ACTION PLAN

FOR
RESTORATION OF POLLUTED STRETCH
OF
RIVER VARUNA
FROM

"RAMESHWAR TO CONFLUENCE WITH RIVER GANGA VARANASI"

UTTAR PRADESH POLLUTION CONTROL BOARD

TC – 12V, VIBHUTI KHAND, GOMTINAGAR,

LUCKNOW (UP)

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1. INTRODUCTION

The River Varuna is an intermittent river, with lean flow conditions prevailing during non-monsoon season. It originates at 25°23'36.24"N & 82°37'36.98"E near district Bhadohi (UP) and flows East-to-Southeast direction for approximately 100 km, and confluences at 25°19'47.02"N & 83°2'37.10"E AdikeshwarGhat in Varanasi with River Ganges in downstream of Varanasi. The area under study, approximately 33 km of river Varuna, lies in district Varanasi of Uttar Pradesh.

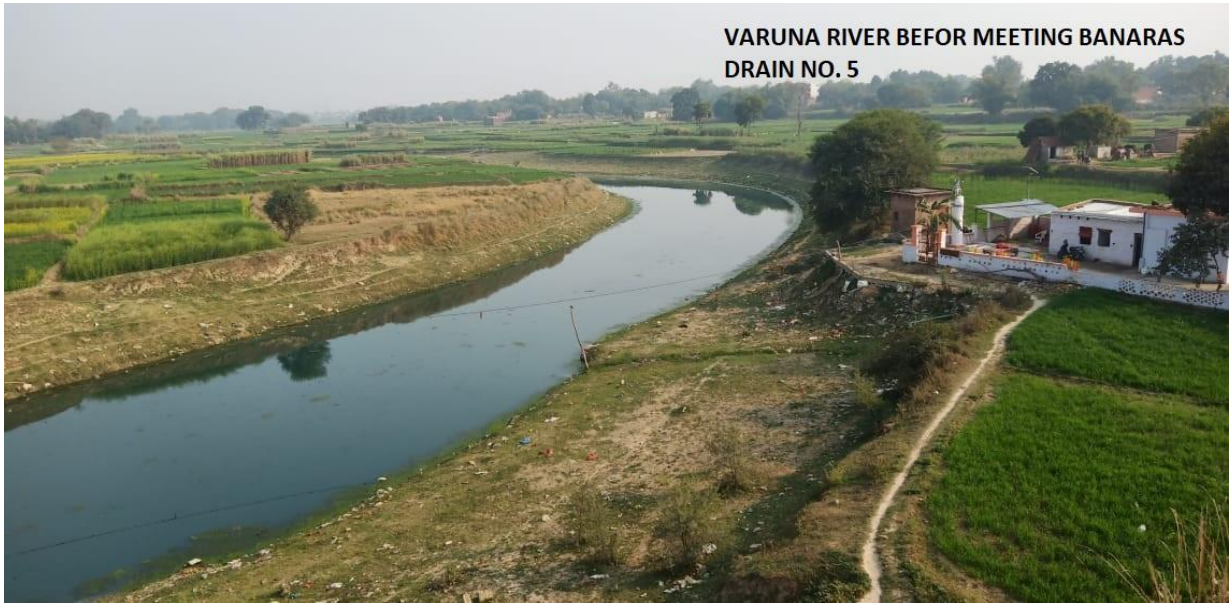


Fig : 1.1- River Varuna before meeting Banaras drain No. 5

The climate of the area is mild and generally warm. Situated in Northern Part of India, the weather during summers is as hot as 45^0 C and humid too. The average annual rainfall in the area is about 998 mm, out of which the major part is received during the monsoon period. The major land use is in Agriculture and there is no significant forest cover. The soil of the area is sandy loam to loamy soil. River Varuna has a total length of approximately 100 km. Earlier, River Varuna used to get its flow during monsoon season through rainwater and groundwater recharge. Presently, groundwater recharge is minimal and now mostly it gets its water through industrial & domestic wastewaters

discharged into river Varuna system.The river Varuna receives domestic wastewater every day from the industries and sewage system flow from a part of municipal area of Varanasi which contributes to the deterioration of its water quality.

As per the last 2 years monitoring of river water quality(given in **Appendix-7**) in the identified polluted stretch of river Varuna, its water is neither fit for Drinking purpose, Outdoor bathing, Fish Culture etc. It can only be used for irrigation, industrial cooling or controlled waste disposal (Class – E, specified as per IS:2296-1982).

Fig: 1.2 - Google Earth image showing Polluted Stretch of River Varuna at Varanasi

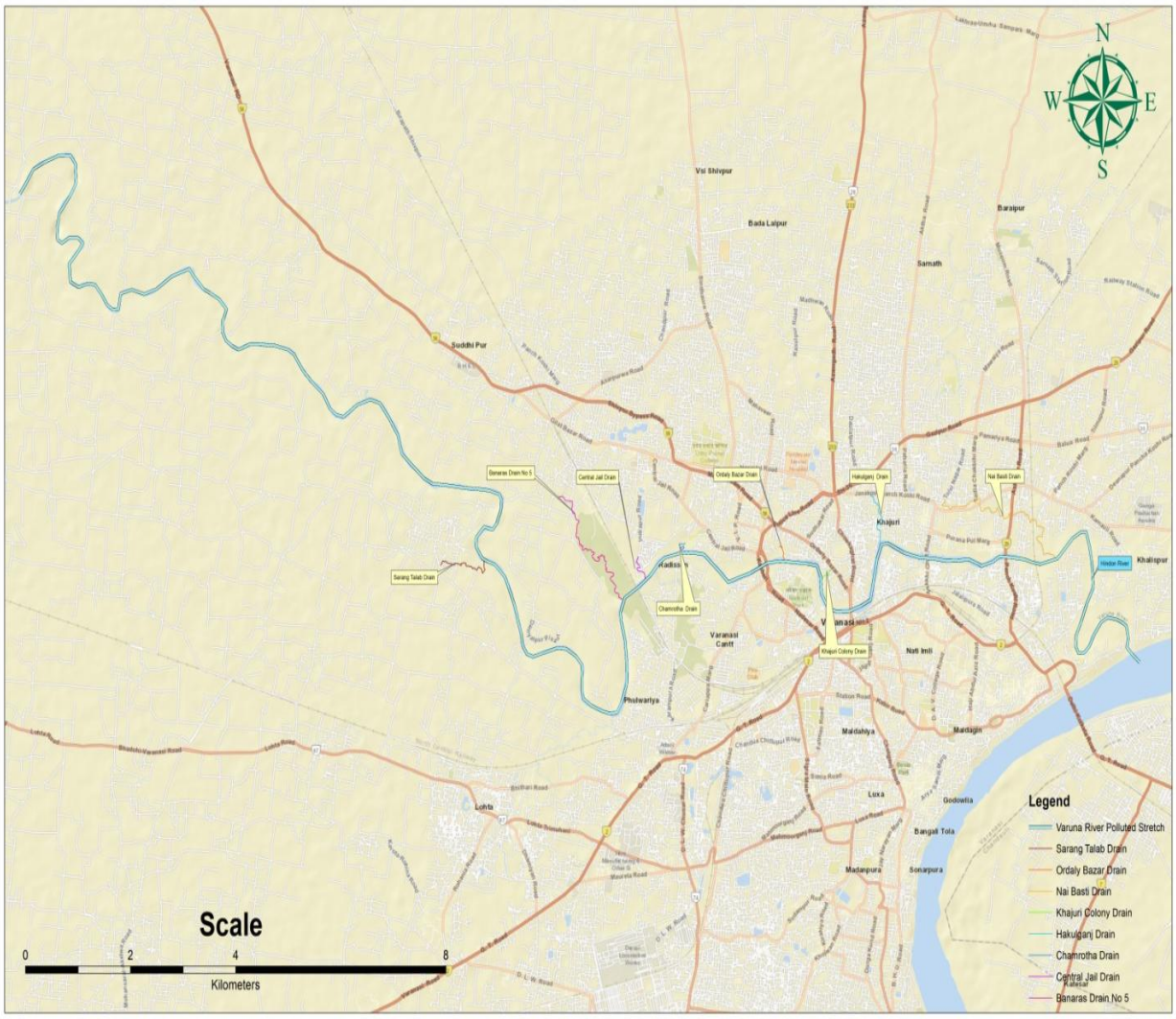


Fig : 1.3- GIS Map of polluted stretch of Varuna River with Drain

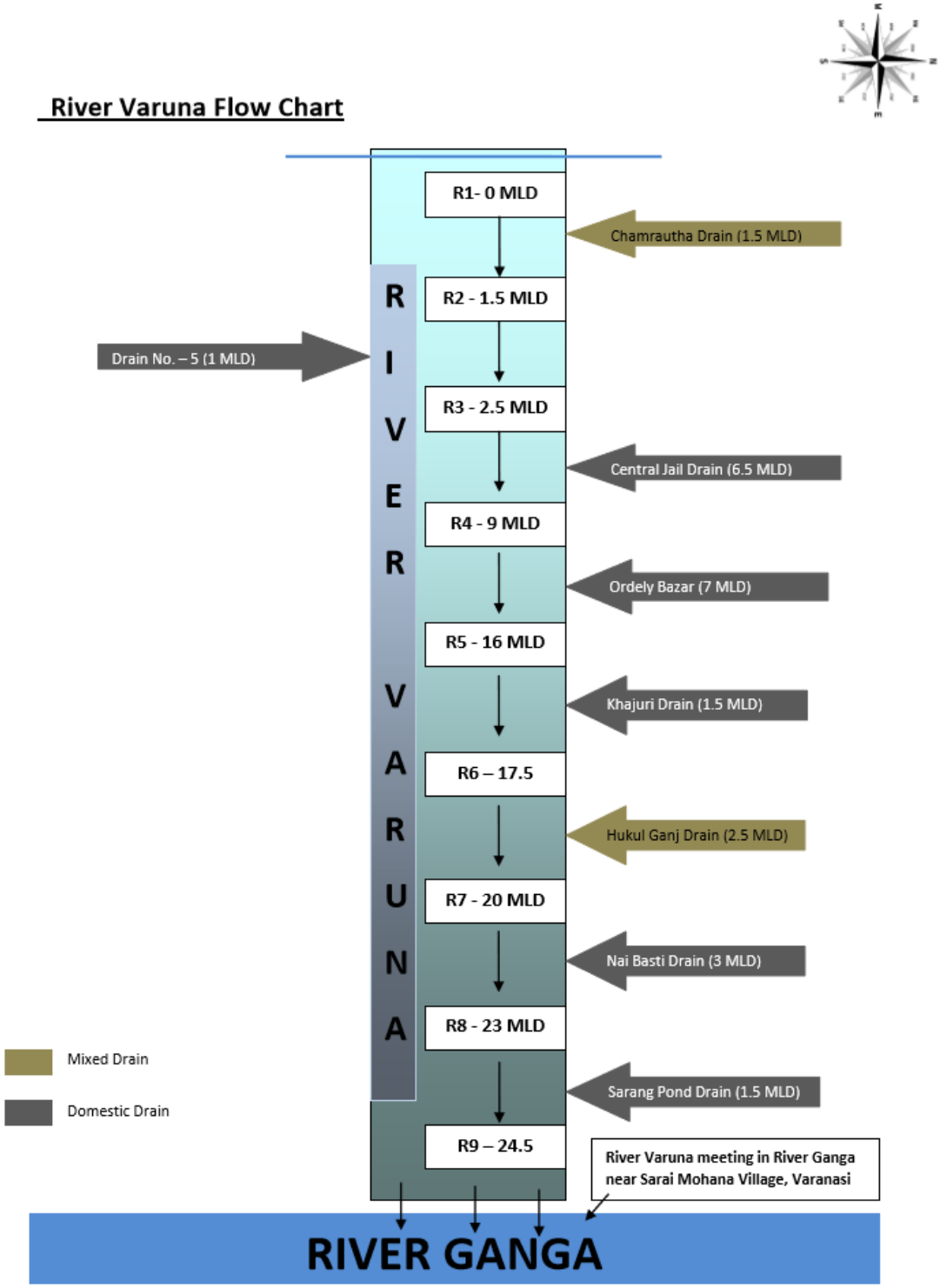


Fig : 1.4- Flow chart of effluent contribution of drains into polluted stretch of River Varuna.

1.1 POLLUTED STRETCH OF VARUNA RIVER FROM RAMESHWAR TO CONFLUENCE WITH RIVER GANGA VARANASI

Polluted Stretch of Varuna river originates from district Bhadohi (UP)and flows East-to-Southeast and confluences at AdikeshwarGhat in Varanasi with River Ganga in the downstream of Varanasi during travel from its origin to the destination, it traverses a total distance of about 202 Kms.

There are 06 villages located on the banks of this Priority-1 polluted stretch of river Varuna. The cumulative population of these villages is 22605, which generate around 5.6 TPD of un-segregated solid waste.

There are 11 water polluting industries located in the catchment area of the concerned stretch of river Varuna. These industries have effluent treatment plants and their treated effluent is discharged through 14 drains, of which 12 are Domestic and 02 drains are mixed drains. These industries are grossly polluting in nature which mostly belong to Textile category. Total Effluent discharge from these industries is approximately 0.11 MLD.

2. OBJECTIVE OF THE ACTION PLAN:

The objective of this Action Plan is to restore the water quality of this priority - 1 polluted stretch of river Varuna and make it fit at least for bathing purpose within 06 months from the date of Action plan as directed by Hon'ble National Green Tribunal vide its order dated 20th September, 2018 passed in the original Application No 673/2018 in the matter of NEWS ITEM PUBLISHED IN 'THE HINDU' AUTHORED BY SHRI JACOB KOSHY titled " More river stretches are now critically polluted: CPCB.

