Action Plan for Kamalpur Beel

Priority III

Environment & Forest Department
Government of Assam

Action Plan for Kamalpur Beel- Priority III

1. Basic Information about the Stretch

The Beel is located in a rural area in kamalpur village predominantly agricultural in nature. No major towns are located at the bank of the Beel. Kamalpur village is located at the bank of the waterbody. Kamalpur is a medium size village located in Kamalpur Circle of Kamrup district, Assam with total 275 families residing. The Kamalpur village has population of 1206 of which 605 are males while 601 are females as per Population Census 2011.

The co-ordinates (in Latitude and Longitude) of the site are 26°20.952'N, 91°40.237′E.

1.1. Basic river stretch/ length:

The wetland is having a length of 1.16 kms with an average area of 11624 sq. meters

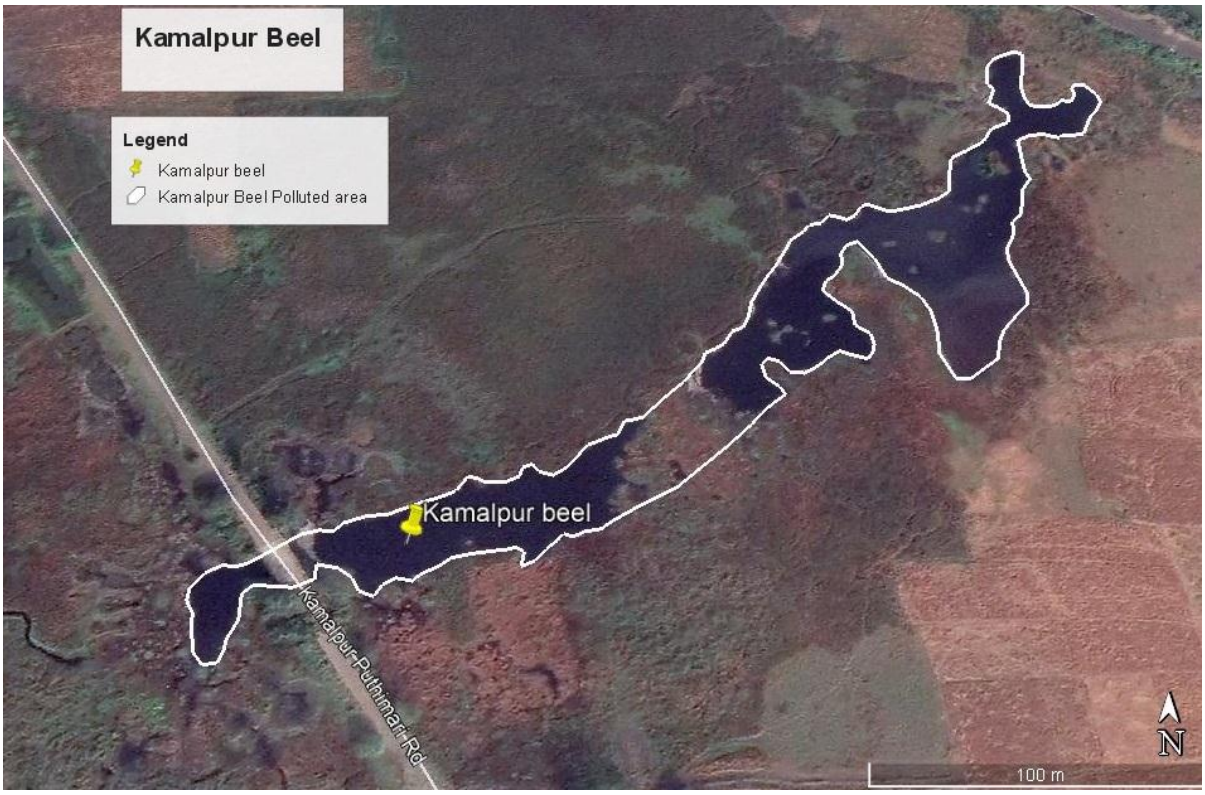

Fig 1: Map showing the Kamalpur Polluted wetland

1.2. Major towns located on the bank between the stretches including population, water consumption details:

Kamalpur is a town under Kamrup (Rural) district, Assam. It is 25 km from Jalukbari, Guwahati and surrounded by Rangia town, Baihata Chariali and Kaniha, Dimu Dobak villages. The Kamalpur village has population of 1206 of which 605 are males while 601 are females as per Population Census 2011. Moreover, the village is in close proximity to the industrial estate and daily wages/labours working in the industries also contribute to sewage generation. Therefore floating population has also been taken into account for the discharge of sewage and the water consumption stands at around 223.6 KLD and total sewage generated is 178.8 KLD by the identified village.

