ACTION PLAN FOR BARAK RIVER-PRIORITY V

1. Basic information about the Stretch

Barak River is one of major rivers of South Assam. The 564 kilometres long river is part of Surma-Meghna River System. It rises in hill country of Manipur where it is biggest and most important of hill country rivers.After Manipur it flows through Mizoram and Assam.It later enters Bangladesh where it forks into Surma and Kushiyara rivers. The local rainfall run off of the valley along with that of adjacent hilly areas flows through river Barak and its various tributaries and is drained out to Bangladesh. The Katakhal, Jiri, Chiri, Modhura, Longai, Sonai, Rukni and Singla are the main tributaries of the valley. The tributaries are mainly rain fed and cause flood problems when precipitation occurs.

The Barak sub-basin drains areas in India, Bangladesh and Burma. The drainage area of the sut lying in India is 41723 sq.km which is nearly 1.38% of the total geographical area of the country. It is be on the north by the Barail range separating it from the Brahmaputra sub-basin, on the east by the Na Lushai hills and on the south and west by Bangladesh. The sub-basin lies in the States of Meghalaya. Manipur, Mizoram, Assam, Tripura and Nagaland.

1.1. Polluted river stretch/length

The length of the polluted stretch of Barak river at d/s of Annapurna Ghat at Silchar is 11km (approx.) with an area of 28.2 sq.km. (Fig 1) and the stretch identified as polluted is from Berenga Pt III to Tarapur Pt VII

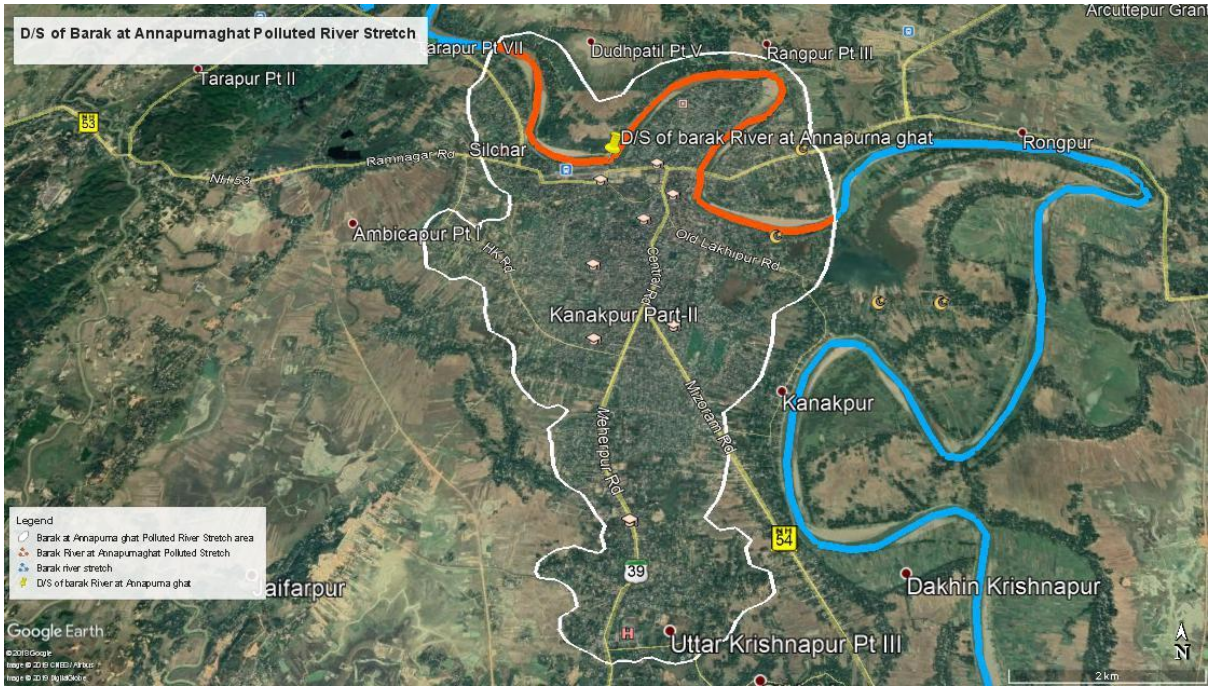

Fig 1: Map showing the polluted river stretch of Barak river at d/s of Annapurna Ghat at Silchar

The length of the polluted stretch of Barak River at Panchgram is about 6.2 kmwith an area of 11.2 sq.km.(Fig 2) and the identified polluted stretch is from Balirbond to Umarpur Pt III