3. POLLUTION INVENTORY

3.1 Details of drains contributing the pollution:

In the polluted stretch under question of river Varuna, total discharge of 59.81 MLD is estimated which mainly comprises of 59.7 MLD domestic sewage and the industrial effluent component being only 0.11 MLD. Thus, the contribution of domestic sewage out of total discharge is approximately 99.8 %. There are 14 Drains that discharge into river Varuna and out of which 06 drains have been tapped till date and the domestic sewage is pumped to sewage treatment plant at Dinapur and Goithiha. The remaining 08 drains, being untapped, there is direct discharge of untreated domestic sewage in the river. As per desk inventory, about 59.7 MLD of sewage and 0.11 MLD of industrial effluent are currently being discharged into the river. Industrial effluent of 11 industries in Varanasi with cumulative discharge of 0.11 MLD is treated in the in-house effluent treatment plants and the treated effluent is mostly recycled back into the process and the residual quantum of treated effluent is utilized for ferti-irrigation. Only during period of excessive rainfall, there is a possibility of treated effluent being utilized for irrigation flowing back into river. The treatment of sewage is a major area of concern, as out of total estimated sewage discharge of 59.7 MLD, only 30.5 MLD (approximately 51%) of sewage is being treated and rest 29.2 MLD of sewage finds its way into the river in untreated state, thus deteriorating the water quality of river Varuna.

The estimation of industrial effluent is based upon the consented discharge quantity from the units, but the actual industrial effluent may be more than the estimate, owing to over discharge by the consented industries and discharge from illegal units operating in non-conforming areas.

A detailed drain wise mapping data regarding sewage, industrial effluent, number of industries in the drain, status of tapping and status of fixing of bar meshes etc. is given in Appendix–1. Summary of drains contributing to the pollution of river is given below:

Summary of Drains

S. N.	District	No of Drains	Type of Drains			Status of Drains			Industries		Sewage Discharge (MLD)			Total Discharge in the River (MLD)
			Domestic	Industrial	Mixed	Tapped	Untapped	Partially Tapped	Number	Treated Effluent (MLD)	Treated	Un-treated	Total	
1	Varanasi	14	12	00	02	06	08	00	11	0.11	30.5	29.2	59.7	59.81

Source : DataObtained from UP Jal Nigam

A. HakulGanj Drain

a. Origin

HakulGanj Drain starting point coordinates is Latitude: 25°20'58.37"N & Longitude:82°59'59.38"E.

b. End Point

Coordinates of the end point of the drain is Latitude: 25°33'92.24" N & Longitude: 82°58'40.18"

c. Length covered

Covered Distance of HakulGanj to meeting point of Varuna river is approx.: 0.93 km.

d. Details of industries & discharge of their effluent into the drain

HakulGanj drain carries domestic sewage and treated wastewater of one textile/Sari printing unit. Total discharge from HakulGanj drain to River Varuna is 3.5MLD, out of which 0.015MLD is treated effluent from industry and rest is untreated sewage.

WATER QUALITY OF CONFLUENCE POINT OF HAKUL GANJ		
	Lat	Long
Starting Point	25°20' 58.37"N	82°59' 59.38"E
Final meeting point	25°33' 92.24" N	82°58' 40.18"E
Length of drain	0.93km	
Nature of drain	Mixed	
Parameters	**Results**	
pH	7.8	
BOD (mg/l)	70	
COD (mg/l)	588	
TSS (mg/l)	446	
T Coli (MPN /100ml)	7000000	

B. Banaras Drain No. 5

a. Origin

Banaras Drain No.5 starting point coordinates is Latitude:25°20'57.13"N & Longitude:82°56'45.37"E

b. End Point

Coordinates of the end point of the drain is Latitude:25°20'9.67"N & Longitude:82°57'25.66"E

c. Length covered

Covered distance of Banaras drain No.5 to meeting point of Varuna river is approx.: 2.83km.

d. Details of discharge of the drain

Banaras drain No.5 carries domestic waste water from the habitation in the vicinity of river Varuna and the catchment area of the drain. Total Discharge from Banaras drain No.5 to River Varuna is 1 MLD, which is untreated sewage.

WATER QUALITY OF CONFLUENCE POINT OF BANARAS DRAIN		
	Lat	Long
Starting Point	25°20' 57.13"N	82°56' 45.37"E
Final meeting point	25°20' 9.67"N	82°57' 25.66"E
Length of drain	2.83km	
Nature of drain	DOMESTIC	
Parameters	**Results**	
pH	7.65	
BOD (mg/l)	65	
COD (mg/l)	546	
TSS (mg/l)	348	
T Coli (MPN /100ml)	4600000	

C. Ordaly Bazar Drain

a. Origin

Ordaly bazar drain starting point coordinates is Latitude:25°20'35.46"N & Longitude:82°59'2.35"E

b. End Point

Coordinates of the end point of theOrdaly bazar drain is Latitude:25°20'28.67"N & Longitude:82°59'5.65"E.

c. Length covered

Covered Distance of Ordaly bazar drain to meeting point of Varuna riveris approx.: 0.29 km.

e. Details of discharge of the drain

Ordaly bazar drain carries domestic waste water from the habitation in the vicinity of river Varuna and the catchment area of the drain. Total Discharge from Ordaly bazar drain to River Varuna is 7 MLD, which is untreated sewage.

WATER QUALITY OF CONFLUENCE POINT OF ORDALY BAZAR		
	Lat	Long
Starting Point	25°20' 35.46"N	82°59' 2.35"E
Final meeting point	25°20' 28.67"N	82°59' 5.65"E
Length of drain	0.29km	
Nature of drain	DOMESTIC	
Parameters	**Results**	
pH	7.6	
BOD (mg/l)	68	
COD (mg/l)	512	
TSS (mg/l)	384	
T Coli (MPN /100ml)	4900000	

D. Khajuri Colony Drain

a. Origin

Khajuri Colony drain starting point coordinates is Latitude:25°20'21.98"N & Longitude:82°59'33.38"E

b. End Point

Coordinates of the end point of the Khajuri Colony drain is Latitude:25°20'19.83"N & Longitude: 82°59'28.30"E.

c. Length covered

Covered Distance of Khajuri Colony drain to meeting point of Varuna river is approx.: 0.18 km.

d. Details of discharge of the drain

Khajuri Colony drain carries domestic waste water from the habitation in the vicinity of river Varuna and the catchment area of the drain. Total Discharge from Khajuri Colony drain to River Varuna is 1.5 MLD, which is untreated sewage.

WATER QUALITY OF CONFLUENCE POINT OF KHAJURI COLONY		
	Lat	Long
Starting Point	25°20' 21.98"N	82°59' 33.38"E
Final meeting point	25°20' 19.83"N	82°59' 28.30"E
Length of drain	0.18km	
Nature of drain	DOMESTIC	
Parameters	**Results**	
pH	7.55	
BOD (mg/l)	68	
COD (mg/l)	576	
TSS (mg/l)	392	
T Coli (MPN /100ml)	4900000	

E. Chamrotha Drain

a. Origin

Chamrotha drain starting point coordinates is Latitude: 25°20'36.02"N & Longitude: 82°58'4.74"E

b. End Point

Coordinates of the end point of theChamrotha drain is Latitude:25°20'31.83"N & Longitude:82°58'2.10"E.

c. Length covered

Covered Distance of Chamrotha drain to meeting point of Varuna river is approx.: 0.34 km.

d. Details of industries & discharge of their effluent into the drain

Chamrotha drain carries domestic sewage, treated waste water of nine textile/Sari printing units and one galvanizing unit. Total Discharge from Chamrotha drain to River Varuna is 1.595 MLD, out of which 0.095MLD is treated effluent from industriesand rest is untreated sewage.

WATER QUALITY OF CONFLUENCE POINT OF CHAMROTHA DRAIN		
	Lat	Long
Starting Point	25°20' 36.02"N	82°58' 4.74"E
Final meeting point	25°20' 31.83"N	82°58' 2.10"E
Length of drain	0.34km	
Nature of drain	MIXED	
Parameters	**Results**	
pH	7.52	
BOD (mg/l)	70	
COD (mg/l)	572	
TSS (mg/l)	350	
T Coli (MPN /100ml)	4900000	

F. Central Jail Drain

a. Origin

Central Jail Drain starting point coordinates is Latitude: 25°20'20.01"N & Longitude: 82°57'40.64"E.

b. End Point

Coordinates of the end point of the Central Jail Drain is Latitude: 25°20'19.73"N & Longitude: 82°57'40.50"E.

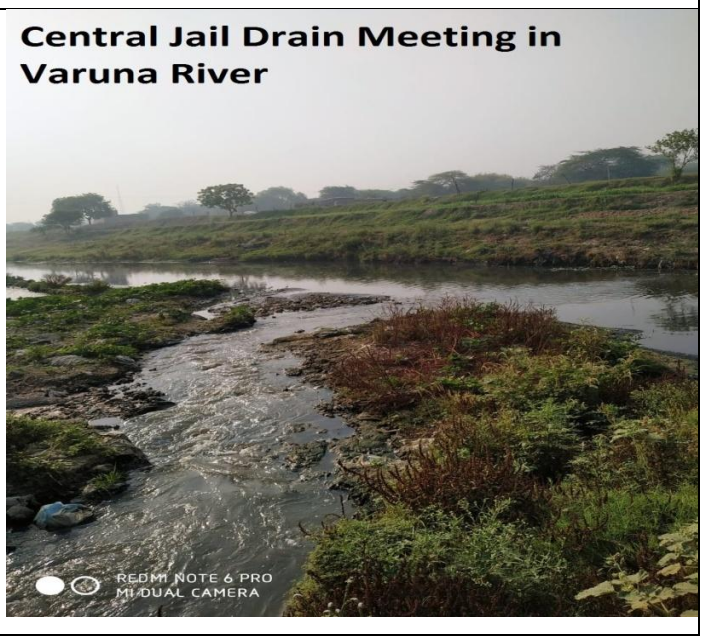
c. Length covered

Covered Distance of Central Jail Drain to meeting point of Varuna river is approx.: 0.43 km.

d. Details of discharge of the drain

Central jail drain carries domestic waste water from the habitation in the vicinity of river Varuna and the catchment area of the drain. Total Discharge from Central jail drain to River Varuna is 8.5 MLD, which is untreated sewage.

WATER QUALITY OF CONFLUENCE POINT OF CENTRAL JAIL DRAIN		
	Lat	Long
Starting Point	25°20' 20.01"N	82°57' 40.64"E
Final meeting point	25°20' 19.73"N	82°57' 40.50"E
Length of drain	0.43km	
Nature of drain	DOMESTIC	
Parameters	**Results**	
pH	7.52	
BOD (mg/l)	64	
COD (mg/l)	548	
TSS (mg/l)	382	
T Coli (MPN /100ml)	4600000	



3.2 Details of Sewage Pollution Sources

As already mentioned above, total sewage discharged into river Varuna through 14 major drains is approximately 59.7 MLD. The sewage and other effluent generated contribute to the organic load of the river. As detailed in foregoing paragraphs, approximately 49% of sewage is discharged into river Varuna in untreated state, thus contributing to bulk of the pollution load in the identified stretch of river for preparation of the Action Plan. It is further emphasised that treatment of sewage as per the prescribed standards prior to its being discharged, besides maintenance of ecological flow is an important component of the Action Plan. Details of City/Towns situated along the identified river stretch and sewage generation is shown in (Appendix – 2)

The details of Sewage Treatment Plants along with installed capacity utilized capacity, operating agency and discharge point is given in the table below:-

Details of STPs

S. No	District	Name of STP	Location		Installed Capacity (MLD)	Utilized Capacity (MLD)	Capacity Utilized (%)	Complia-nce Status (Yes /No)	Operating Govt. Agency	Discharge Drain
			Latitude	Longitude						
1	Varanasi	Goithaha	25.387703	82.998361	120	25	20.83	Yes	Jal Nigam	Local drain ultimately meeting down-stream to River Ganga
2	Varanasi	Dinapur	25.347883	83.046482	140	70	50	Yes	Jal Nigam	Local drain ultimately meeting down-stream to River Ganga
3	Varanasi	Dinapur	25.347883	83.046482	80	80	100	Yes	Jal Nigam	Local drain ultimately meeting down-stream to River Ganga
Total					**340**	**175**	**51.47%**			