Table I: Sewage generation and gaps in treatment

Area	**Population as per 2011 census (Catchment villages of Kamalpur wetland)**	**Water Consumption (KLD) @135 lpcd**	**Sewage Generation (KLD)**	**No. of STPs proposed**	**Existing Treatment capacity (KLD)**	**Gaps in KLD**
Kamalpur village	**1206**	**223.6**	**178.8**	**Nil**	**NIL**	**178.8**
Floating Population	**450**					

Table II: Total gap in projected population and sewage generation till 2035

Area	**Projected Population till 2035**	**Water Consumption (KLD) @135 lpcd**	**Sewage Generation (KLD)**	**No. of STPs proposed**	**Existing Treatment capacity (KLD)**	**Gaps in KLD**
Kamalpur Wetland	**1820**	**346.9**	**277.6**	**Nil**	**NIL**	**277.6**
Floating Population	**750**					

1.3. Stretch of river perennial or non perennial/ flow available/ water uses in the stretch

` The Beel is primarily Non-perennial in nature However, during monsoon combined sewage flows through the Beel throughout the Year.

2. Water Quality of River Stretch/ Drains Contributing Pollution/ Ground Water

2.1. Drains contributing to pollution

Only one drain/channel flowing across the National Highway near the Industrial area

2.2 Latest water quality and current as per assessment targeted

The water quality test has been carried out at Kamalpur Beel at one locations since July 2017 under NWMP.

The sample is tested for various parameters and the latest water quality data for the month of March, 2020 are as follows in **Table III**

:

Table III: Analysis report of Kamalpur beel at Kamalpur- March 2020

Parameter	Value
D.O. (mg/L)	Nil
pH	7.5
Cond(µS/cm)	1168
BOD(mg/L)	27.5
COD(mg/L)	90.3
NO_3 -N (mg/L)	0.30
TSS (mg/L)	88.0
Turbidity (NTU)	04
p-Alkalinity (mg/L)	Nil
m-Alkalinity (mg/L)	280
Hardness (mg/L)	288
Calcium as $CaCO_3$(mg/L)	176
Magnesium as $CaCO_3$ (mg/L)	112
Chloride as Cl- (mg/L)	116
Sulphate as SO_4^{-2} (mg/L)	94.3
Phosphate as PO_4 (mg/L)	0.42
TKN (mg/L)	3.2
NH_4-N (mg/L)	1.4
Total Dissolved Solids (mg/L)	618
TFS (mg/L)	232
Fluoride (mg/l)	0.64
Boron (mg/l)	0.28
Na (mg/L)	87.3
K (mg/L)	19.5
Total Iron (mg/L)	0.27
Lead (mg/L)	0.004
Zinc (mg/L)	0.057
Copper (mg/L)	0.003
Total Chromium (mg/L)	BDL

Parameter	Value
Nickel (mg/L)	0.013
Cadmium (mg/L)	BDL
Mercury (mg/L)	BDL
Arsenic(mg/L)	0.005
Total Coliform (MPN/100ml)	1500
Faecal Coliform (MPN/100ml)	730

2.3 Characteristics of the river and the major drains

Major contributor of waste water flow is through one major drain/channel flowing across the National Highway near the industrial area. The water body has been receiving heavy loads of silt, sewage and solid waste and the water quality has deteriorated beyond limits. Luxuriant growth of water hyacinths, weeds are visible in the water spread area of the Beel. The quality of the water is very poor. Heavy deposit of silt/sludge has been accumulated on the bed of the Beel for years.

Table IV: Analysis report of the major drains contributing to pollution in the Kamalpur Beel

Parameter	value
D.O. (mg/L)	Nil
pH	7.1
Cond(µS/cm)	898
BOD(mg/L)	42.0
COD(mg/L)	126
NO_3 -N (mg/L)	3.1
TSS (mg/L)	128
Turbidity (NTU)	08
p-Alkalinity (mg/L)	Nil
m-Alkalinity (mg/L)	206
Hardness (mg/L)	226
Calcium as $CaCO_3$(mg/L)	142
Magnesium as $CaCO_3$ (mg/L)	84
Chloride as Cl- (mg/L)	68
Sulphate as SO_4^{-2} (mg/L)	72.2
Phosphate as PO_4 (mg/L)	2.6
TKN (mg/L)	14.6
NH_4-N (mg/L)	4.8
Total Dissolved Solids (mg/L)	574
TFS (mg/L)	140
Fluoride (mg/l)	0.48
Boron (mg/l)	0.038
Na (mg/L)	112.4