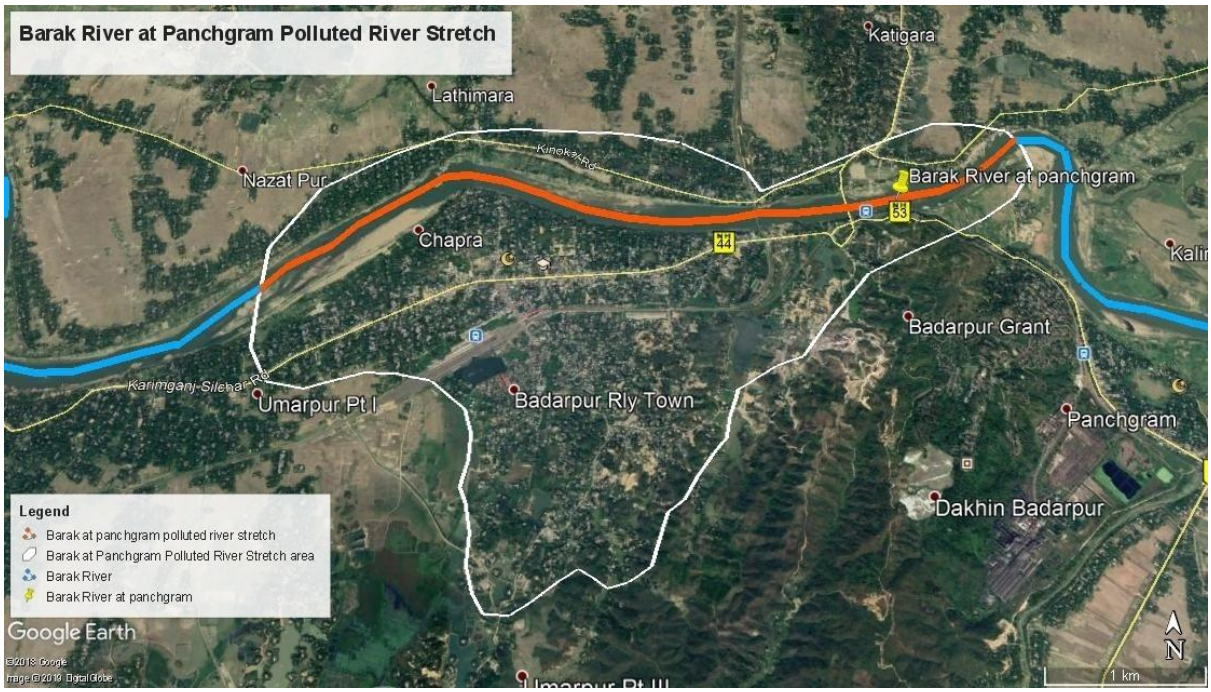

Fig 2: Map showing the polluted river stretch of Barak River at Panchgram

2. Background:

In compliance of the direction of Hon'ble National Green Tribunal, Principal Bench, New Delhi in the matter of news published in 'The Hindu' authored by Jacob Koshy, Tiltled 'More river stretches are now critically polluted CPCB', Government of Assam constituted River Rejuvenation Committee (RRC) vide memorandum673/2018 dated 19/12/2018 for effective abatement of pollution, rejuvenation, protection and management of the identified polluted stretches, for bringing the polluted river stretches to be fit at least for bathing purposes within six months

3. Basis of Action Plan forBarak polluted river stretch

The action plan for rejuvenation, protection and management of the identified polluted river stretch of Assam has been prepared based on the following

- As per direction of Hon'ble National Green Tribunal, Principal Bench, New Delhi in the matter of news published in 'The Hindu' authored by Jacob Koshy, Tiltled 'More river stretches are now critically polluted CPCB'
- Comprehensive report on Prevention and Control of Pollution in River Hindon: An Action Plan for Rejuvenation' [Submitted in compliance to Hon'ble National Green Tribunal]

4. Components of Action Plan

(a) Industrial Pollution Control

- Inventorisation of industries
- Categories of industry and effluent quality
- Treatment of effluents, compliance with standards and mode of disposal of effluents
- Regulatory regime.

(b)Identification, Channelization, Treatment and Utilization of Treated Domestic Sewage

- Identification of towns in the catchment of river

- Town-wise Estimation of quantity of sewage generated and existing sewage treatment capacities to arrive at the gap between the sewage generation and treatment capacities;
- Identification of towns for installing sewerage system and sewage treatment plants.
- Storm water drains now carrying sewage and sullage joining river and interception and diversion of sewage to STPs,
- Treatment and disposal of septage and controlling open defecation.

(c)River catchment/Basin Management-Controlled ground water extraction and periodic quality assessment

- Periodic assessment of groundwater resources and regulation of ground water extraction by industries particularly in over exploited and critical zones/blocks.
- Ground water re-charging /rain water harvesting
- Periodic ground water quality assessment and remedial actions in case of contaminated groundwater tube wells/bore wells or hand pumps.
- Assessment of the need for regulating use of ground water for irrigation purposes.