Source: *Data obtained from UP Jal Nigam and Desk Inventory of UPPCB.*

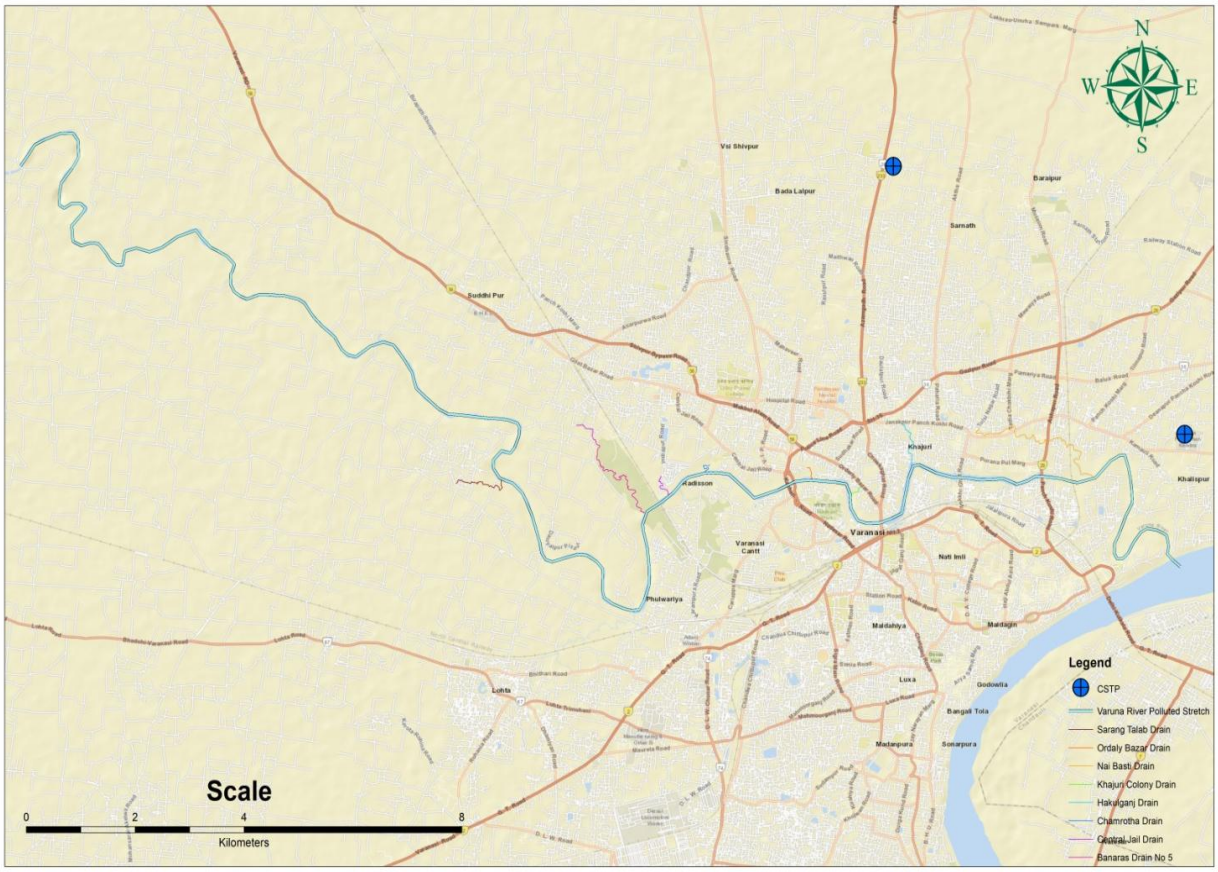


Fig : 1.5- GIS Map showing installed Sewage Treatment Plants (STPs)

The only city situated at the bank of river Varuna is Varanasi. Details of city and its population, etc. is given in **Appendix-2**

There are 6 villages located on the banks of this Priority-1 polluted stretch of river Varuna. The total population of these villages is 22605. Approximately 2.441 MLD of sewage isgenerated which needs to be treated in-situ through traditional techniques. The Panchayati Raj Department of Government of Uttar Pradesh may be given responsibility for treatment of this sewage under Rashtriya Swachhata Mission-Gramin. Details of villages, their location, population etc. is given in **Appendix – 3**

3.3 Details of wetlands

The details of wet lands situated along the identified river stretch along with their place, geographical coordinates and its distance from the river is given in the table below. These wetlands have been identified with respect to their location on the either side within the periphery of 2kms of the river.

Primary list of Wetlands

WET LANDS / WATER BODIES ALONG THE RIVER VARUNA						
S. NO.	DISTRICT	NAME OF WETLAND	LAT, LONG	DISTANCE FROM RIVER (Km)	WET LAND SIDE BY RIVER	
					LEFT	RIGHT
1	VARANASI	CHAKIYA	25°24'10.61"N 82°43'53.93"E	1 KM	YES	
2		JAGATI PUR	25°22'36.73"N 82°43'42.15"E	1.35 KM		YES
3		BAJARDIHA	25°22'57.08"N 82°44'18.50"E	0.37 KM		YES
4		HARBHAMPUR	25°22'43.02"N 82°44'1.61"E	0.89 KM		YES
5		FATEHPUR	25°24'23.73"N 82°48'58.75"E	0.05 KM		YES
6		KRISHNAPUR KALA	25°23'45.43"N 82°50'13.52"E	0.98 KM	YES	
7		KOLILPUR KHURD	25°23'33.44"N 82°51'14.29"E	0.58 KM	YES	
8		RAMESHWAR	25°22'55.34"N 82°51'15.59"E	0.55 KM		YES
9		KRISNAPUR KHURD	25°23'57.77"N 82°51'49.44"E	0.74 KM	YES	
10		CHAKKA	25°23'38.78"N 82°52'11.36"E	0.68 KM	YES	
11		KHEWALI	25°21'54.11"N 82°52'15.80"E	0.85 KM		YES
12		MANSAPUR	25°22'10.88"N 82°54'27.74"E	0.74 KM	YES	
13		BHAGTUPUR	25°22'17.01"N 82°54'10.38"E	0.43	YES	
14		GANESHPUR	25°22'4.61"N 82°55'18.95"E	1.02 KM	YES	

Gap Analysis of Sewage treatment:

The Varuna River enters from the West and circles the outer part of the Varanasi before meeting into the River Ganga at the downstream northern end. The sewage load and the population around river Varuna in comparison to overall population of Varanasi is infinitesimal. Most of the sewage generated from Varanasi is attributed to river Ganga. River Ganga from

Kannauj to Varanasi has been identified as polluted river stretch (priority 4) in the same order of Hon`ble NGT in OA No. 673/2018. A separate action plan of its rejuvenation and waste management is in process.The majority of the drains of the city directly affect Ganga and the overall role of Varuna river in the management of sewage in Varanasi is almost insignificant because of the following reasons- the amount of the sewage being directed to Varuna and geographical location coverage of varuna. Hence, a gap analysis of the sewage treatment for Varuna River is irrelevant here.

3.4 Details of Industrial pollution sources

There are 11 water polluting industries located in the catchment area of the concerned stretch of river Varuna. These industries have effluent treatment plants and their treated effluent is mainly recycled in the process and only minimal quantity of residual treatment effluent is discharged for ferti-irrigation. Only during period of excessive rainfall, there is possibility of treated effluent being utilized for irrigation flowing into river. The 11 water polluting industries are grossly polluting in nature which belong to Textile sector (10) and Galvanizing unit (1). Details of 11 Industrial Units is shown in Appendix-4 . The sector wise distribution of industries and their estimated treated effluent discharge is given below :

Summary of Industrial Units

S. No	District	Drain	Type of Industry * The Type of Industry may be changed as per local conditions								Total Effluent Discharge (MLD)
			Sugar	Pulp & Paper	Distillery	Textile	Slaughter House	Tannery	Others	Total	
1	Varanasi	Chamrotha Drain	-	-	-	09	-	-	01	10	0.095
		Hukulganj Drain				01				01	0.015
Total						**10**			**01**	**11**	**0.11**

Source:*Desk Inventory of UPPCB.*

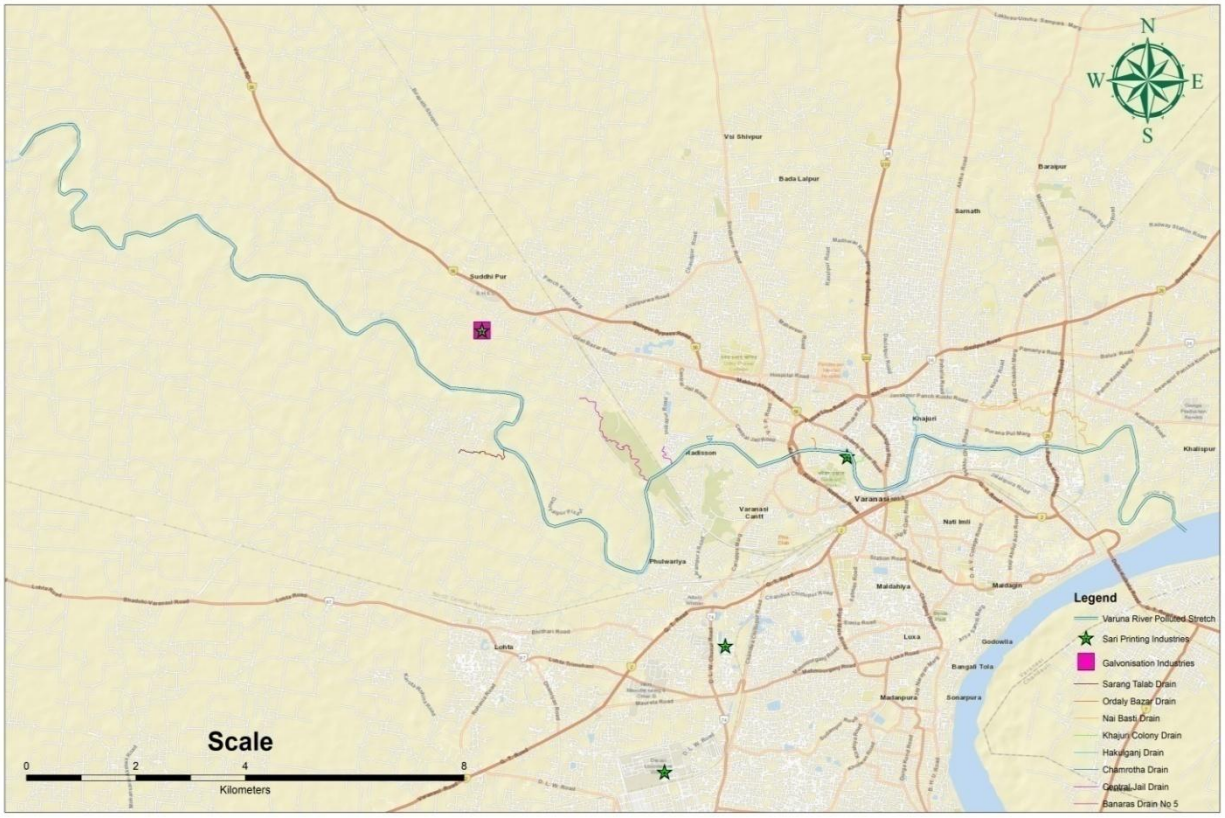


Fig : 1.6- GIS Map showing various Industries within the Polluted Stretch of River Varuna

GAP Analysis of Industries Situated in the Polluted Stretch of River Varuna

Sl. No	District	Name of Industry	Sector	Water Consump-tion (KLD)	Effluent Discharge (KLD)	Details of ETP	Gap Analysis	Remark
1	Varanasi	M/s Saurabh SareePvt.	Sari Printing	12	10	Equalization tank, Chemical Reaction tank, Primary Settling tank, Aeration tank, Secondary settling tank, Carbon filter, Sand filter, Sludge drying bed, Treated Water collection tank	Water consumption to be reduced and charter of the CPCB to be followed as per appendix 4(A)	As per CPCB charter for water recycling and pollution prevention for textile industry
2	Varanasi	M/s Devraj Prints	Sari Printing	9.6	8	Equalization tank, Chemical Reaction tank, Primary Settling tank, Aeration tank, Secondary settling tank, Carbon filter, Sand filter, Sludge drying bed, Treated Water collection tank	Water consumption to be reduced and charter of the CPCB to be followed as per appendix 4(A)	As per CPCB charter for water recycling and pollution prevention for textile industry
3	Varanasi	M/s Amarlata Prints	Sari Printing	12	10	Equalization tank, Chemical Reaction tank, Primary Settling tank, Aeration tank, Secondary settling tank, Carbon filter, Sand filter, Sludge drying bed, Treated Water collection tank	Water consumption to be reduced and charter of the CPCB to be followed as per appendix 4(A)	As per CPCB charter for water recycling and pollution prevention for textile industry
4	Varanasi	M/s Pooja Prints	Sari Printing	12	10	Equalization tank, Chemical Reaction tank, Primary Settling tank, Aeration tank, Secondary settling tank, Carbon	Water consumption to be reduced and charter of the CPCB to be	As per CPCB charter for water recycling and pollution prevention for

						filter, Sand filter, Sludge drying bed, Treated Water collection tank	followed as per appendix 4(A)	textile industry
5	Varanasi	M/s Shyam Creations	Sari Printing	12	10	Equalization tank, Chemical Reaction tank, Primary Settling tank, Aeration tank, Secondary settling tank, Carbon filter, Sand filter, Sludge drying bed, Treated Water collection tank	Water consumption to be reduced and charter of the CPCB to be followed as per appendix 4(A)	As per CPCB charter for water recycling and pollution prevention for textile industry
6	Varanasi	M/s Kala Nidhi	Sari Printing	12	10	Equalization tank, Chemical Reaction tank, Primary Settling tank, Aeration tank, Secondary settling tank, Carbon filter, Sand filter, Sludge drying bed, Treated Water collection tank	Water consumption to be reduced and charter of the CPCB to be followed as per appendix 4(A)	As per CPCB charter for water recycling and pollution prevention for textile industry
7	Varanasi	M/s Rangsan	Sari Printing	14.4	12	Equalization tank, Chemical Reaction tank, Primary Settling tank, Aeration tank, Secondary settling tank, Carbon filter, Sand filter, Sludge drying bed, Treated Water collection tank	Water consumption to be reduced and charter of the CPCB to be followed as per appendix 4(A)	As per CPCB charter for water recycling and pollution prevention for textile industry
8	Varanasi	M/s Sheetals	Sari Printing	12	10	Equalization tank, Chemical Reaction tank, Primary Settling tank, Aeration tank, Secondary settling tank, Carbon filter, Sand filter, Sludge drying bed, Treated Water collection tank	Water consumption to be reduced and charter of the CPCB to be followed as per appendix 4(A)	As per CPCB charter for water recycling and pollution prevention for textile industry

