13	0.46	0.50	0.96	0.96	0.80	1.00	0.91
21	Amonia as N													
22	No2+No3 as N													
23	Nitrate as N													
24	Nitrate as N													
25	Tot.Phosphate as P													
26	Silicate as Sio2													
27	Sulphate as So_4		0.41	0.20	0.49	0.27	0.32	0.22	0.35	0.32	0.29	0.39	0.37	0.40
BIOLOGICAL/BACTERIOLOGICAL														
29	BOD5-20°C	mg/l												
30	COD													
31	Dissolved Oxygen													
32	DO-SAT %	%												
33	Tota Coliform	MPN/1ml												
34	Fecal Coliform													
35	E.Coli													
TRACE & TOXIC														
37	Arsenic	microgram/litre												
38	Cadmium													
39	Chromium													
40	Coper													
41	Lead													
42	Mercury													
43	Zinc													
CHEMICAL INDICES														
45	Ca-Hardness	(mg/l)												
46	Tot-Hardnes			34.11	34.11	68.22	20.49	95.52	54.60	158.38	179.56	77.24	166.76	132.78
47	Na% (%)	%		0.080	0.093	0.130	0.149	0.083	0.050	22.7	20.6	32.92	22.42	24.86
48	RSC(-)			NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
49	SAR(-)			0.29	0.25	0.19	0.14	0.36	0.51	0.76	0.71	0.91	0.77	0.79
50	PESTICIDES													

SITE: LABHA
SUB-DIV: LG SUB-DIV
CODE: 005-LGD3BEH

Water Quality Datasheet for the period : 2015-2016

Station Name : LABHA — **Division : LGD, BERHAMPORE**

Local River : MAHANANDA

River Water Analysis

S.No	Parameterrs	Unit	Jun-15	Jul-15	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15	Jan-16	Feb-16	Mar-16	Apr-16	May-16
Date of Collection														
PHYSICAL														
1	Q (cumec)		87.40	300.64	-	1,546.79	611.51	-	-	-	186.03	158.24	-	97.93
2	Weather													
3	Colour-Code(-)													
4	EC- GEN(micro mho/cm)		250	165	250	252	220	290	355	205	184	222	160	157
5	Odour - Cod(-)		Odurless											
6	pH-GEN (pH units)		8.00	7.00	7.80	7.50	7.40	8.20	8.30	7.70	8.00	8.40	7.90	8.40
7	Tempareture	C°	29.00	27.50	32.00	28.00	28.50	28.00	25.00	19.00	16.00	-	26.00	29.00
CHEMICAL														
9	Alk-Phen (C_aCo_3)	mili gram/liter												
10	Alk-Tot (as CaCo3)													
11	Boron													
12	Calcium		1.29	1.20	1.55	1.72	1.20	1.89	1.89	1.38	1.29	1.81	0.77	0.86
13	Chloride		0.42	0.42	0.47	0.37	0.34	0.44	0.52	0.47	0.39	0.55	0.29	0.63
14	Carbonate		0.003	0.003	0.00	0.00	0.00	0.00	0.00	0.007	0.004	0.004	0.00	0.001
15	Fluoride													
16	Iron													
17	Bicarbonate		0.128	0.123	0.125	0.131	0.115	0.131	0.116	0.072	0.073	0.119	0.054	0.047
18	Potassium		0.06	0.06	0.05	0.07	0.09	0.08	0.06	0.07	0.09	0.10	0.08	0.07
19	Magnesium		1.12	0.52	1.12	0.86	0.69	0.69	0.69	0.95	0.69	1.38	0.34	0.43
20	Sodium		0.63	0.22	0.22	0.13	0.09	0.28	0.22	0.70	0.70	1.04	0.79	0.74
21	Amonia as N													
22	No2+No3 as N													
23	Nitrate as N													
24	Nitrate as N													
25	Tot.Phosphate as P													
26	Silicate as Sio2													
27	Sulphate as So_4		0.04	0.10	0.21	0.23	0.42	0.48	0.31	0.02	0.10	0.13	0.15	0.06
BIOLOGICAL/BACTERIOLOGICAL														
29	BOD5-20°C	mg/l												
30	COD													
31	Dissolved Oxygen													
32	DO-SAT %	%												
33	Tota Coliform	MPN/1ml												
34	Fecal Coliform													
35	E.Coli													
TRACE & TOXIC														
37	Arsenic	microgram/litre												
38	Cadmium													
39	Chromium													
40	Coper													
41	Lead													
42	Mercury													
43	Zinc													
CHEMICAL INDICES														
45	Ca-Hardness	(mg/L)												
46	Tot-Hardnes		88.71	40.92	88.71	68.22	54.60	54.60	54.60	115.45	98.45	158.15	55.67	64.21
47	Na% (%)	%	0.049	0.091	0.134	0.214	0.230	0.105	0.130	22.58	25.27	24.02	39.90	35.24
48	RSC(-)		NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
49	SAR(-)		0.57	0.24	0.19	0.11	0.09	0.25	0.19	0.65	0.70	0.82	1.06	0.92
50	PESTICIDES													