(d)Flood Plain Zone

- Regulating activities in flood plain zone.
- Management of Municipal, Plastic, Hazardous, Bio-medical and Electrical and Electronic wastes.
- Greenery development- Plantation plan.

(e)Ecological/Environmental Flow (E-Flow)

- Issues relating to E-Flow
- Irrigation practices

(f)Such other issues which may be found relevant for restoring water quality to the prescribed standards.

5. **Action Plan as per direction of Hon'ble NGT**

The components to be discussed in the action plan for rejuvenation, protection and management of identified polluted stretch of Barak river are as follows

5.1. Industrial Pollution Control

Classified industrial units are observed with infrastructural facilities (ETPs, STPs) in the periphery of the polluted stretch of Barak river at d/s of Annapurna Ghat, Silchar along with few small scale industrial establishments. However, there has been no account of any major industrial estate/area in the periphery of the polluted stretch of Barak river at Panchgram of Karimganj district

Further directions were issued by the PCBA to all the industrial units which has failed to comply with the discharged norms. Moreover, the Board has also issued direction to build their own set up in their premises which do not have STP/ETP

The classified industry details situated at the radius of the polluted river stretch is presented at **Table I.**

Following are the suggestions for control of industrial pollution control

- The industry that will extract groundwater for manufacturing process should not operate unless they possess valid permission for groundwater extraction from Central Ground Water Authority.
- No industries should discharge their effluent directly into drains without treatment, rather they should reuse their treated effluent/sewage.
- Direction to be issued to the units which are not complying to the effluent discharge norms as per Section 5 of the Environment (Protection) Act, 1986, by PCBA for ensuring compliance to the discharge norms.

6. Identification, Channelisation, Treatment and Utilization of Treated Domestic Sewage

6.1. Major towns located on the bank

Silchar is the major town that belongs to Cachar District is located on the bank of Barak river at d/s of Annapurna Ghat polluted stretch. The approximate population of the Silchar town is 7,04,465 with 1,56,321 numbers of households as per Census 2011. The major localities identified in and around the catchment areas of polluted stretch of Barak river at d/s of Annapurna Ghat are Silchar, Ramnagar, masimpuretc

Barak river also enters Karimganj district at Panchgram, however, the polluted stretch of the river is not identified across the major populated locality of the district headquarter Karimganj. The major localities identified in and around the catchment areas of polluted stretch of Barak river under Karimganj division are Panchgram, Badarpur etc. Under the Badarpur Tehsil, the estimated population isaround 1,64,703 with 32898 households as per Census 2011.

6.2. Town wise estimation of quantity of sewage generated and existing sewage treatment capacities

The major town/village responsible for contribution of sewage in the polluted stretches of Barak river are Silchar and Badarpur. The waste

generated by Silchar town at Cachar District is approximately 76082.2 KLD and Badarpur at Karimganj district is around 17787.9 KLD.

6.3. Identification of towns for installing sewerage system and sewage treatment plants.

As per the survey done, two (02) numbers of STP has been proposed atSilchar town and Badarpur in consultation with the District Administration.

Table II: Sewage generation and gaps in treatment

S.N	Area	Population as per 2011 census	Water Consumption (KLD) @135lpcd	Sewage Generation (KLD)	No. of STPs proposed	Existing Treatment capacity (KLD)	Gaps in KLD
1	Silchar	7,04,465	95102.8	76082.2	01	Nil	76082.2
2	Badarpur	1,64,703	22234.9	17787.9	01	Nil	17787.9

6.4. Water Quality of the river stretch

There are two (2) sampling locations of Barak River under NWMP which is presented as below at **Table III**

Table III: Monitoring Location Details

S.No	Sampling Location	Coordinates
1	Barak river at d/s of Annapurna Ghat	24°49'56.95"N 92°47'34.56"E
2	Barak river at Panchgram	24°52'34.55"N 92°35'13.65"E

The change in the water quality of Barakriver in terms of BOD value for the period 2016-2019 is presented below in **Table IV and V**

Table IV: BOD value in mg/l of Barak river at d/s of Annapurna Ghat for the year January, 2016- April, 2019

Year	BOD Value	Year	BOD Value	Year	BOD Value	Year	BOD Value
Jan-16	2.8	Jan-17	2.3	Jan-18	2.1	Jan-19	2.0
Feb-16	3.9	Feb-17	2.5	Feb-18	2.0	Feb-19	2.0
Mar-16	1.6	Mar-17	2.1	Mar-18	1.3	Mar-19	2.0
Apr-16	1.1	Apr-17	1.1	Apr-18	2.4	Apr-19	2.0
May-16	1.6	May-17	1.8	May-18	2.0		
Jun-16	1.1	Jun-17	2.0	Jun-18	2.1		
Jul-16	4.0	Jul-17	2.8	Jul-18	3.2		