9	Varanasi	M/s Vijay Laxmi Criations	Sari Printing	18	15	Equalization tank, Chemical Reaction tank, Primary Settling tank, Aeration tank, Secondary settling tank, Carbon filter, Sand filter, Sludge drying bed, Treated Water collection tank	Water consumption to be reduced and charter of the CPCB to be followed as per appendix 4(A)	As per CPCB charter for water recycling and pollution prevention for textile industry
10	Varanasi	M/s Chitranashi	Sari Printing	12	10	Equalization tank, Chemical Reaction tank, Primary Settling tank, Aeration tank, Secondary settling tank, Carbon filter, Sand filter, Sludge drying bed, Treated Water collection tank	Water consumption to be reduced and charter of the CPCB to be followed as per appendix 4(A)	As per CPCB charter for water recycling and pollution prevention for textile industry
11	Varanasi	M/s Nike Energy	Galvani-zing	3	2	Equalization tank, Flocculation tank, Settling tank, Carbon filter, Sludge drying bed	No Gap	
Total				**129**	**107**			

Textile : - There are 10 textile /sari printing units in the catchment of polluted river stretch which consume around 126 KLD ground water & 105 KLD treated effluent is being discharged from these units. For reduction of water consumption & strengthening of Pollution control system as per charter prepared by CPCB, the action points with time line are given in **Appendix –4A.**

3.5 DETAILS OF WASTE MANAGEMENT:

3.5 (a) Municipal Solid Waste

The disposal of Solid Waste as per the provisions of Solid Waste Management Rules. 2016, is not only mandatory but essential also keeping in view the fact that any improper dumping or dumping near the river bed is bound to pollute the river water by way of leachate discharges. In Varanasi, a total around 600 TPD of solid waste isbeing generated grossly. There are 05 Solid Waste Management and Disposal Facility of 640 TPD capacity, wherein the solid waste is utilized for production of compost along with production of 200 KVA power through Waste to Energy Pilot Plant of capacity 24 TPD of solid waste. There are 03 Bio-methanization Plant of capacity 05 TPD each at BhawaniyaPokhri, PahariyaMandi, near IDH Hospital. There is one more Bio-composting Plant of capacity 01 TPD at Ramghat which uses flow waste. The gap between overall waste generated & treatment capacity available is negligible.The details of Waste Generated, Treatment Capacity and the gap between waste generated & treatment capacity is given in the tables below:

Municipal Solid Waste

S. No.	District	Name of City/ Town	Waste generated (TPD)	Type of Treatment Facility	Treatment Capacity (TPD)	Gap between waste generated & treatment capacity available (TPD)
1	Varanasi	Varanasi	600	Waste to Compost	600	Nil
				Waste to Energy	24	
				Bio-methanization	15	
				Flower to Compost	01	
Total					640	

Source: Urban Development Department, Government of Uttar Pradesh.

Details of Municipal Solid Waste Treatment Facilities

S.No.	District	Name of Facility	Type	Treatment Capacity (TPT)	Status (operational/ non-operational/ under construction)	Status of authorization from UPPCB under SWM Rules, 2016	Compliant/ non-compliant	Reason/ Remarks
1	Varanasi	Karsana Bhawaniya Pokhri, PahariyaMandi, Near IDH Hospital and Ramghat	MSW	640	Operational	No	Partially Complying	Source segregation and door to door collection of Solid Waste needs to be practiced.

There are 06 villages located on the banks of this Priority-1 polluted stretch of river Varuna. The total population of these villages is 22605 which generate 5.6 TPD of un-segregated solid waste. This un-segregated solid waste is dumped in open plots or ponds/low lying areas in the villages which contribute air and ground water pollution. Details of villages, their location, population etc. is given in **Appendix–3.** There is an open dumping site within 500 meter of river Varuna in Varanasi. The estimated quantity of legacy waste in this dumping site is approximately 30000 MT.

Details of Dumping Site 500 Meters from the edge of the River

S. No.	District	Name of Dumping site	Location		Area (Ha)	Legacy/ Current	Estimated quantity of MSW (MT)	Name of ULB/ Panchayat	Disposal Plan (Yes/No)
			Latitude	Longitude					
1	Varanasi	River Varuna (Old Bridge, Saraya), Varanasi	25⁰20` 25.5`` N	82⁰58` 51.3`` E	0.5	Legacy	30,000	Nagar Nigam	No

3.5 (b) Bio-Medical Waste

In Varanasi, total 450 Health Care Facilities have been inventorized. Total 2.112 TPD Bio-Medical Waste is generated. All the Health Care Facilities have valid agreements with 03 Common Bio Medical Waste Treatment and Disposal Facilities situated in Varanasi, Prayagraj and Ghazipur. There is no gap between the quantum of Bio-medical Waste generated and capacity of infrastructure available for safe disposal of Bio-medical Waste. The segregation of Bio-Medical Waste and disposal in the CBWTFs as per the

provisions of Bio-Medical Waste Management Rules, 2016 is a major area of concern. The mixing of Bio-Medical Waste with Municipal Solid Waste is also observed which also needs to be addressed. The details of total Health Care Facilities, Bio-medical Waste generation and treatment, details of Common Bio-medical Waste Treatment and Disposal Facilities is given in the tables below :

S. N.	District	Total No. of HCFs	Bio Medical Waste generated (TPD)	Bio Medical Waste Treated (TPD)	No. of HCFs attached with CBWTF	No. of HCFs having captive treatment facility	Gap between waste generated & treatment capacity available (TPD)	Remarks
1	Varanasi	450	2.112	2.112	450	0	NIL	There is no gap in Bio-Medical Waste Generation & Treatment.

Source: *Desk Inventory of UPPCB*

Source: *Desk Inventory of UPPCB.*

Details of Common Bio Medical Waste Treatment Facilities treating BMW of Varanasi

S. N.	Name of the CBWTF operator connect No. & Address	Total No. of HCFs Being Covered	Covered District	Treatment facility available			BMW Treatment capacity Kg/day	Number of Vehicles	Status of On Line Continuous Emission Monitoring System & Connectivity	Validity of issued Authori-zation
				Incinerator	Auto Clave	Shredder				
1	M/s Sangam Medicare , Handiya Allahabad	158	Allahabad , Varanasi, Kaushambi, Sonbhadra, Mirjapur, Jaunpur, Pratapgarh, Chitrakot	250 kg/ hr	500 ltr/ shift	400 kg/ day	4000	10 with GPS	Not Installed	19.01.2023
2	M/s Center for Pollution Control, Mohansarai, Varanasi.	488	Varanasi BhadohiJaunpur	150 kg/ hr	100 ltr/s hift	50 kg/ hr	2000	6 with GPS	Not Installed	31.12.2018
3	M/s Silicon welfare society Vill-Banka Distt-Ghazipur	130	GhazipurBaliya DevariyaAzamg arhAmedkar Nagar Varanasi Mau Chandauli	100 kg/ hr	200 ltr/s hift	150 kg/ hr	1600	7 with GPS	Installed & Connected	31.12.2019

3.5 (c) Hazardous Waste

In Varanasi, total 11 Industrial Units have been inventorized as Hazardous Waste Generating Units under the provisions of The Hazardous and Other Wastes (Management and Trans-boundary Movement) Rules, 2016. Total 0.015 TPD Hazardous Waste is generated. The Hazardous Waste is disposed of through Common Treatment, Storage and Disposal Facilities (TSDFs) situated in Kanpur Dehat. There is no gap between the quantum of Hazardous Waste generated and capacity of Common Treatment, Storage and Disposal Facilities (TSDFs). The details of total Hazardous Waste generating units, Waste generation and treatment is given in the table below:

SN	District	Name of City/ Town	No. of Waste Generating Units	Hazardous Waste Generated (TPD)	Capacity of the Facility for Treatment & Disposal of Hazardous Waste (TPD)	Specify Name & Capacity of Common H.W. TSDF	Gap between waste generated & treatment capacity available (TPD)	Remarks
1	Varanasi	Varanasi	11	0.015	TSDF	M/s Bharat Oil & Waste Management Ltd. Kumbhi, Akbarpur, Kanpur Dehat& M/s RamkyEnviro Engineers Ltd. Kumbhi, Akbarpur, Kanpur Dehat	NIL	There is no gap in Hazardous Waste Management Generation & Treatment.

Source :*Desk Inventory of UPPCB.*

3.5 (d) E-Waste

In the State, total 43 Common E- Waste Disposal Facilities are operational. Out of these, 10 units are collection centre, 18 have the facility of collection & dismantling whereas remaining 15 are collection, dismantling and recycling centres. The cumulative capacity of these plants is 264552 TPA and 10,000 Pieces/Annum. The quantum of E-Waste generated in the State is approximately 86,000 TPA. Hence there is no gap in the generation and treatment infrastructure for safe E-Waste handling as per the provisions of E-Waste Rules, 2016. The status report of E-Waste disposal facilities in the State is enclosed at Appendix-5.

4. STATUS OF GROUND WATER

The Priority-1 polluted stretch of Varuna River is from Rameshwar to Varanasi. The river flows through only 01Development Block in the districts of Varanasi. The status of Ground Water in this block is given below:

RIVER VARUNA, RAMESHWAR TO CONFLUENCE OF RIVER GANGA AT DISTRICT VARANASI
GROUND WATER STATUS

S. N.	District	Block	Pre Monsoon / Post Monsoon water level (Meters)				Status of Exploitation
			2014	Aug-15	Nov-15	Jan-16	
1	Varanasi	VARANASI	10.6	9.4	12.2	5.58	Semi-critical

Source : http://cgwb.gov.in/District_Profile/UP/Varanasi.pdf

CHEMICALS ANALYSIS DATA OF SAMPLES COLLECTED FROM GROUND WATER MONITORING WELLS IN UTTAR PRADESH 2005 -2016

S N	District	Block	pH	E.C.µ S/cm at25°C	CO_3	HCO_3	Cl	F	NO_3	SO_4	TH	Ca	Mg	Na	K
					mg/l										
1	Varanasi	Varanasi	8.15	886	ND	470	40	0.42	3.62	9	430	8	98	7.9	2.3

Source : http://cgwb.gov.in/District_Profile/UP/Varanasi.pdf

5. MONITORING OF POLLUTION SOURCES

5.1 Monitoring of Drains:

In Varanasi total 14 drains are situated in the catchment area of river Varuna. Out of these 06 drains have been tapped and diverted to STP at Dinapur and Goithaha for treatment of the waste water. Remaining 08 drains are untapped and their discharge is directly flowing into river Varuna. The regular monitoring of these 08 untapped drains is necessary for assessment of pollution load as well as planning of corrective measures. The details of drains, Latitude and Longitude of monitoring locations and the monitoring frequency are given in the table below:

Monitoring of Drains

S. N.	District	Name of Drain	Monitoring Point			Monitoring Frequency	Controlling Regional Office
			Place	Latitude	Longitude		
1	Varanasi	Chamrotha Drain	Near Kashi Ram Awas, Shivpur	25°33'89.07"N	82°96'12.55"E	Weekly	Varanasi
2	Varanasi	Central Jail Drain	Near Central Jail	25°34'22.47"N	82°96'71.1"E	Weekly	Varanasi
3	Varanasi	Banaras Drain No. 5	Near Daniyalpur Village	25°19'51.00"N	82°57'26.0"E	Weekly	Varanasi
4	Varanasi	Ordaly Bazar Drain	Near Varuna Bridge, Kachahri	25°34'15.3"N	82°98'47.52"E	Weekly	Varanasi
5	Varanasi	Khajuri Colony Drain	Near Khajuri Colony	25°34'12.35"N	82°98'92.48"E	Weekly	Varanasi
6	Varanasi	Hukulganj Drain	Near Vruna Bridge Chukaghat	25°33'73.22"N	82°99'97.82"E	Weekly	Varanasi
7	Varanasi	NaiBasti Drain	Near Varuna Bridge NakkhiGhat	25°34'19.87"N	83°00'87.15"E	Weekly	Varanasi
8	Varanasi	SarangTalab Drain	Near NakkhiGhat Bridge	25°20'23.54"N	82°55'56.14"E	Weekly	Varanasi

5.2 Monitoring of River:

The stretch of river Varuna identified for the preparation of Action Plan lies between Remeshwar and AadiKeshwarGhat. Regular Monitoring of river is necessary for assessment of water quality of the river and evaluation of impact of Action points on the river water quality. The monitoring of river Varuna at

Rameshwar and at AadiKeshwarGhat just before meeting the river Ganga is proposed on daily basis. The monitoring points, latitude and longitude, monitoring frequency are given in the table below:

S. N.	District	Monitoring Point			Monitoring Frequency	Controlling Regional Office
		Place	Latitude	Longitude		
1	Varanasi	Rameshwar	25°23'15.57"N	82°51'15.39"E	Daily	Varanasi
2	Varanasi	AadiKeshwarGhat	25°19'47.87"N	83°02'37.42"E	Daily	Varanasi

5.3 Monitoring of Water Polluting Industries:

All the water polluting industries will be monitored regularly by 03 agencies namely UPPCB, District Ganga Committee/ZilaParyavaranSamiti and Third Party Institutions of repute. GPIs will be monitored quarterly and other industries will be monitored randomly by District Ganga Committee/ZilaParyavaranSamiti. Third Party Institutions shall also be entrusted with the responsibility of comprehensive monitoring by CPCB and NMCG. Besides this the drive for identification and closure of illegal industries operating in non-conforming areas shall also be carried out by District Ganga Committees/ZilaParyavaranSamitis with appropriate Magisterial and Police support.