SITE: ENGLISHBAZAR
SUB-DIV: LG SUB-DIV
CODE: 010-LGD3BEH

Water Quality Datasheet for the period : 2015-2016

Station Name : ENGLISH BAZAR — **Division : LGD, BERHAMPORE**

Local River : MAHANANDA

River Water Analysis

S.No	Parameterrs	Unit	Jun-15	Jul-15	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15	Jan-16	Feb-16	Mar-16	Apr-16	May-16
	Date of Collection													
PHYSICAL														
1	Q (cumec)		10.51	68.11	135.85	704.66	99.83	-	-	38.80	-	-	5.79	-
2	Weather													
3	Colour-Code(-)													
4	EC- GEN(micro mho/cm)		300	335	225	304	270	380	390	220	205	325	400	346
5	Odour - Cod(-)		Odurless											
6	pH-GEN (pH units)		7.50	7.40	7.80	7.40	7.50	8.00	8.40	8.00	8.00	7.90	7.70	7.70
7	Tempareture	C°	27.50	28.00	28.00	28.00	31.00	25.00	25.00	19.00	20.00	28.00	28.00	38.00
CHEMICAL														
9	Alk-Phen (C_aCo_3)	miligram/liter												
10	Alk-Tot (as CaCo3)													
11	Boron													
12	Calcium		3.18	1.89	1.72	1.72	1.46	2.58	1.72	1.12	1.20	1.29	2.06	2.15
13	Chloride		0.44	0.39	0.39	0.39	0.37	0.42	0.52					
14	Carbonate		0.00	0.003	0.00	0.00	0.00	0.00	0.00	0.002	0.002	0.001	0.00	0.00
15	Fluoride													
16	Iron													
17	Bicarbonate		0.334	0.098	0.141	0.136	0.131	0.184	0.197					
18	Potassium		0.06	0.06	0.05	0.06	0.08	0.10	0.08	0.07	0.09	0.07	0.09	0.09
19	Magnesium		2.06	0.17	1.03	0.86	0.43	0.86	0.86	2.06	0.95	0.86	0.86	0.52
20	Sodium		0.70	0.24	0.20	0.13	0.09	0.48	0.59	0.78	0.78	0.87	0.96	0.87
21	Amonia as N													
22	No2+No3 as N													
23	Nitrate as N													
24	Nitrate as N													
25	Tot.Phosphate as P													
26	Silicate as Sio2													
27	Sulphate as So_4		0.02	0.38	0.27	0.06	0.42	0.00	0.04	0.02	0.00	0.00	0.00	0.06
BIOLOGICAL/BACTERIOLOGICAL														
29	BOD5-20°C	mg/l												
30	COD													
31	Dissolved Oxygen													
32	DO-SAT %	%												
33	Tota Coliform	MPN/1ml												
34	Fecal Coliform													
35	E.Coli													
TRACE & TOXIC														
37	Arsenic	microgram/litre												
38	Cadmium													
39	Chromium													
40	Coper													
41	Lead													
42	Mercury													
43	Zinc													
CHEMICAL INDICES														
45	Ca-Hardness	(mg/l)												
46	Tot-Hardnes		163.73	13.62	81.83	68.22	34.11	68.22	68.22	157.70	106.85	106.92	145.62	132.94
47	Na% (%)	%	0.086	0.098	0.150	0.213	0.229	0.084	0.055	19.350	25.830	28.160	24.180	23.970
48	RSC(-)		NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
49	SAR(-)		0.430	0.240	0.170	0.110	0.090	0.370	0.520	0.620	0.750	0.830	0.790	0.750
50	PESTICIDES													