Aug-16	**3.8**	Aug-17	2.6	Aug-18	2.2		
Sep-16	1.8	Sep-17	2.1	Sep-18	2.2		
Oct-16	2.0	Oct-17	2.2	Oct-18	2.1		
Nov-16	1.5	Nov-17	2.1	Nov-18	2.2		
Dec-16	**4.2**	Dec-17	2.2	Dec-18	**5.5**		

The above data indicated that BOD value has increased in only six (06) occasions out of forty (40) occasions.The BOD value which indicates organic load generally increases due to the waste generated from the activity of the residents in the form of domestic household waste through different drains and channels. This incidental exceedance may be due todraining off untreated city sewage through four major drains into the river as the BOD load of the Ranga Khal and Singir Khal is observed to 54 mg/l and 48 mg/l respectively. Assam is cursed with the catastrophic flood every year and hence the BOD load also vary due to additional organic matter introduced in the river as a result of continuous rainfall during this disastrous calamity. Hence this exceedance can be considered as incidental and can be omitted from the polluted river stretch. Moreover, this marginal exceedance of BOD level does not reflect the extremity of pollution.

Table V: BOD value in mg/l of Barak River at Panchgram for the year January, 2016- April, 2019

Year	BOD Value	Year	BOD Value	Year	BOD Value	Year	BOD Value
Jan-16	2.4	Jan-17	2.1	Jan-18	2.1	Jan-19	1.6
Feb-16	1.1	Feb-17	1.2	Feb-18	2.2	Feb-19	2.0
Mar-16	2.4	Mar-17	1.0	Mar-18	2.1	Mar-19	2.4
Apr-16	**3.5**	Apr-17	1.1	Apr-18	2.1	Apr-19	2.1
May-16	1.9	May-17	1.9	May-18	2.0		
Jun-16	1.2	Jun-17	1.9	Jun-18	2.1		
Jul-16	**3.1**	Jul-17	2.1	Jul-18	**3.0**		
Aug-16	1.1	Aug-17	2.2	Aug-18	2.6		
Sep-16	2.1	Sep-17	2.1	Sep-18	2.0		
Oct-16	**3.2**	Oct-17	1.6	Oct-18	2.0		
Nov-16	1.5	Nov-17	2.1	Nov-18	2.1		
Dec-16	0.7	Dec-17	2.1	Dec-18	**4.1**		

The above data indicated that BOD value has increased in only five (05) occasions out of forty (40) occasions.The BOD value which indicates

organic load generally increases due to the waste generated from the activity of the residents in the form of domestic household waste through different drains and channels. This incidental exceedance may be due to draining off untreated city sewage through three major drains coming from the Badarpur circle. Assam is cursed with the catastrophic flood every year and hence the BOD load also vary due to additional organic matter introduced in the river as a result of continuous rainfall during this disastrous calamity. Hence this exceedance can be considered as incidental and can be omitted from the polluted river stretch. Moreover, this marginal exceedance of BOD level does not reflect the extremity of pollution.

6.5. Drains contributing to pollution

Four major drains are identified in the Silchar sub district, which is responsible for draining off majority of the municipal, industrial and commercial waste from the Silchar town to the river **(Table VI).**Out of these drains, khalsrangirkhal and singirkhal carries most of the municipal sewage originated form domestic households.

Table VI: Major channels/drains of Silchar town contributing to the pollution load of the River

Sl. No	Name	Description
1	Rangir Khal	The length of the Rangir Khal is 16 kms (approx.)
2	Longlai Khal	-
3	Singir Khal	The length of the Singir Khal is 500 m (approx.)
4	Bachai Khal	-

Moreover, the river receives storm water and sewage from three major outfalls/drains of natural origin and kuchcha nullahs from the Badarpur block which is presented at **Table VII.**

Table VII: Major channels/drains under Badarpur block contributing to the pollution load of the River

Sl. No	Name	Description
1	Kerosene nullah	The length is 500 m (approx.) and the drain originates near HPCL and falls into Barak river at Panchgram
2	Pola river	The length of nullah is 1.5 km (approx.). It originates near East Bakri Hawar of Hailakandi district and falls into Barak river at Panchgram
3	Hatiya river	It originates near West Bakri Hawar of Hailakandi district and falls into Barak river at Panchgram

6.6. Characteristics of the major drains

The drains mainly carries industrial as well as residential wastes. Direct dumping of residential and commercial garbage into the channel is making it shallower and heavily silted. As a result, during rainy season water overflows and inundates the areas. It is also observed that the drains of the town are also becoming a regular garbage-dumping site.Moreover, these drains are not planned properly to carry even the regular water.