5.4 Establishment of river Varuna Pollution Control Room

A Control Room for monitoring and centralized reporting of various pollution sources shall be established in Varanasi with appropriate infrastructure and human resource. This control room will be under overall supervision of Commissioner, Varanasi and will be run by UP Pollution Control Board with the help of District Ganga Committees/ZilaParyavaranSamitis. For monitoring purpose, District Ganga Committees/ZilaParyavaranSamitis will be employing JRFs/Monitoring Assistants on contractual basis with the financial support of District Ganga Committees/ZilaParyavaranSamitis. Educational/Technical Institutions and Colleges will also be identified for taking their help in monitoring and remediation of pollution sources. Capacity building for monitoring of pollution sources of the students of such identified institutions and colleges will also be done by Pollution Control Board. The Control Room with adequate infrastructure viz. LED Monitor, Desktop, Printer, Wi-Fi facility, Room rent including electricity charges etc. shall be

established by UP Pollution Control Board with financial support from National Mission for Clean Ganga (NMCG). The monitoring will be done from the Control Room with the help of Web Portal on which monitoring data from field shall be uploaded. The Web Portal will be developed by UP Pollution Control Board and login ID and Password will be provided to District Ganga Committees/Zila ParyavaranSamitis for access to the portal and uploading of monitoring data of various pollution sources.

6. POLLUTED RIVER STRETCH REJUVENATION PLAN

S. N.	Action Point	Time line	Implementing Department/ Agency	Remark
A.	**SEWAGE MANAGEMENT**			
	(a) Short Term Action Point			
1	Estimation of total sewage generation from City/Towns where sewage treatment facility does not exist and preparation of DPR for treatment of sewage to be sent to NMCG	02 Months	U.P. Jal Nigam & Concerned ULBs	
2	Measurement of flow & load of all the drains contributing pollution load in River Varuna	02 Month	U.P. Jal Nigam & Concerned ULBs	
3	Installation of Bar-meshes in the drains & regular cleaning & disposal of Solid Waste from them	03 Months	Concerned ULBs	The ULBs will ensure compliance in the prescribed time line as informed by Urban Development Department.
4	Untapped drains to be provided with modular treatment facilities/ In-Situ bio-remediation or **Phytorid-SWAB (CSIR-NEERI) based treatment**	06 to 09 Months	U.P. Jal Nigam & Concerned ULBs	TheULBs/Urban Development Department will ensure compliance in the prescribed time line as informed by Urban Development Department.
5	Completion and commissioning of under construction STPs	06 Month	U.P. Jal Nigam/ Govt. working Agencies	
6	Formulation of Action Plan for long term use of treated water discharged from STPs	03 Months	U.P. Jal Nigam, Irrigation & Concerned ULBs in consultation with UPPCB/CPCB	
7	Installation of Web Cams & OCEEMS in STPs	02 Month	U.P. Jal Nigam/ Operating Govt. Agencies	

S. N.	Action Point	Time line	Implementing Department/ Agency	Remark
8	Formulation of Action Plan for income generation of STPs including installation of Solar Power Plants, Energy Plantation & sale of sludge and treated water etc.	02 Months	U.P. Jal Nigam & ULBs	
9	Obtaining Consent to Operate/Establish and Hazardous Authorization from UPPCB	02 Month	U.P. Jal Nigam/ Operating Govt. Agencies	
10	Preparation of DPR for channelization including diversion of sewage generated from household / township / villages to sewer lines and interception of all drains (excluding drains carrying industrial wastewater) for ensuring proper treatment through upcoming STPs.	Within 3 Months	Jal Nigam / Nagar Nigam, Concerned Districts	
11	Septage Management in the areas where sewerage network does not exist	Within 06Months	ULBs/Jal Nigam	The ULBs will ensure compliance in the prescribed time line as informed by Urban Development Department.
	(b) Long Term Action Point			
1	Laying of Sewerage Network & Connection of households to the sewer line in order to utilize the installed capacity of existing STPs	12 Months from sanction of DPR	U.P. Jal Nigam & Concerned ULBs	Timeline to be checked by the implementing department/agency on the basis of preparation of DPR & funding. If funding is not available then possible sources of funding along with Executive Summary to be enclosed.
2	Establishment of Sewage Treatment Plants of adequate capacity for the treatment of total sewage generated		U.P. Jal Nigam & Concerned ULBs	140 MLD STP at Dinapur is already constructed & functional. Interception & diversion work is under progress.
3	Tapping and diversion of all the drains to the related Sewage Treatment Plant for treatment based on prepared DPR	06 Months	U.P. Jal Nigam & U.P. Irrigation Department	The construction of interception sewer line along Varuna River by U.P. Irrigation Department is under progress. This interception sewer line will be connected to SPS at Chowkaghat. After this connection all the 08 untapped drains will be tapped & their discharge will be sent to Dinapur 140 MLD STP. Funds are available with both the agencies for this work.

S. N.	Action Point	Time line	Implementing Department/ Agency	Remark
4	Infrastructure development for use of treated sewage in irrigation/horticulture from functional STPs.	12 Months from sanction of DPR	U.P. Jal Nigam & Concerned ULBs	Timeline to be checked by the implementing department/agency on the basis of preparation of DPR & funding. If funding is not available then possible sources of funding along with Executive Summary to be enclosed.
5	Installation of Solar Power Plant & Energy Plantations in the vacant land of STPs	12 Months after sanctioned of DPR	U.P. Jal Nigam/ Operating Govt. Agencies	Timeline to be checked by the implementing department/agency on the basis of preparation of DPR & funding. If funding is not available then possible sources of funding along with Executive Summary to be enclosed.
6	Installation of supplementary/tertiary treatment system in existing STPs which are not able to achieve discharge norms in the present system	12 Months	U.P. Jal Nigam & Concerned ULBs	
7	Treatment of waste water in Rural areas flowing into the river by Bio-remediation/Phyto-remediation/Oxidation Pond etc.	12 Months	Gram Panchayat, Panchayati Raj, Rural Development Departments, RastriyaSwachta Mission-Gramin	The financial resources may be arranged from MNREGA/Swachh Bharat Mission – Gramin
8	Ensuring ODF in all the villages situated along the river	12 Months	Gram Panchayat, Panchayati Raj, Rural Development Departments, RastriyaSwachta Mission-Gramin	
9	Channelization including diversion of sewage generated from household / township / villages to sewer lines and interception of all drains for ensuring proper treatment through upcoming STPs or use of innovative technology like**Phytorid-SWAB (CSIR-NEERI).**	24 Months	U.P. Jal Nigam/ Nagar PalikaParishad&Jila Panchayat	
B.	**INDUSTRIAL WASTE MANAGEMENT**			
	(a) Short Term Action Point			
1	Re-inventorisation of Water Polluting Industries in the catchment area of the drains and their status with respect to consent, installation of ETP, adequacy of ETP and final discharge point	03 Months	UPPCB, UPSIDC, ULBs & Department of Industries	
2	Monitoring of water polluting industries and ensuring closure of industries which are operating without consent or non-compliant	Quart-erly	UPPCB & CPCB	

S. N.	Action Point	Time line	Implementing Department/ Agency	Remark
3	Installation of OCEEMS, Flow Meter & Web Cams in large and medium category of GPIs with connectivity to the server of CPCB and UPPCB	03 Months	UPPCB	
4	Closure and legal action against the illegal water polluting industries operating in non-confirming /residential areas	Regular activity	District Level Inter-Departmental Enforcement Committee having representatives of Administration, Police, UPPCB, ULBs, Development Authority, Power Corporation, Department of Industries etc.	
	(b) Long Term Action Point			
1	Adoption of cleaner technologies by water polluting industrial sectors having major impact on water quality of the river. for ex. – Electroplating, Dyeing, Pulp & Paper industries etc.	24 Months	UPPCB, CPCB & Department of Industries	
2	Imposing stringent norms in Distillery, Pulp & Paper, Slaughter House & Tannery sectors	24 Months	Departments of Environment, Industries, Excise & UPPCB	
3	Reducing abstraction of ground water by reuse/recycle of treated effluent by installation of additional treatment facilities & process improvement	12 Months	CGWA, CPCB, Department of Industries & UPPCB	
4	Use of treated effluent from CETPs for industrial and irrigation purposes	12 Months	Department of Industries, SPVs, Operating Agencies, UPPCB & CPCB	
5	Actions related to improvement of ETPs and reduction of use of ground water by the industries	6-24 Months	Department of Industries, UPPCB & CPCB	
C.	**SOLID WASTE & FLOOD PRONE ZONE MANAGEMENT**			
	(a) Short Term Action Point			
1	Strictly ensuring prohibition of dumping of solid & other waste within 500 Meters of the banks of the river	Immediate	ULBs, Gram Panchayats, Development Authorities & Urban Development Department	

S. N.	Action Point	Time line	Implementing Department/ Agency	Remark
2	Collection & Segregation of Solid Waste as per the provision of SWM Rules, 2016	12 Months	ULBs, Gram Panchayats, Development Authorities & Urban Development Department	
3	Disposal of Recyclable waste through registered recyclers	09 Months	ULBs, Gram Panchayats, Development Authorities & Urban Development Department	
4	Compliance of SWM Rules, 2016 by bulk generators (onsite bio-composting, disposal of recyclable waste through registered recyclers)	04 Months	ULBs, Development Authorities, Railways, Transport Corporation, Mandi Parishad, Cantonment Board, Educational Institution, RWAs & Urban Development Department etc.	As per the Action Plan submitted by Department of Urban Development, UP **(Appendix – 6)**
5	Up gradation& operation of existing non-operational & non-complying Solid Waste Treatment Facilities as per prescribed norms	12 Months	ULBs, Development Authorities & Urban Development Department	
6	Compliance of C&D Waste Management Rules, 2016 & prohibition of illegal dumping of C&D waste	09 Months	ULBs, Development Authorities & Urban Development Department	
7	Installation of Web Cams in Solid Waste & C&D Waste Treatment & Disposal Facilities with open access to UPPCB & CPCB server connectivity	Within 03 Month of operation	ULBs, Development Authorities	
8	Formulation of Action Plan for income generation of Solid Waste & C&D Waste Treatment & Disposal Facilities including installation of Solar Power Plants, Energy Plantation & sale of RDF, compost etc.	02 Months	ULBs, Development Authorities & Urban Development Department	

S. N.	Action Point	Time line	Implementing Department/ Agency	Remark
9	Obtaining Consent to Operate/Establish and Authorization from UPPCB	02 Months	ULBs, Development Authorities, Urban Development Department & UPPCB & CPCB	
10	Ensuring idol immersion in environmental friendly manner by creation of artificial ponds with proper lining & proper disposal of sludge & effluent	Immediate	ULBs, Development Authorities &District Administration	
11	Ensure strict prohibition of encroachments & illegal constructions in FPZ	Immediate	Irrigation, ULBs, Development Authorities, District Administration & Police	
12	Removal of solid waste & algal growth disposed in the river by use of low cost innovative techniques with involvement of local community	06 Months	ULBs, Gram Panchayat, Development Authorities &Irrigation	
	(b) Long Term Action Point			
1	Establishment of new solid waste & C&D treatment & disposal facilities against the gap with respect to generation of solid waste	24 Months after sanction of DPR	ULBs, Development Authorities & Urban Development Department	Budget is available for Nagar Nigams as informed by Urban Development Department, U.P.
2	Treatment & disposal of legacy waste dumped within 500 meters of the bank of the River	24 Months after sanction of DPR	ULBs, Development Authorities & Urban Development Department	Budget is available for Nagar Nigams as informed by Urban Development Department, U.P.
3	Construction of electric/fuel efficient crematorium to stop disposal of un-burnt/ semi burnt corpses in the river	24 Months	ULBs, Development Authorities & Urban Development Department	Budget is available for Nagar Nigams as informed by Urban Development Department, U.P.
4	Demarcation & notification of FPZ	24 Months	Irrigation Department	
5	Removal of illegal encroachments & constructions from FPZ	24 Months	Irrigation Department, Administration & Police	
D. ECOLOGICAL FLOW & GROUND WATER MANAGEMENT				
	(a) Short Term Action Point			

S. N.	Action Point	Time line	Implementing Department/ Agency	Remark
1	Identification, inventorization & geo referencing of wetlands/water bodies including their zone of influence & catchment areas within 2 Km of the river	03 Months	State Wetland Authority, Forest & Wildlife, Panchayati Raj, Revenue Department, ULBs & Gram Panchayats	
2	Identification & geo referencing of vacant lands in the vicinity of the river for development of bio-diversity parks & forest areas	03 Months	Forest & Wildlife, Panchayati Raj, Revenue Department, ULBs & Gram Panchayats	
3	Identification of external water sources like canal escapes etc. for addition of water in the river	03 Months	Irrigation Department	Only surplus water after fulfilling irrigation demands will be provided to near by rivers through canal escapes.
4	Prohibition of illegal mining & diversion of river stream	Regular Activity	District Administration, Mining Department & Irrigation Department	Only diversion of river stream would be reported to District authorities in non mansoon period by concerned district irrigation officers.
5	Ensuring rain water harvesting/recharging structures & construction of water harvesting structures	Regular Activity	Mining, Irrigation, Rural Development & Minor Irrigation Department	Possible funding may be arranged through MNREGA and Central assistance by NMCG.
	(b) Long Term Action Point			
1	Notification of E-flow of the River	12 Mont	Irrigation Department, MoWR	
2	Ecological restoration of the wetlands including plantation in the catchment area & development of community based eco-tourism in the wetland	24 Months from sanction of DPR	State Wetland Authority, Forest & Wildlife Department Tourism Department & National Mission for Clean Ganga	
3	Development of Bio-diversity Parks and Riverine Forests by plantation & re-generation of native species of trees, grasses & herbs	24 Months from	State Wetland Authority, Forest & Wildlife Department & National Mission for Clean Ganga	Funds may be arranged from NMCG.
4	Adoption of good irrigation practices to minimize the water consumption through awareness & support to the farmers	12 Months	Agriculture Department, Rural Development	
5	Removal of encroachment from wetlands, ponds & their restoration	24 Months	Revenue, Administration, Panchayati Raj Department, ULBs & Gram Panchayats	