Parameter	value
K (mg/L)	32.6
Total Iron (mg/L)	
Lead (mg/L)	0.008
Zinc (mg/L)	0.052
Copper (mg/L)	0.004
Total Chromium (mg/L)	BDL
Nickel (mg/L)	BDL
Cadmium (mg/L)	BDL
Mercury (mg/L)	BDL
Arsenic(mg/L)	0.004
Total Coliform (MPN/100ml)	15000
Faecal Coliform (MPN/100ml)	2300

2.4. Flow details of the polluted river stretch

Discharge has been measured at the inlet at culvert location and outlet at lock gate of the Beel and it is around 0.40 m3/sec and 0.35 m3/sec respectively.

2.5. Characteristics of the major drains contributing to pollution

The contributing major drains out falling in to the Beel carries domestic sewage

2.6 Ground water quality in the polluted river stretch

2.6.1 Controlled Ground water Extraction and quality Assessment

About 49% of the households rely on tube well to obtain potable water. Very few numbers of the population owns earthen well whereas some of them depends on both supplied water as well as concrete well.

The details of estimated ground water resource in Kamrup district is presented below in **Table V**

Table V: Estimation of ground water resource in the Kamrup district

Ground water extraction details	Ground water	Irrigation Practices	Ground water recharging mechanism	Rain water harvesting
Gross Ground Water Draft	1487.29 mcm	Minor and medium irrigation schemes	Recharging of groundwater are done by creation of Pond/lakes under	➢ The roof top rainwater harvesting is practiced in
Net Ground Water Availability	715.97 mcm			

Stage of Ground Water Development	43%	such as DTW and STW	government schemes.	Government buildings, School and Offices. ➢ Industries should be encouraged for roof top rain water harvesting.
Existing draft for Irrigation Use	586 mcm			
Future provision for Domestic & Industrial Use	105.16 mcm			

The Kamrup district is still under 'Safe' category and sufficient resources are still available for future development

2.6.2 Status of Ground Water

The water quality is found to be well within the permissible limit for drinking, irrigation and industrial purposes. Due to slightly higher content of iron in some sporadic patches of the area and fluoride content exceeding permissible limit in some pockets in and around Guwahati City, water needs to be treated before being used for drinking purpose.

2.6.3. Ground water Quality of Kamalpur area (catchment of Kamalpur Beel)

Table VI: Latest Ground water Quality of Kamalpur area (catchment of Kamalpur Beel) – March 2020

Parameter	Value
pH	7.3
Cond(µS/cm)	254
BOD(mg/L)	1.4
COD(mg/L)	5.2
NO_3 -N (mg/L)	2.2
TSS (mg/L)	6
Turbidity (NTU)	2
p-Alkalinity (mg/L)	Nil
m-Alkalinity (mg/L)	86
Hardness (mg/L)	72
Calcium as $CaCO_3$(mg/L)	48
Magnesium as $CaCO_3$ (mg/L)	24
Chloride as Cl- (mg/L)	20
Sulphate as SO_4^{-2} (mg/L)	22.3
Phosphate as PO_4 (mg/L)	0.08
Total Dissolved Solids (mg/L)	164
TFS (mg/L)	40

Parameter	Value
Fluoride (mg/l)	0.32
Boron (mg/l)	0.013
Na (mg/L)	28.2
K (mg/L)	6.4
NH_4-N	0.19
TKN	0.56
Total Iron (mg/L)	0.22
Lead (mg/L)	BDL
Zinc (mg/L)	0.054
Copper (mg/L)	0.003
Total Chromium (mg/L)	BDL
Nickel (mg/L)	BDL
Cadmium (mg/L)	BDL
Mercury (mg/L)	BDL
Arsenic(mg/L)	BDL
Total Coliform (MPN/100ml)	Nil
Faecal Coliform (MPN/100ml)	Nil

2.6.4 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.

2.7 Flood Plain Zone

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

Name of River	Flood plain areas
Kamalpur Beel	Kamalpur village

2.7.1. Regulating activities in the Flood Plain Zone

The 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

2.7.2. Greenery development - Plantation Plan

State Department 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

2.7.3. Proposal for Biodiversity Park

At present there is no any land availability for establishment of Biodiversity Park in the catchment area of the wetland.