Recently two development projects under the City infra-structure development funds (CIDF) have been undertaken by the District administration for reducing the water logging conditions of the Silchartown during monsoon which is as below

- A RCC guard wall is to be constructed on the Rangir Khal (budget 42 crores) to reduce water logging during monsoon and improve the depth and the flow of water in the drain

6.7.Flow details of the major drains contributing to river pollution

The discharge of the one major drain, Rangir Khal is 15.803 m^3/sec. Further action has been initiated to measure the flow of various out falling drains.

6.8. Sewage generation from the towns located on the banks of the polluted river

The main contributor of pollution in the riveris municipal sewage. There are no treatment systems for the sewages which are dumped in open thereby ultimately finding their ways to water bodies without treatment. Moreover, Sewage treatment facility has not been set up yet in Assam.

6.9. Number of Sewage treatment plants present and treatment capacity, and gaps

There is no sewage treatment plant at present.

6.10. Number of STPs proposed and capacity

As per the survey done, two (02) numbers of STP has been proposed at Silchar town and Badarpur with a capacity of 76082.2 KLD and 17787.9 KLD respectively in consultation with the District Administration

6.10. Interception and diversion of drains /in situ treatment given

Two (02) numbers of STP has been proposed along with interceptor drains for in situ treatment before outfall.

6.11. Drainage system/ sewerage network present/proposed

Some natural drainage of local origin and kuchcha nullahs are acting as the drainage system to evacuate sewage originating from domestic households, commercial establishments, institutes, industries etc.

There is no sewerage system at present. In this project two (02) number of STP along with interceptor drains for collection of the sewage of the basin has been proposed. All the sewage of the catchment area of the river shall be collected by interceptor drains and shall be treated in the proposed STP before outfall in to the river.

6.12. Treatment and Disposal of Septage and controlling Open Defecation

Some of the households in the towns are equipped with ordinary septic tanks. Under the Swacch Bharat Abhiyan, the Local Administration has constructed 2035 numbers of IHHLin the Silchar sub districtto attain open defecation free status. Moreover, public toilets have also been constructedat the commercial areas.

Moreover, in the Badarpur Tehsil under Karimganj district, 352 numbers of IHHL under Swachh Bharat Mission have been construct to achieve ODF.

Following remedial actions will be taken in consideration of treatment and disposal of sewage

- Sewage Treatment plant should be installed for treatment
- The discharge should be trapped by strainers before draining off to the river.
- Every individual households should be connected to sewer lines.
- Every households should be recommended to have individual drainage that should be connected to soak pits or stagnated pool.
- Roadside hotels/restaurants should not be allowed to dispose untreated sewage and solid waste into the nearby drains or rivers.

These establishments should be properly regulated by the concerned authority.

- Public awareness tocontrol open defecation and understand the sanitary hygiene.
- Local administration should provide proper pucca toilets for the individuals or atleast community toilets through the IHHL scheme under Swachh Bharat Mission.

7. Controlled Ground water Extraction and quality Assessment

The district is potential from ground water point of view as revealed by the studies carried out by CGWB. The stage of ground water development in Cacharand Karimganjdistricts are 4% and 7%. As long-term water level trend does not show any major change so the whole district may be considered as SAFE

The details of estimated ground water resource inthe Cacharand Karimganjdistrictsare presentedbelow in **Table VIII and IX**

Table VIII: Estimation of ground water resource in the Cachar district

Ground water extraction details	Ground water	Irrigation practices	Ground water recharging mechanism	Rain water harvesting
Net Ground Water Availability	1020.02 mcm	Minor and medium irrigation schemes such as DTW and STW	Recharging of groundwater are done by creation of Pond/lakes under government schemes.	The roof top rainwater harvesting is practiced.
Gross Ground Water Draft	39.21 mcm			
Stage of Ground Water Development	4%			
Future provision for Domestic & Industrial Use	52.46 mcm			
Future Provision for Irrigation Use	966.99 mcm			

Table VIII: Estimation of ground water resource in the Karimganj district

Ground water extraction details	Ground water	Irrigation practices	Ground water recharging mechanism	Rain water harvesting
Net Ground Water Availability	425.58mcm	Minor and medium irrigation schemes such as DTW and STW	Recharging of groundwater are done by creation of Pond/lakes under government schemes.	The roof top rainwater harvesting is practiced.
Gross Ground Water Draft	28.36mcm			
Stage of Ground Water Development	7 %			
Future provision for Industrial Use	26.36 ham			

7.1. Status of Ground Water

The quality of ground water in the Cachardistrict is suitable for both the drinking and irrigation purposes except with higher concentration of iron (Fe) in the range of 0.05 to 5 ppm is observed in Kabaganj, Ujjan, Tarapur, Paila pool, Sadin bazaar, Dayapur, Dwarbond, Panibhora, Rangpur, Phatimora, Chandighat T.G. and Durgakona areas. Iron concentration in deeper aquifers is comparatively much lower than the shallow aquifers and it ranges from 0.3 ppm to 1.3 ppm

The major ground water related problems in the Karimganjdistrict are the high concentration of iron in the ground water. The content of iron in ground water ranges from 0.10 to 1.70 ppm and observed in few pockets of the northern part of the district

However, the high concentration of iron beyond permissible limit in ground water in some of the areas of Cachar and Karimganj districts can pose problem, which can be lowered by aeration and filtration method.