SITE: FARAKKA (CS-97A)
SUB-DIV: LG SUB-DIV
CODE: 003-LGD3BEH

Water Quality Datasheet for the period : 2015-2016

Station Name : FARAKKA (CS-97A) **Division : LGD, BERHAMPORE**

Local River : GANGA

River Water Analysis

S.No	Parameterrs	Unit	Jun 15	Jul-15	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15	Jan-16	Feb-16	Mar-16	Apr-16	May-16
	Date of Collection													
PHYSICAL														
1	Q (cumec)		2,269.36	5,015.83	21,923.00	27,400.00	6,300.39	3,376.36	3,178.29	862.11	901.55	723.83	437.45	543.91
2	Weather													
3	Colour-Code(-)													
4	EC- GEN(micro mho/cm)		310	158	230	280	250	291	350	322	350	275	400	381
5	Odour - Cod(-)							Odurless						
6	pH-GEN (pH units)		8.00	7.80	8.00	7.40	7.30	8.20	8.30	8.30	8.50	8.40	8.40	8.50
7	Tempareture	C°	32.00	31.00	30.50	29.50	31.50	27.00	25.50	19.50	17.00	23.00	25.00	29.00
CHEMICAL														
9	Alk-Phen (C_aCo_3)													
10	Alk-Tot (as CaCo3)													
11	Boron													
12	Calcium		1.29	0.95	1.55	1.81	1.29	1.89	1.20	2.06	1.89	1.89	1.98	1.98
13	Chloride		0.50	0.42	0.37	0.42	0.42	0.44	0.52	0.50	0.50	0.57	0.57	0.52
14	Carbonate		0.004	0.003	0.001	0.00	0.00	0.00	0.00	0.002	0.002	0.003	0.004	0.003
15	Fluoride													
16	Iron													
17	Bicarbonate		0.131	0.082	0.128	0.136	0.115	0.138	0.148	0.110	0.111	0.111	0.123	0.105
18	Potassium		0.07	0.09	0.09	0.08	0.08	0.09	0.09	0.09	0.10	0.09	0.10	0.09
19	Magneslum		1.12	0.77	1.46	0.77	0.43	0.69	0.52	1.12	1.55	1.20	1.38	1.03
20	Sodium		0.87	0.26	0.22	0.19	0.13	0.47	0.48	1.00	1.00	1.00	1.00	0.91
21	Amonia as N													
22	No2+No3 as N													
23	Nitrate as N													
24	Nitrate as N													
25	Tot.Phosphate as P													
26	Silicate as Sio2													
27	Sulphate as So_4		0.73	0.21	0.31	0.33	0.42	0.27	0.27	0.33	0.31	0.33	0.48	0.42
BIOLOGICAL/BACTERIOLOGICAL														
29	BOD5-20°C													
30	COD	mg/l												
31	Dissolved Oxygen													
32	DO-SAT %	%												
33	Tota Coliform													
34	Fecal Coliform	MPN/1ml												
35	E.Coli													
TRACE & TOXIC														
37	Arsenic													
38	Cadmium													
39	Chromium													
40	Coper													
41	Lead													
42	Mercury													
43	Zinc													
CHEMICAL INDICES														
45	Ca-Hardness	(mg/l)	88.71	61.41	115.94	61.41	34.11	54.60	40.92	158.36	170.96	153.99	166.76	149.68
46	Tot-Hardnes	%	0.039	0.080	0.151	0.150	0.148	0.067	0.048	23.42	22.03	23.92	22.42	22.69
47	Na% (%)		NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
48	RSC(-)		0.79	0.28	0.18	0.17	0.14	0.41	0.52	0.79	0.76	0.80	0.77	0.74
49	SAR(-)													
50	PESTICIDES													