S. N.	Action Point	Time line	Implementing Department/ Agency	Remark
6	Connecting the river with fresh water source like canal for restoration of E-flow	24 Months	Irrigation Department	Only surplus water after fulfilling irrigation demands will be provided to nearby rivers through canal escapes.
E. MONITORING & EVALUATION				
(a) Short Term Action Point				
1	Daily Monitoring of river water quality at the upstream & downstream of cities & meeting points of the major drains	Regular Activity	UPPCB, District Ganga Committee/ District Environment Committee	
2	Weekly monitoring of drains, STPs & CETPs	Regular Activity	UPPCB, District Ganga Committee/ District Environment Committee	
3	Monitoring of water polluting industries	Quarterly	UPPCB, District Ganga Committee/ District Environment Committee	
4	Monitoring of ground water quality within 500 meters of the rivers & drains	Quarterly	UPPCB, CGWA, CPCB & District Ganga Committee/ District Environment Committee	
5	Pre-monsoon & post-monsoon monitoring of ground water level	Regular Activity	CGWA & Directorate of Ground Water	
6	Measurement of River flow as per the protocol	Regular	Irrigation Department & District Ganga Committee/ District Environment Committee	Annual flow discharge data of river .
7	Project formulation & funding including recurring expenses for employment of JRFs/Monitoring Assistants/Field Assistants, purchase of kits &equipments, vehicle on rental basis, development of Web Portal & establishment of Control Room, purchase of desktop computers, printers/ LED Monitor etc.	02 Months	UPPCB, District Ganga Committee/ District Environment Committee, SMCG & NMCG	
8	Development of Web Portal for reporting & centralized monitoring of water quality of the river & drains and action points with access to all concern stakeholders departments/agencies responsible for implementation of the action plan	Regular	UPPCB, NMCG & CPCB	
9	Establishment of Regional Control Rooms at District/ Division Level for monitoring & uploading of data related to monitoring of water quality & compliance of action points with its integration to the State Level Control Room	04 Months	UPPCB, District Ganga Committee/ District Environment Committee	

APPENDICES

Appendix-1

Pollution Source Mapping of River Varuna (RameshwarGhat to Varanasi)

S. N.	District	Name of Drain	Meeting Point of Drain		Domestic/ Industrial/ Mixed	Tapped/ Untapped/ Partially Tapped	Industries		Sewage Discharge (MLD) *			No. of Barmesh
			Latitude	Longitude			Number	Treated Effluent (MLD)	Treated	Untreated	Total	
1	Varanasi	Phulwariya Drain	25°32'7.13"N	83°35'55.28"E	Domestic	Tapped (STP Dinapur)	NA	NA	2.8	0.0	2.8	01
2	Varanasi	Sadar Bazar Drain	25°33'81.93"N	82°97'56.4"E	Domestic	Tapped (STP Dinapur)	NA	NA	2.0	0.0	2.0	01
3	Varanasi	Raja Bazar Drain	25°33'5.91 " N	82°99'14.08"E	Domestic	Tapped (STP Dinapur)	NA	NA	0.1	0.0	0.1	01
4	Varanasi	Teliyabag Drain	25°33'48.54"N	82°99'74.43"E	Domestic	Tapped (STP Dinapur)	NA	NA	18.0	0.0	18.0	01
5	Varanasi	Nakkhighat Drain	25°34'1.06"N	83°0'89.22"E	Domestic	Tapped (STP Dinapur)	NA	NA	0.1	0.0	0.1	01
6	Varanasi	Central Jail Drain	25°34'22.47"N	82°96'71.1"E	Domestic	Untapped	NA	NA	0.0	8.5	8.5	Nil
7	Varanasi	SarangTalab Drain	25°20'23.54"N	82°55'56.14"E	Domestic	Tapped (STP Dinapur)	NA	NA	1.5	0.0	1.5	01
8	Varanasi	Ordaly Bazar Drain	25°34'15.3"N	82°98'47.52"E	Domestic	Untapped	NA	NA	0.0	7.0	7.0	Nil
9	Varanasi	Chamrotha Drain	25°33'89.07"N	82°96'12.55"E	Mixed	Untapped	10	0.095	0.0	1.5	1.5	Nil
10	Varanasi	Khajuri Colony Drain	25°34'12.35"N	82°98'92.48"E	Domestic	Untapped	NA	NA	0.0	1.5	1.5	Nil
11	Varanasi	Banaras Drain No. 5	25°19'51.00"N	82°57'26.0"E	Domestic	Untapped	NA	NA	0.0	1.0	1.0	Nil

12	Varanasi	Hukulganj Drain	25°33'73.22"N	82°99'97.82"E	Mixed	Untapped	01	0.015	0.0	3.5	3.5	Nil
13	Varanasi	NaiBasti Drain	25°34'19.87"N	83°00'87.15"E	Domestic	Untapped	NA	NA	0.0	4.7	4.7	Nil
14	Varanasi	Narokhar Drain	25°20'19.78"N	82°57'40.15"E	Domestic	Tapped (STP Dinapur)	NA	NA	7.5	0.0	7.5	01
	Total						**11**	**0.11**	**32**	**27.7**	**59.7**	

**** Discharge Data provided by U.P. Jal Nigam, Varanasi.***

Note :-

In Varanasi, Total 14 Drains exists in the catchment area of River Varuna, carrying total sewage flow of 59.7 MLD. Out of these 06 Drains having sewage flow of 30.5 MLD have been tapped & remaining 08 Drains are untapped contributing discharge of 29.2 MLD into River Varuna in untreated state. Hence the gap between total sewage and tapped flow is 30.5 MLD for which the work of tapping & diversion of these 08 Drains into STP is in progress.

Appendix-2

Details of Cities & Towns

S.No.	District	Name of City/ Town	Population (Census 2011)	Estimated Sewage generation (year 2011) MLD	Population * (Year 2019) based upon U.P. Jal Nigam Information	Estimated Sewage generation (year 2019) MLD
1	Varanasi	Varanasi	11,98,491	180.0	17,93,772	269.78

* Source of information https://www.census2011.co.in

Appendix-3

Details of Gram Panchayats& Revenue Villages on the banks of River Varuna

VILLAGE SITUATED ALONG THE RIVER KALI RIVER LEFT BANK										
S. No.	District	Name of village	LAT	LONG	Distance (Km)	Population (2011)	Decadal growth rate (%)	Estimated population (2019)	Sewage Generation (MLD)	Estimated MSW (Kg/day)
1	Varanasi	Pargaspur	25°23' 41.96"N	82°37' 43.94"E	0.18	3,000	17.15	3412	0.368	**852.900**
2	Varanasi	Kohiripur Kala	25°23' 23.03"N	82°50' 41.12"E	0.05	236	17.15	268	0.029	**67.095**
3	Varanasi	Chilbila	25°23' 15.76"N	82°47' 53.89"E	0.27	3,656	17.15	4158	0.449	**1039.401**
4	Varanasi	Kudi	25°24' 9.39"N	82°48' 33.29"E	0.12	7,885	17.15	8967	0.968	**2241.706**
5	Varanasi	Rameshwar	25°23' 14.02"N	82°51' 16.97"E	0.05	1,749	17.15	1989	0.215	**497.241**
6	Varanasi	Khewali	25°22' 20.70"N	82°52' 9.62"E	0.07	3,352	17.15	3812	0.412	**952.974**
					Total	**19878**		**22605**	**2.441**	**5651.315**

* Source of information https://www.census2011.co.in;

 # Source of information Swachh Bharat Mission–Gramin (Uttar Pradesh) Ministry of DrinkingWater and Sanitation, Govt. of India

Appendix-4

Details of Industries

S. N.	District	Name and Address	Location		Type	Treatment Mechanism (ETP/CETP)	Effluent Discharge (KLD)
			Latitude	Longitude			
1	Varanasi	M/s SaurabhSareePvt. Ltd. S-17/3 C-4 Krishna Nagar Colony, Pahariya, Varanasi	25.31	82.97	Sari Printing	ETP Installed	10 KLD
2	Varanasi	M/s Devraj Prints S-15/243 Shamsher Singh Compount, Shivpur, Varanasi	25.34	82.99	Sari Printing	ETP Installed	8 KLD
3	Varanasi	M/s Amarlata Prints S-15/243 Shamsher Singh Compound, Shivpur, Varanasi	25.34	82.99	Sari Printing	ETP Installed	10 KLD
4	Varanasi	M/s Pooja Prints S-15/243 Shamsher Singh Compount, Shivpur, Varanasi	25.34	82.99	Sari Printing	ETP Installed	10 KLD
5	Varanasi	M/s Shyam Creations S-15/243 Shamsher Singh Compount, Shivpur, Varanasi	25.29	82.96	Sari Printing	ETP Installed	10 KLD
6	Varanasi	M/s Kala Nidhi S-15/243 Shamsher Singh Compount, Shivpur, Varanasi	25.34	82.99	Sari Printing	ETP Installed	10 KLD
7	Varanasi	M/s RangsanShamsher Singh Compount, Shivpur, Varanasi	25.36	82.93	Sari Printing	ETP Installed	12 KLD
8	Varanasi	M/s Sheetals S-15/243 Shamsher Singh Compount, Shivpur, Varanasi	25.34	82.99	Sari Printing	ETP Installed	10 KLD (At present Closed)
9	Varanasi	M/s Vijay LaxmiCriations J-13/93 Cotton Mill Compound, Chaukaghat, Varanasi	25.02	83.17	Sari Printing	ETP Installed	15 KLD
10	Varanasi	M/s Chitranashi S-15/243, Shivpur, Varanasi	25.34	82.99	Sari Printing	ETP Installed	10 KLD
11	Varanasi	M/s Nike Energy, Tarna, Varanasi	25.36	82.93	Galvanizing	ETP Installed	2 KLD

Source : Desk Inventory of UPPCB.

Appendix 4A

Action Points for Textile Industries

Central Pollution Control Board has released a document titled "Charter for Water Recycling & Pollution Prevention For Textile Industry".

The Textile unit shall take timebound steps as detailed below for fulfilling the existing gaps with reference to water consumption & discharge of effluent, effluent treatment infrastructure etc. as below with timeline for upgrading the Effluent Treatment Plant –

S.No.	Objective	Action Point	Timeline
1.	Water Consumption	Reduce Water consumption by 20 % per kg of product by Completing upgradation of ETP.	31-12-2019
2.	Water Consumption	Reduce Water consumption by 15 % in addition to last years 20 % per kg of product by Completing upgradation of ETP by adding tertiary treatment units.	31-12-2020
3.	Water Consumption	Confirmation of 30 % Water Recycle against total input (in other words water consumption per kg should be reduced by 30 % minimum)	Beyond 31-12-2020
4.	Monitoring of Water Consumption	Installation of sealed flow meter and running hours meter on bore wells and inlet pipeline of different process section.	01 Month
5.	Colour coding of pipe lines	Colour coding of pipe lines carrying recycled process water and fresh process water	06 Months
6.	Self-Assessment of ETP adequacy	Preperation of ETP adequacy assessment report	01 Month
7.	Ìnstallation of sealed flow metering system	Ìnstallation of sealed flow metering system along with running hours at the inlet water source (Borewell or other sources) and outlet and at inlet pipeline of different process operation and outlet of ETP	30-06-2019
8.	Setting up of Online Effluent Monitoring System	Setting up of Online Effluent Monitoring System to Monitor final outlet discharge, units connected to CETPs can have Common System Installed at CETP discharge	06 Months

Apendix-5

Status of E-Waste Management

Status of E-waste Recycling / Collection / Generation Units inthe State of U.P.
(As on 09.10.2018)

S. N.	Name & Address of Unit	Regional Office	Status of Authorisation	Status of Registration & Validity	Type	Capacity (TPA)
1	M/s Auctus -E Recycling Solutions Pvt. Ltd., F-637, M.G. Road, Industrial Area, Ghaziabad.	Ghaziabad	Grant	Registered 30.08.2019	Collection, Dismantle	1800
2	M/s Mahaluxmi Metal Alloys (India) Pvt. Ltd., Modinagar, Ghaziabad.	Ghaziabad	Grant	Registered 22.05.2023	Collection, Dismantle, Recyclers	30000
3	M/s N.K. Products, 58-59, M.G. Road, Ghaziabad.	Ghaziabad	Refused	Registered 22.06.2016	Collection, Dismental	9000
4	M/s Bharat Oil Co., E-18, Site-IV, Sahibabad, Industrial Area, Ghaziabad.	Ghaziabad	Grant	Registered 16-05-18	Collection, Dismental	4000
5	M/s Planet Green Recycling Pvt. Ltd., G-129, Phase -1, M.G. Road, Ghaziabad.	Ghaziabad	Grant	Registered 23.08.2018	Collection, Dismental, Recyclers	1500
6	M/s Rocket Sales, Plot No. 1-12, I/A, M.G. Raod, Hapur.	Ghaziabad	Grant	Registered 27.08.2019	Collection,, Dismental	300
7	M/s Arsh Recycling Pvt. Ltd., Plot No. 203, UPSDIC, I/A, M.G. Road, Ghaziabad.	Ghaziabad	Grant	Registered 20.06.2023	Collection, Dismental, Recycling,	15000
8	M/s Auctus Recycling Solutions Pvt. Ltd.Habibpur, Greater Noida.	Greater Noida	Grant	Registered 06.12.2021	Dismental, Callection	19500
9	M/s Khan Traders, B-5, site4, Panki Industrial Area,	Kanpur	Grant	Registered	Collection,	7190