7.2. Remedial Actions

The following remedial actions will be taken in consideration of contaminated ground water sources, controlled ground water extraction and periodic quality assessment

- Ground water of deeper aquifers should be analyzed for periodic assessment of element like Arsenic, Fluoride, Iron etc.
- Alternate sources of drinking water should be explored and prioritized.

- Awareness campaigns about health hazards due to intake of excessive Arsenic, Fluoride are the need of the time.
- Role of pesticides used for agricultural activity should be carefully observed.
- Survey should be conducted regarding ground water uses by different categories such as domestic, Industries etc and also to identify the over exploited and critical areas in the river stretches with respect to ground water extraction.
- Effective management of industrial effluent or sewage for preventing contamination of ground water sources.
- The industry that will extract groundwater for manufacturing process should not operate unless they possess valid permission for groundwater extraction from Central Ground Water Authority.
- Strict vigilance and conducting inspection of the industries to rule out any forceful treated effluent injection in to ground water resources.
- Roof top rain water harvesting techniques should be encouraged for industrial, commercial or individual households and community

8. Flood Plain Zone

The following are the identified flood prone area for the polluted river stretch

Sl. No	Name of River	Flood plain areas
1	Kolong river at d/s ADP Bridge	Tarapur, Navapally, Rongpur Part III
2	Kolong river at Morigaon	Thandarpur, Uttarbadarpur, Chhapar

8.1. Regulating activities in the Flood Plain Zone

Further following activities need to be regulated in the flood plain zones.

S.No	Action points	Responsible authority
1	Plantation in the flood plain zone	Forest Department
2	Checking Encroachment	Local administration
3	Demarcation of the flood plain zone	Water Resource Department
4	Prohibition of disposal of all kinds of wastes	District Administration

8.2. Waste management status

Table IX: Management of Industrial, Municipal, Biomedical, Plastic and Electronics Waste

Sl. No	Type	Status	Proposed actions	Authority
1	**Industrial Waste**	➢ No industrial waste dumped on land or discharged into water bodies/river. ➢ Industrial wastes are managed by industries itself ➢ Authorisation have been granted to different industries in line with Water act 1974, Hazardous Waste (Management, Handling and Transboundary Movement) Rule, 2008 as amended. ➢ Regular monitoring by PCBA to ensure that the terms and conditions are strictly adhered in accordance with the prescribed standards.	Direction issued to the industries to identify the non-point sources and arrest contamination of storm water.	Pollution Control Board Assam
2	**Municipal waste**	➢ Dumping is carried out unscientifically in the open space. ➢ No proper segregation of bio-degradable and non-biodegradable waste ➢ No proper segregation of dry and wet waste ➢ Lack of unscientific disposal facilities/infrastructure technology like decentralized composting or bio-methanation plant, waste to energy plant, solid waste management plant.	Municipal Body is in process of inducting the following activity ➢ Implementation of segregation of waste at source ➢ Door-to-door garbage Collection of waste ➢ Formation of Sanitation task Force ➢ Formation of Neighbourhood Community ➢ Awareness campaigns Processing and disposal of waste	Municipal Body

Sl. No	Type	Status	Proposed actions	Authority
3	**Plastic Waste**	➢ Dumping is carried out unscientifically in the open space along with the municipal waste. ➢ No proper segregation of bio-degradable and non-biodegradable waste ➢ No proper segregation of dry and wet waste ➢ Lack of unscientific disposal facilities/infrastructure technology like decentralized composting or bio-methanation plant, waste to energy plant, solid waste management plant.		Municipal Body/Pollution Control Board Assam
4	**Hazardous Waste**	➢ Hazardous waste are managed by hazardous waste generating industries itself by disposing the same through authorised recycler, secured landfill area, Bio-remediation etc. ➢ PCBA has engaged collection centre for collection of Hazardous waste ➢ Lack of TSDF facility for commonly utilization by hazardous waste generating industries		Pollution Control Board Assam
5	**Bio-medical Waste**	➢ Segregation at the source under Biomedical waste Management Rules, 1998 as amended ➢ The HCFs have installed ETP for treatment of liquid waste generated	Direction issued to all HCF unit to implement the BMW Rules, 2016 as amended in all HCF Units. (As per guidelines of CPCB)	HCF units/Pollution Control Board Assam