9.0

Abbreviations & Symbols

ABBREVIATIONS & SYMBOLS

Av.	Average
Conc.	Concentration
Disc.	Discharge
GD	Gauge & Discharge
GDS	Guage, Discharge & Sediment
g/l	Gram per litre
Km	kilometer
m	meter
mm	milimeter
WQ	Water Quality
W. Year	Water Year
Cumec	Cubic meter per second
+	Cation
-	Anion
ppm	Parts per million
me/l	miliequivalent per litre
pH	Negative logarithm of hydrogen ion concentration
k+	Pottasium Ion
Na^{+}	Sodium Ion
Ca^{++}	Calcium Ion
Mg^{++}	Magnesium Ion
Al^{+++}	Aluminium Ion
Fe^{+++}	Ferric Ion
B^{+}	Boron
Nh_4^{+}	Ammonium
Co_3^{-}	Carbonate
HCo_3^{-}	Bi-Carbonate
Cl^{-}	Chloride
F^{-}	Fluoride
So_4^{-}	Sulphate
So_3^{-}	Sulphite
No_3^{-}	Nitrate
No_2^{-}	Nitrite
CN^{-}	Cyanide
Po_4^{-}	Phosphate
SiO_3^{-}	Silicate
DO	Dissolved Oxygen
BOD	Biochemical Oxygen Demand
S.A.R.	Sodium Absorption Ratio
R.S.C.	Residual Sodium Carbonate
MPN	Most Probable Number
mg/l	Milligram per litre
LGD-3	Lower Ganga Division-3
max	maximum
min.	minimum

10.0

Tolerance Limits of Water Quality Parameters for use in Irrigation, Industrial, Cooling & Controlled Waste Disposal

TOLERANCE LIMITS OF WATER QUALITY PARAMETERS FOR USE IN IRRIGATION, INDUSTRIAL, COOLING & CONTROLLED WASTE DISPOSAL

(According to IS: 2286-1982)

Sl No.	Characteristics	Tolerance Limits
01	pH Value	6.0 to 8.5
02	Electrical Conductance at 25 degree C	2250 x 106
03	Total Dissolved Solids (Inorganic) mg/l, max	2100
04	Sodium Absorption Ratio, max	26
05	Percent Sodium, max	60
06	Boron (as B), mg/l, max	2
07	Chloride (as Cl), mg/l, max	600
08	Sulphate (as So_4) mg/l, max	1000

TOLERANCE LIMITS OF WATER QUALITY PARAMETERS FOR USE IN IRRIGATION, INDUSTRIAL, COOLING & CONTROLLED WASTE DISPOSAL

(According to IS: 2286-1982)

Sl. No.	CHARACTERISTICS	TOLERANCELIMITS			
		CLASS – A	CLASS – B	CLASS – C	CLASS – D
1	Ph Value	6.5 – 8.5	6.5 – 8.5	6.5 – 8.5	6.5 – 8.5
2	Dissolved Oxygen mg/l, min.	6	5	4	4
3	Bio-Chemical Oxygen Demand (5 days at 20 degree Centigrade) mg/l, max.	2	3	3	-
4	Total Coliform Organisms. MPN/100 ml, max.	50	500	5000	-
5	Total Dissolved Solids mg/l, max	500	-	1500	-
6	Chlorides (as Cl) mg/l, max.	250	-	600	-
7	Sulphate (as SO_4) mg/l, max.	400	-	400	-
8	Electrical Conductance at 25 degree Centrigade, mhos, max.	-	-	-	1000×10^6

Class A refers to drinking water without conventional treatment but after disinfection.
Class B refers to outdoor bathing.
Class C refers to drinking water with conventional treatment followed by disinfections.
Class D refers to fish culture and wild life propagation.