S. N.	Name & Address of Unit	Regional Office	Status of Authorisation	Status of Registration & Validity	Type	Capacity (TPA)
	Kanpur.			15-11-2020	Dismental	
10	M/s Green Tech Rcycling, Khasra No.-645, Acchraunds, Bahdaurpur Road, Partapur, Meerut .	Meerut	Grant	Registered 12.01.2022	Collection, Dismantling,	1800
11	M/s Narora Atomic Power Station, Narora, Bulandshahar.	Bulandshahar	Not Applied	_	Collection' Dismantling, & Recycling	10
12	M/s Metal Alloys, E-46, Industrial Area, Ramnagar, Varanasi	Varanasi	Grant	Registered 31-05-2019	Collection	1825
13	M/s Comwen Information Technologies Pvt.Ltd., 127/35B, ChakRagunath, Naini, Allahabad.	Allahabad	Grant	Registered 11-08-2017	Collection	300
14	M/s DasiaECo E-Waste Recyclers E-160 Industrial area, Khalilabad, SantKabairnagar.	Basti	Grant	Registered 31-12-2017	Collection, Dismantling,	720
15	M/s Sims Recycling Solutions Plot no.1 UdyogKendraIIEcotech-III Greater Noida.	Greater Noida	Grant	Registered 31.12.2019	Collection, Dismantling, Recycling	1250
16	M/s J.A.O. E-Waste Recycling Co, Vill- Jaitpur,Distt-Moradabad.	Moradabad	Grant	Registered 23.11.2020	Collection	3001
17	M/s HIN Green E-waste Recycling (P) Ltd, B-19/1, Summer Garden Colony, Meerut.	Meerut	Grant	Registered 12.04.2018	Collection, Dismental,	750
18	M/s S.R. Metcast India (P) Ltd 11.8 Km.Agra Mathura Road, Agra.	Agra	Grant	Registered 02.08.2022	Collection	600
19	M/s K.M. Metals Suppliers 9/270,271,Mathura Agra.	Agra	Not Applied	_	Collection	5000
20	M/s Prakash Metal House 39/223, KarwanLohamandi,Agra.	Agra	Grant	Registered 02.05.2023	Collection	1500

S. N.	Name & Address of Unit	Regional Office	Status of Authorisation	Status of Registration & Validity	Type	Capacity (TPA)
21	M/s Shree MahaveerJi Trading Company, 30/127, Chippitala, Agra.	Agra	Not Applied	Reject	Collection	4500
22	M/s E-Waste Recyclers India E-50, UPSIDC Industrial area, NH-2 Kosikalan, Mahura.	Mathura	Grant	Registered 01.03.2022	Collection, Dismantle	6000
23	M/s Supar Trading Company, Plot No.-3 Govt. Industrial Estate, Talkatora Road, Lucknow.	Lucknow	Not Applied	Registered 03.04.2016	Collection	365
24	M/s V.R. Techno Enviro Services pvt.ltd. khasra No. 440, indiraPriyedarshni ward, jarhra Indira Nagar, Lucknow.	Lucknow	Not Applied	Registered 09.04.2016	Collection, Dismantle	365
25	M/s Sachin enterprises,84/1,Plot no.34-35 Fazalganj, Kanpur.	Kanpur	Grant	Registered One Time	Collection	5000 Pieces Per **Annum**
26	M/s Gandhi Traders, 91/103, Dalelpurwa, Kanpur.	Kanpur	Grant	Registered 04.06.2018	Collection	5000 Pieces Per **Annum**
27	M/s Greezon Recycling Pvt. Ltd., R 30, UPSIDC, Industrial Area, Sikandrabad, Bulandshahar.	Bulandshahar	Grant	Registered 27.08.2022	Collection Dismantling, Recycling	16.5
28	M/s Sachin Enterprises, 123/751, block-T 74 pratapganjGadariyanPurwa, Fazalgang, Kanpur.	Kanpur	Grant	Registered 16.11.2022	Collection, Dismantling, Refurbishing	2500
29	M/s Greeniva Recycler Pvt. Ltd., Plot No. G-284, M.G. Road, Industrial Area, Hapur.	Hapur	Grant	Registered 18.06.2019	Collection, Dismantling, Recycling.	1500
30	M/s S. Malik Traders, Plot No.-93, 94 Vill-BudheraJahidpur, Meerut.	Meerut	Grant	Registered 12.01.2022	Collection, Dismantling,	365

S. N.	Name & Address of Unit	Regional Office	Status of Authorisation	Status of Registration & Validity	Type	Capacity (TPA)
31	M/s Royal Faiz Recycling (p) Ltd. , I-22, I.A. M.G. Road, Hapur.	Ghaziabad	Grant	Registered 29.01.2023	Collection, Dismantling,Recycling	12000
32	M/s 3 C Recycler, F-326, I/A, M.G. Road, Hapur.	Ghaziabad	Grant	Registered 31.12.2022	Collection, Dismantling,Recycling	9000
33	M/s Life E- Recycling (P) Ltd., F- 435, UPSIDC I/A, M.G. Road, Hapur.	Ghaziabad	Grant	Registered 05.06.2023	Collection, Dismantling,	9000
34	M/s Hind Recycling (P) Ltd., Plot No. F-203, M.G. Road, Hapur.	Ghaziabad	Grant	Registered 01.03.2022	Collection, Dismantling,	9000
35	M/s Hayat Recycler, F-53, 54, I/A, M.G. Road, Hapur.	Ghaziabad	Grant	Registered 21.06.2023	Collection, Dismantling, Recycling	15000
36	M/s B.R.P. Infotech Private Limited, F-394, Phase-I, M.G.Road, Industrial Area, Hapur	Hapur	Grant	Registered 28.06.2023	Recycling, Dismantling, Segregation, Collection	9000 MT/Year
37	M/s Sky Green Waste Recycling Managememt , Khasra No.- 174, AlipurJijmana, Meerut, U.P.	Meerut	Grant	Registered 20.12.2023	Dismantling, Recycling	5475 MT/Y 4500 MT/A
38	M/s Swachh Bharat Recycling Company, Gali-N0-4, 2083, SaipuramInsutrial Area, Delhi Road, Meerut, U.P.	Meerut	Grant	Registered 08.05.2023	Recycling	4800 MT/A
39	M/s RudraInterprises, Plot No. A- 96, Sector-A-4, Tronica City, Loni, Ghaziabad	Ghaziabad	Grant	Registered 03.05.2023	Disposal & Dismantling	500 MT/Month

S. N.	Name & Address of Unit	Regional Office	Status of Authorisation	Status of Registration & Validity	Type	Capacity (TPA)
40	M/s Avgree Recycling Pvt. Ltd. KH No. 549, Vill.-Tiyala, Meerut- Bulandshahar Road, Hapur Bypass, Hapur	Ghaziabad	Grant	Registered 10.09.2023	Dismantling & Segregation	11000 MT/A
41	M/s Faiz Recycling, G-235, MG Road, Industrial Area, Hapur	Ghaziabad	Grant	Registered 13.02.2024	Dismantling & Segregation	36.67 MT/Day
42	M/s Horizon Recycling Pvt. Ltd., Khasra no.-35, Kumarhera, 7th km Dehradun Road, Saharanpur, U.P.	Saharanpur	Grant	Registered 02.08.2022	Recycling, Dismantling, Segregation, Collection	12000 MT/A
43	M/s Golden Ewaste Recyclers Pvt. Ltd., Plot No.- 12A, Gagol Road, Behind Sophia School UdyogPuram, Partapur, Meerut	Meerut	Grant	Registered 01.04.2024	Transportation, Refurbishing, Dismantling, Segregation, Storage, Disposal	9600 MT/A

Appendix-6

MSW improvement Action Plan with time-line for the ULBs as proposed by Department of Urban Development, U.P.

S.N.	Key Activities	Timeline (In Months)								
		1	2	3	4	5	6	7	8	9
1	Policy Framework adoption (During the period the ULBs are required to adopt various rules /regulation in terms of bylaws for effective implementation of SWM rules)									
2	With adoption action plan the ULBs along the river will formulate IEC campaign (Specifically designing of promotional materials related to not only just for better waste management in the area but also making common people/institutions aware and sensitise about river pollution and its control measure for making an effective behaviour change. The first 2 months will be needed for preparing the material and widely spreading the message and then it's going to be a continuous effort for a sustained drive to make perceptible change among stakeholders.)									
3	Detail Gap Analysis of existing resources in terms of human resource/ equipment/ vehicles that are presently deployed and further required for full compliance of SWM rules. During the period each ULB shall prepare a detail micro plan (ward – wise) in sync with the action plan for effective implementation.									
4	Procurement of Required Material / Services after Gap Analysis									

5	Capacity Building. All the key stakeholders from senior officials to the level of safaikarmi is required to be sensitize and trained for the effective compliance of SWM rules and during the period intensive capacity building programmes shall be conducted.									
6	Identification of Land/ Building for waste processing shall be completed for all ULBs within 2 months (decentralised composting/MRF).									
7	Construction /Setting up of decentralised processing facility (composting for wet waste and MRF for dry waste) in all ULBs.									
8	Bulk waste Generators Identification and consultation/capacity building foronsite Waste Management.									
9	Identification and integration of Informal Rag Pickers									
10	Segregation/ collection / transport / processing (10 percent) (by 4th month of Action Plan adoption)									
11	Segregation/ collection / transport / processing (20 percent)									
12	Segregation/ collection / transport / processing (35 percent)									
15	Segregation/ collection / transport / processing (50 percent)									
16	Segregation/ collection / transport / processing (65 percent)									
17	Segregation/ collection / transport / processing (80 percent)									
18	Segregation/ collection / transport / processing (100) percent) Within 12 months.									

Appendix-7

Status of River Water Quality Data

Water Quality of River Varuna in UP

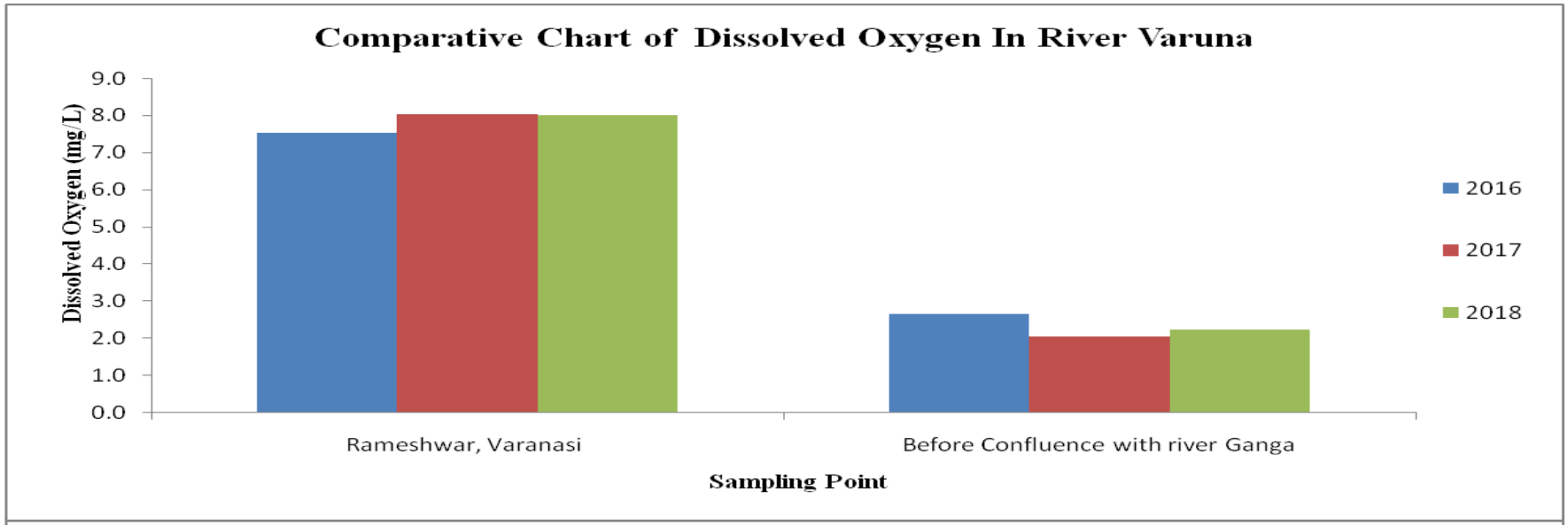
Year 2016 - 2018

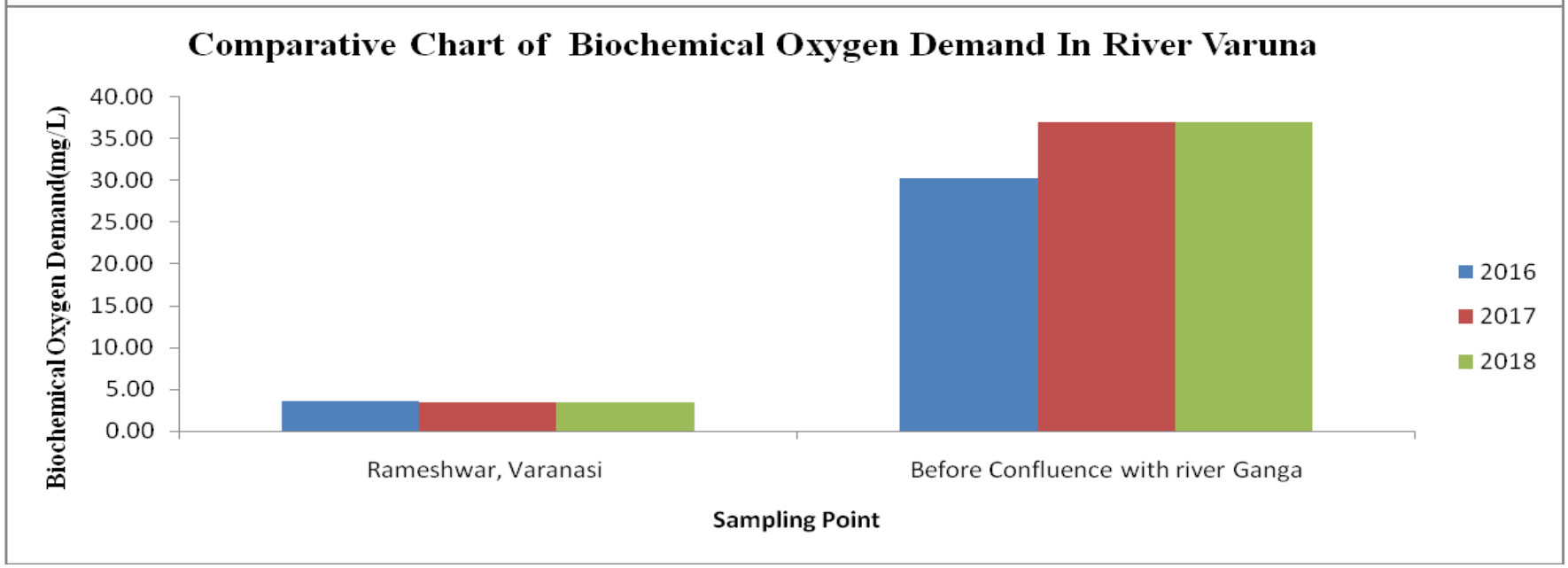
River Varuna is a minor tributary of the River Ganga. The Varuna rises near Bhadohi, flows east-to-southeast for some 100 km, and joins River Ganga in Varanasi, just downstream of Varanasi. The name Varanasi itself is interpreted to be derived from the name of the river Varuna. The river demarcates the north end of Varanasi - the city that lies between Varuna and Assi Rivers.Uttar Pradesh Pollution Control Board has been regularly monitoring 02 sampling station of River Varuna in Varanasi city under National Water Quality Monitoring Programme (NWMP).