Sl. No	Type	Status	Proposed actions	Authority
6	**E –waste**	➢ Annual return in (Form-3) is submitted by E-Waste generating units to PCBA from time to time for onwards transmission to CPCB ➢ Most of the e-waste generator have sent their e-waste to their respective manufacturer. ➢ There is no authorised recycler, refurbisher, dismantler etc. available to ensure environmentally sound management of E-waste. ➢ There is no "facility" wherein the process of dismantling, recycling, and disposal of e-waste are carried out.	Few entrepreneur approached PCBA for registration and authorisation as Collection center and dismantler	Pollution Control Board Assam

8.3. Gaps identified in waste management

Presently, approximately 422679 Kg/day of gaps has been identified from the Silchar town and 98821.8 from the Badarpur Tehsil for municipal solid waste management

8.4. Greenery development - Plantation Plan

State Government has initiated afforestation in the degraded forestland, also raising roadside plantation besides creating check dams/embankments in the river catchment areas to combat erosion and soil conservation.

The following remedial actions has to be initiated in consideration of greenery development

- Raise plantation along the river bank to control the flow run off water directly to the river
- Bamboo species to be raised as it is a good soil binder thereby stabilize the banks of the river from erosion

9. Environmental Flow (E-Flow)

9.1. Stretch of river perennial or non- perennial/flow available/water usage in the stretch

The entire river stretch is perennial in nature with sufficient water all through the year.The maximum discharge of the Barak river stretch is approximately 7786.08 m3/sec

Irrigation practices in the river

The high volume ofdischarge and water level of the river can be of great use for good irrigation practices for the people. Different irrigation activity in the form of LIS, FIS have been undertaken in the river under government proposed schemes

10. Identified organisations responsible for preparation and execution of the action plans

Organisations responsible for preparation and execution of the action plans are as follows:

- Secretary to the Govt. of Assam, Environment and Forest department
- Secretary to the Govt. of Assam, Urban Development department
- Commissioner, Industries and Commerce, Assam
- Member Secretary, Pollution Control Board Assam
- Commissioner, Guwahati Municipal Corporation
- Commissioner to the Govt. of Assam, Water ResourceDepartment
- Divisional Forest officer, Social Forestry, Basistha, Guwahati -29

11. Monitoring mechanism proposed for implementation of action plans

The water quality assessment and evaluation of impacts is necessary to understand the river state at various stages of the project implementation and post implementation of the project. Therefore the water quality assessment and evaluation of the project achievements is essential component for the long term benefit of the project. The monitoring and evaluation also indicate for taking corrective measure at appropriate time. The ill effects may be controlled by taking step at right time for right cause. The monitoring and evaluation schedule and plan is proposed, which is under.

11.1 Water Quality Stations (WQS):

The water quality monitoring will include following parameters, which shall be monitored at monthly interval or as and when required. The one complete unit to be purchased and identified parameters to be monitored at defined sampling stations.

The sampling stations are:

- Barak river at BadarpurGhat

The parameters to be monitored are as follows.

1	pH	6	Bio-Chemical Oxygen Demand (BOD)
2	Turbidity	7	Faecal coliform
3	Conductivity	8	Total coliform
4	Temperature		
5	Dissolved Oxygen (DO)		

Most of the parameters will be monitored manually and will be incorporated in database.

12. Public Mass awareness etc.

Any river conservation project to be implemented successfully, public awareness is of utmost importance. Unless the public are made aware about the irreversible damage and pollution caused by indiscriminate littering and dumping of waste and garbage in drain and water bodies connected to KolongRiver, the project cannot be implemented in true sense of the word to achieve conservation. Some members of the communities are already aware that there is a need for river conservation programme and that they will be benefitted. Hence, it should be ensured with the following points

- The communities are effectively involved in all the stages of the project cycle from conceptualization, to preparation, to finalization, to implementation and finally O & M.
- Public Awareness & Public Participation should be affront-end activity of the project
- The entire programme of conservation should be conceived, formulated, implemented, monitored and evaluated in close consultation with the stake holding communities.
- Therefore, education and awareness programmes are key to the sustainability of the various components implemented as part of the river restoration project.

13. Action Plan

Table X: Action Points

Type	Action Points	Responsible Authority	Time Targeted
Industries	a) Strict observation/ monitoring of industrial effluent/waste water discharge strictly for compliance. a) Stringent action against non-complying industrial units b) No industry should operate or continue manufacturing process unless they possess valid permission for ground water extraction from Central Ground Water Authority (CGWA) c) Small service providing units like street food selling vendors, laundry etc should not be allowed to dispose solid, liquid or semi-liquid wastes directly into the drains or sewers. d) Set up online monitoring system in the major industries. e) To stress all the industrial units to adopt cleaner technology and take appropriate measures for reduction of effluent, recycling and reuse of treated water f) Directions has been issued for Zero Liquid Discharge (ZLD) in the major polluting	**Pollution Control Board Assam**	**3 Months (June, 2019 To August, 2019)**