2.8. Irrigation practices in the river

Any kind of irrigation practices has not been proposed or initiated yet

However, the treated sewage can be used for many purposes which are as follows:

- Treated water can be used for de-dusting of roads in order to minimise the impact of PM_{10} and $PM_{2.5}$.
- For irrigation purpose.
- It can be used for roadside gardening.
- It can also be used for curing during construction works.

Treated sewage can be supplied to industries for non-potable uses

2.9. Achievable Goals

Primary water Quality Criteria for Bathing water (water used for organised outdoor bathing)

Criteria	Rational
1. Fecal Coliform MPN/100 ml: 500 (desirable) 2500 (Maximum Permissible) 2. Fecal Streptococci MPN/100 ml: 100 (desirable) 500 (Maximum Permissible) 3. pH: : Between 6.5 -8.5 4. Dissolved Oxygen: 5 mg/l or more 5. Biochemical Oxygen demand 3 day,27°C: 3 mg/l or less	To ensure low sewage contamination. Fecal coliform and fecal streptococci are considered as they reflect the bacterial pathogenicity. The desirable and permissible limits are suggested to allow for fluctuation in environmental conditions such as seasonal change, changes in flow conditions etc. The range provides protection to the skin and delicate organs like eyes, nose, ears etc. which are directly exposed during outdoor bathing The minimum dissolved oxygen concentration of 5 mg/1 ensures reasonable freedom from oxygen consuming organic pollution immediately upstream which is necessary for preventing production of anaerobic gases (obnoxious gases) from sediment. The Biochemical Oxygen Demand of 3 mg/1 or less of the water ensures reasonable freedom from oxygen demanding pollutants and prevent production of obnoxious gases";

2.10. Health status of the public in the catchment of polluted river stretch

Due to heavy accumulation of sewage in the Beel foul smell could be witnessed in the surrounding area of the Beel but no serious health hazard is envisaged.

3. Inventory of Sources of Pollution and Gaps Identificaton

3.1 Municipal Sources/ Sewage Management

3.1.1 Sewage generation from the village located on the banks of the polluted Beel

There is no dedicated sewerage network for collection of sewage generated from every household. The drains direct the sewage to the Beel.

3.1.2 No. of sewage treatment plants present and treatment capacity, actual sewage treatment and the gaps in treatment

Water Consumption is 223.6 KLD and total sewage generation is 178.8 KLD. The effluent generating from the nearby industries have functional ETP/STP.

3.1.3 No. of STPs proposed and capacities

The Beel is located in Kamalpur village have population of 1656. No STP is proposed for the said beel.

3.1.4 Interception and diversion of drains/ in situ treatment given

There is only one drain/channel is flowing across the National Highway near the industrial area.

3.2 Drainage System/ sewerage network present/ proposed

Presently in Kamrup district, there is no separate sewerage network. All the existing Storm Water drains carries the sewages coming from households and then fall into the major beel including kamalpur Beel.

3.3. Short term measures

- In- situ treatment of sewage by Bioremediation.
- Dosing of microbes near the drain outfall of all the drains.
- Strict vigilance of the industries to check that no industrial effluent is out falling in the drains

3.4 Industrial Pollution control

3.4.1 No. of industries-category RED or water polluting/ small scale

Classified industrial units are observed with infrastructural facilities (ETPs, STPs) within the periphery of 500 m of the polluted river stretch along with few small scale industrial establishments.

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 VII**

Table VII: Industry details as per the following of Kamalpur Beel polluted stretch

Sl. No	Name of the Industry	Category	Total Water Consumption (KLD)		Waste Water /waste Generation (KLD)	Without consent/Directions issued	ETPs		CETPs	OCEMS	Gaps	Proposed CETP
			Ground Water	Surface/ Supplied Water			**Functional**	**Non-Functional**				
1	M/S ECO Tech Papers, Kamalpur, Pubpar, Kamrup (R)	**Red**	811	-	649	CTO obtained	Functional (Waste water reused in the system. No discharge outside to the premise)	-	**Nil**	**Nil**	**Nil**	Nil
2	M/S Ashoka kraft paper, Mill LLP, Baihata, Kamalpur, Kamrup (R)		275	-	220	CTO obtained	Recycled	-				
3	M/S Alliance India, Dinkar, Baihata, Kamalpur, Kamrup (R)	**Orange**	12	-	06	CTO obtained	Functional	-				
4	M/S Parksons Packaging Ltd., Dinkar, Baihata, Kamalpur, Kamrup (R)		4	-	3.2	CTO obtained	Functional	-				
5	M/S York Print Pvt. Ltd. (Unit-4), Dinkar, Baihata, Kamalpur, Kamrup (R)		0.6	-	0.10	CTO obtained	Functional	-				
6	M/S York Print Pvt. Ltd. (Unit-5), Dinkar, Baihata, Kamalpur, Kamrup (R)		0.6	-	0.10	CTO obtained	Functional	-				
7	M/S R.K. Dispo products, Dolma, Kamalpur, Kamrup (R)		0.4	-	0.32	CTO obtained	Recycled	-				
Total			**1103.6**		**878.72**	**-**	**-**	**-**			**Nil**	