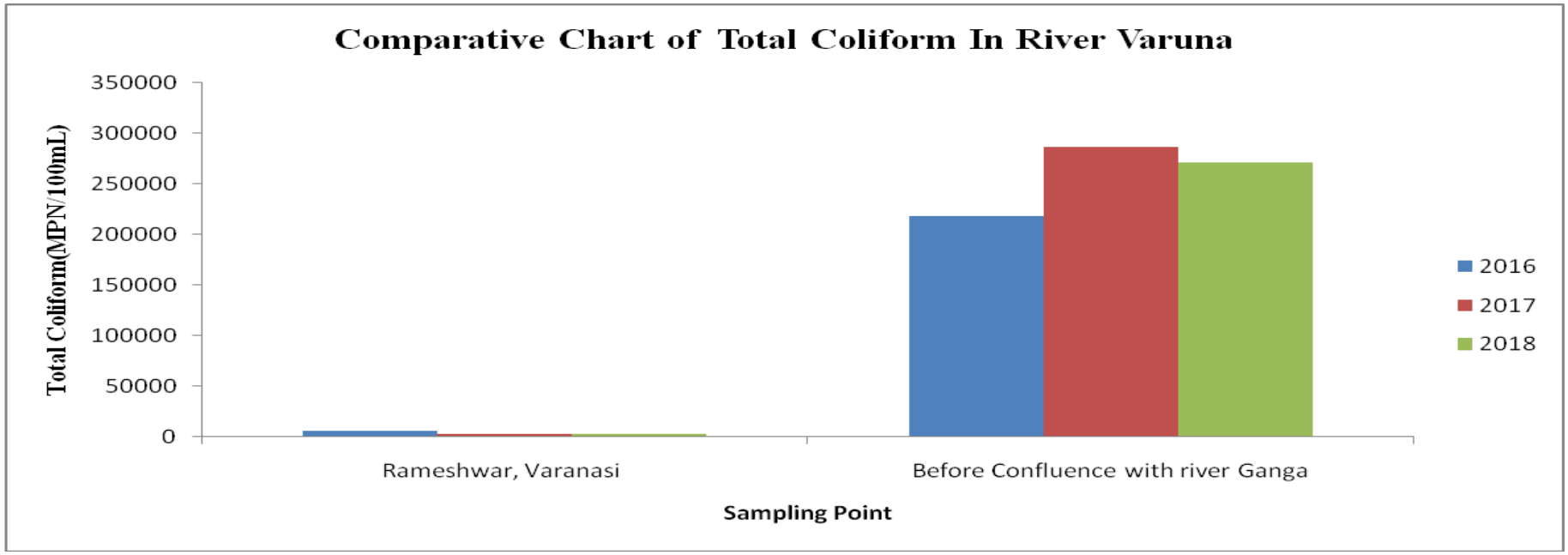
Average data of Dissolved Oxygen (D.O.), Biochemical Oxygen Demand (B.O.D.) and Total Coliform (T.C.) obtained from water quality monitoring during 2016 to 2018 indicates that :-

- Water quality Of River Varuna at Rameshwar, Varanasi falls under category-D (Fish Culture and wild life propagation).
- Water quality Of River Varuna before confluence with river Ganga falls under category-E. (Irrigation, Industrial Cooling, Controlled waste disposal)

Water Quality Of River Varuna in UP												
Year 2016-2018												
SN	Regional Office	District	Sampling Point	2016			2017			2018		
				D.O. (mg/l)	B.O.D. (mg/l)	Total Coliform (MPN/100ml)	D.O. (mg/l)	B.O.D. (mg/l)	Total Coliform (MPN/100ml)	D.O. (mg/l)	B.O.D. (mg/l)	Total Coliform (MPN/100ml)
1	Varanasi	Varanasi	Rameshwar, Varanasi	7.5	3.57	6158	8.0	3.35	2575	8.00	3.40	2727
2	Varanasi	Varanasi	Before Confluence with river Ganga	2.7	30.20	217500	2.1	36.90	285833	2.23	36.90	270833


Comparative Chart of Dissolved Oxygen In River Varuna
Dissolved Oxygen (mg/L)
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
Rameshwar, Varanasi
Before Confluence with river Ganga
Sampling Point
2016
2017
2018


Comparative Chart of Biochemical Oxygen Demand In River Varuna
Biochemical Oxygen Demand(mg/L)
40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
Rameshwar, Varanasi
Before Confluence with river Ganga
Sampling Point
2016
2017
2018



CLASS OF WATER AS PER IS : 2296

Classification	TYPE OF USE
ClassA	Drinking watersourcewithoutconventional treatmentbut afterdisinfection
ClassB	Outdoorbathing
ClassC	Drinking watersourcewith conventional treatment followed bydisinfection.
ClassD	Fish culture and wild life propagation
ClassE	Irrigation,industrial cooling orcontrolled waste disposal

TOLERANCE LIMITS

TABLE-1: TOLERANCE LIMITS FOR INLAND SURFACE WATERS, CLASS – A

S. No.	Characteristic	Tolerance
(1)	(2)	(3)
(i)	pH	6.5 to 8.5
(ii)	Dissolved Oxygen, mg/l,	6.0
(iii)	Bio-chemical Oxygen Demand	2.0
(iv)	Total Coliform Organisms, MPN/100 ml, Max	50
(v)	Colour, Hazen units, Max	10
(vi)	Odour	unobjectionable
(vii)	Taste	Agreeable taste
(viii)	Total Dissolved Solids, mg/l, Max	500
(ix)	Total Hardness (as $CaCO_3$), mg/l ,Max	300
(x)	Calcium Hardness (as $CaCO_3$), mg/l, Max	200
(xi)	Magnesium (as $CaCO_3$), mg/1,Max	100
(xii)	Copper (as Cu), mg/l, Max	1.5
(xiii)	Iron (as Fe), mg/l,Max	0.3
(xiv)	Manganese (as Mn), mg/1,Max	0.5
(xv)	Chlorides (as Cl), mg/l,Max	250
(xvi)	Sulphate (as SO_4), mg/l ,Max	400
(xvii)	Nitrates (as NO_2), mg/1,Max	20
(xviii)	Fluorides (as F,) mg/l,Max	1.5
(xix)	Phenolic compounds(as C_6H_5OH), mg/l,Max	0.002
(xx)	Mercury (as Hg), mg/l ,Max	0.001
(xxi)	Cadmium (as Cd), mg/1,Max	0.01
(xxii)	Selenium (as Se), mg/l ,Max	0.01
(xxiii)	Arsenic (as As), mg/1,Max	0.05
(xxiv)	Cyanides (as CN), mg/l, Max	0.05
(xxv)	Lead (as Pb), mg/l, Max	0.1
(xxvi)	Zinc (as Zn), mg/l, Max	15
(xxvii)	Chromium (asCr^{6+}), mg/l,Max	0.05
(xxviii)	Anionic detergents, (as MBAS), mg/l ,Max .	0.2
(xxix)	Poly-nuclear aromatic hydrocarbons (PAH),	0.2
(xxx)	Mineral oil, mg/l ,Max	0.01
(xxxi)	Barium (as Ba), mg/l ,Max	1.0
(xxxii)	Silver (as Ag), mg/l Max	0.05
(xxxiii)	Pesticides	Absent
(xxxiv)	Alpha emitters, µc/ml, Max	10^{-9}
(xxxv)	Beta emitters, µc/ml, Max	10^{-8}

TABLE- 2: TOLERANCE LIMITS FOR INLAND SURFACE WATERS, CLASS – B

S. No.	Characteristic	Tolerance Limit
(1)	(2)	(3)
(i)	pH Value	6.5 to 8.5
(ii)	Dissolved Oxygen, mg/1,Max	5.0
(iii)	Biochemical Oxygen Demand (5 days at 20 °C), Max	3.0
(iv)	Total Coliform Organisms, MPN/100 ml, Max	500
(v)	Fluorides (as F)<mg/l, Max	1.5
(vi)	Colour, Hazen units, Max	300
(vii)	Cyanides (as CN), mg/l, Max	0.05
(viii)	Arsenic (as As), mg/l, Max	0.2
(ix)	Phenolic Compounds (as C_6H_5OH) mg/l, Max	0.005
(x)	Chromium (as Cr^{6+}), mg/l, Max	1.0
(xi)	Anionic detergents (as MBAS), mg/l, Max	1.0
(xii)	Alpha emitters, µc/ml, Max	10^{-8}

TABLE - 3: TOLERANCE LIMITS FOR INLAND SURFACE WATERS, CLASS – C

S.No.	Characteristic	Tolerance Limit
(1)	(2)	(3)
(i)	pH Value	6.5 to 8.5
(ii)	Dissolved Oxygen, mg/l Minimum	4.0
(iii)	Biochemical Oxygen Demand	3.0
(iv)	Total coliform organisms, MPN/100 ml, Max	5000
(v)	Colour, Hazen units, Max	300
(vi)	Fluorides (as F), mg/l ,Max	1.5
(vii)	Cadmium (as Cd), mg/l, Max	0.01
(viii)	Chlorides (as Cl), mg/l, Max	600
(ix)	Chromium (as Cr^{6+}), mg/l, Max	0.05
(x)	Cyanides (as CN), mg/l, Max	0.05
(xi)	Total Dissolved Solids, mg/l, Max	1500
(xii)	Selenium (as Se), mg/l, Max	0.05
(xiii)	Sulphates (as SO_4), mg/l, Max	400
(xiv)	Lead (as Pb), mg/l, Max	0.1
(xv)	Copper (as Cu),mg/l,Max	1.5
(xvi)	Arsenic (as As), mg/l, Max	0.2
(xvii)	Iron (as Fe), mg/l, Max	50
(xviii)	Phenolic compounds (as C_6H_5OH), mg/l, Max	0.005
(xix)	Zinc (as Zn), mg/l, Max	15
(xx)	Insecticides, mg/l, Max	Absent
(xxi)	Anionic detergents (as MBAS), mg/l, Max	1.0
(xxii)	Oils and grease, mg/l, Max	0.1
(xxiii)	Nitrates (as NO_3), mg/1,Max	50
(xxiv)	Alpha emititers, µc/mg, Max	10^{-9}
(xxv)	Beta emitters, µc/ml, Max	10^{-8}

TABLE- 4: TEOLERANCE LIMITS FOR INLAND SURFACE WATERS, CALSS – D

S.No.	Characteristic	Tolerance Limit
(1)	(2)	(3)
(i)	pH value	6.5 to 8.5
(ii)	Dissolved Oxygen, mg/l, Min.	4.0
(iii)	Free Ammonia (as N), mg/l, Max.	1.2
(iv)	Electrical Conductance at 25 °C, µS, Max	1000
(v)	Free Carbon Dioxide (as $C0_2$),mg/1, Max	6.0
(vi)	Oils and Grease, mg/l, Max	0.1
(vii)	Alpha emitters, µc/ml, Max	10^{-9}
(viii)	Beta emitters, µc/ml, Max	10^{-8}

TABLE- 5: TOLERANCE LIMITS FOR INLAND SURFACE WATERS, CLASS – E

S.No.	Characteristic	Tolerance Limit
(1)	(2)	(3)
(i)	pH value	6.0 to 8.5
(ii)	Electrical Conductance at 25°C, µS, Max	2250
(iii)	Sodium Adsorption Ratio, Max	26
(iv)	Boron (as B), mg/l, Max	2.0
(v)	Total Dissolved Solids, (inorganic), mg/l, Max	2100
(vi)	Sulphates (as SO_4), mg/l, Max	1000
(vii)	Chlorides (as Cl), Mg/l, Max	600
(viii)	Sodium Percentage, Max	60
(ix)	Alpha emitters, µc/ml, Max	10^{-9}
(x)	Beta emitters, µc/ml, Max	10^{-8}