Type	Action Points	Responsible Authority	Time Targeted
	industrial units		
Interception and treatment of raw sewage	a) The quality of waste water flowing in the drains of identified polluted stretch have to be analysed and studied to assess the drain wise characteristics of waste water. b) Concerned departments should design the installation of Sewage Treatment Plant (STP) based on flow details of the drains and utilization capacity and ensure that each households are connected to the sewers as applicable. c) Sewage Treatment Plant should also consider treatment and disposal of sewage for river catchment area settlement including discharge from toilets constructed under Swachh Bharat Mission d) To trap the discharge using strainers before falling into river. e) Channelization including diversion of sewage generated from households to sewer lines/interception of all the drains presently carrying sewage and for ensuing proper treatment through the upcoming STPs. f) Local administration	**PCBA/ ULBs/ ULBs/ District Administration/ Water Resource Department**	**2 Years (June,2019 to May, 2021)**

Type	Action Points	Responsible Authority	Time Targeted
	should provide pucca latrines to all the households through Individual Households Latrines (IHHL) Scheme under Swachh Bharat Mission.		
Ground Water Assessment **Ground Water Assessment**	a) Conducting survey regarding ground water usage by category wise such as domestic, community, industries etc. and also identification of over exploited and critical blocks in the river stretches with respect to the ground water extraction. b) Carry out assessment of ground water survey in the catchment area of the identified polluted stretch once in a year to ensure quality. c) All the industries should have valid NOC from CGWA. d) To promote roof top rain water harvesting by the industrial, commercial including individual households thereby recharging the ground water. e) Directions to be issued that no industries should inject their treated effluent for ground water recharging.	**PCBA/CGWA**	**Continuous** **6 Months (February,2020 to July, 2020)**
Flood Plain Zone	a) Conservation of the river through watershed	**Soil Conservation Department/Water**	**6 Months (February,2020**

Type	Action Points	Responsible Authority	Time Targeted
	management. b) Cleaning of the river bed and bank. c) Afforestation on both the banks to prevent soil erosion d) Recreational activities to be promoted. e) Erection of pathway of the river banks. f) Checking encroachment in the flood plain zone of the polluted river stretch g) Prohibition of disposal of municipal, plastic, biomedical and other wastes in the polluted stretch of the river bank h) Demarcation of the flood plain zone.	**Resource/ ULBs /Forest Department/ Tourism Department/PWD Assam/District Administration**	**to July, 2020)**
	The plan for the polluted stretches of the river may be implemented in a time bound manner by fragmenting activities as a) Modification of consent conditions in and around the polluted stretches. b) Surveillance of sources of pollution in contrast to the norms. c) Assessment of water quality of the polluted stretches on monthly basis has already been commencing d) The monitoring committee may convene meeting of Stakeholder organizations on	**Pollution Control Board Assam**	**3 Months (June,2019 to August, 2020)** **c) Monthly Basis**

Type	Action Points	Responsible Authority	Time Targeted
	Quarterly basis with under the chairmanship of Chief Secretary		
Solid Waste	a) Prohibition of direct disposal of solid waste in the river banks. b) Frequent River Surface cleaning by removal of debris, plastics etc.	**ULBs/ Water Resource Department**	**3 Months (November, 2019 to January, 2020)**
Environmental Flow	a) Flow measurement of the river should be carried out by the concerned department and the record has to be maintained b) Fresh water flowing through escape channels/small barrages should be checked. c) The river can be of good potential for irrigation practices and should be carried out by the farmers.	**Water Resource Department**	**Continuous**
Public Awareness	a) Awareness programs to highlight the issues related with the direct discharge of solid waste and open defecation. b) Mass awareness to conserve water.	**Environment & Forest Department /UDD/P&RD/ULBs/ Gram Panchayat**	**Continuous**

14. Budget Estimate for STP at Silchar town

1	No. of STP	01 No.
2	Capacity of STP	76 MLD
3	Life of STPs	25 years
4	Cost of STPs, Sewerage System, Pumping	Rs. 92.5 crores

	Station & other accessories.	
7	For Captive power	Rs. 0.5 Crore
Total Amount		**Rs. 93 Crores**

15. Budget Estimate for STP at Badarpur

1	No. of STPs	01 No.
2	Capacity of STP	17 MLD
3	Life of STPs	25 years
4	Cost of STP, Sewerage System, Pumping Station & other accessories	Rs. 22 crores
7	For Captive power	0.5 Crore
Total Amount		**Rs. 22.5 Crores**

Grand Total: Rs. 115.5 Cr

Members of River Rejuvenation Committee (RRC)

Secretary to the Govt of Assam
Environment & Forest Department

Secretary to the Govt of Assam
Urban Development Department

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20/7/19

Commissioner
Industries and Commerce Assam

Member Secretary
Pollution Control Board Assam