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.

4. Identification of major sources required to be controlled based on pollution load

4.1. Waste management status

Table VIII: Waste management status and proposed actions

Type	Status	Proposed actions	Authority	Time Targeted
Industrial Waste	a) No industrial waste dumped on land or discharged into water bodies/river. b) Industrial wastes are managed by industries itself c) Authorisation have been granted to different industries in line with Water act 1974, Hazardous Waste (Management, Handling and Transboundary Movement) Rule, 2008 as amended. d) Regular monitoring by PCBA to ensure that the terms and conditions are strictly adhered in accordance with the prescribed standards.	a) Direction issued to the industries to identify the non-point sources and arrest contamination of storm water. b) There are no gaps in the treatment of industrial waste as the industrial units have ETPs in their premises as presented in **Table VII**	**Pollution Control Board Assam**	**3 Months (April 2020 – June 2020)**
Municipal waste	Since the catchment area of the river does not fall under any municipal bodies, the villagers manage and treat their own solid wastes by constructing composting pit and other vermi	Awareness generation regarding solid waste management rule.	**Village Panchayat**	**Continuous**

Type	Status	Proposed actions	Authority	Time Targeted
	composting practices etc. in their household.			
Plastic Waste	Plastic wastes are being burnt by the villagers in their household	a) Village panchayats to segregate and collect plastic waste and initiate necessary steps to channelize the waste to authorized agencies for recycling and reprocessing.	**ULBs/Village Panchayat**	**3 Months (April 2020 – June 2020)**
		b) Awareness campaign regarding health and other issues related to burning of plastics.		**Continuous**
Hazardous Waste	No Hazardous waste generating industrial units have been identified within 500 meters periphery of the catchment area.	Not Applicable	**Not Applicable**	**Not Applicable**
Bio-medical Waste	No Biomedical waste generating industrial units have been identified within 500 meters periphery of the catchment area.	Not Applicable	**Not Applicable**	**Not Applicable**
E –waste	a) Annual return in (Form-3) is submitted by E-Waste generating units to PCBA from time to time for onwards transmission to CPCB b) Most of the e-waste generator have sent their e-waste to their respective manufacturer. c) There is no authorised recycler, refurbisher, dismantler etc. available to ensure environmentally sound management of E-waste. d) 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 Recycler	**Pollution Control Board Assam**	**Continuous**

4.2. Solid waste management

In situ management by burial/landfilling in the rural households. Awareness generation regarding the solid waste management Rules. Regarding the plastic waste negligible, might rise in the future, depending upon changes in consumption pattern. Issue directions to Village panchayats to segregate and collect plastic waste and initiate necessary steps to channelize the waste to authorized agencies for recycling and reprocessing.

4.3. Gaps identified in waste management

a) Lack of community awareness
b) Proper segregation of waste at source
c) Insufficient no of secondary collection system
d) Lack of scientific sanitary landfill.

Presently, around 993.6 Kg/day of gaps has been identified for municipal solid waste management as they are dumped unscientifically

4.4. Gaps in Bio Medical Waste management

No Biomedical waste generating industrial units are located on the bank of the Kamalpur Beel.

4.5. Gaps in Industrial waste Management

No Hazardous waste generating industrial units are located on the bank of the Kamalpur Beel.

5. Any other Information

5.1 Remedial plans for control of ground water contamination

Proposal to remove silt and sludge from the bed of the Beel and replacing with natural soil will reduce the contamination to the ground water.

5.2 Remedial plans for health impacts in the catchment of polluted river stretch

Proposal to remove silt and sludge from the bed of the Beel will improve the water quality as a result the problems of foul smell will be mitigated in the surrounding area of the Beel.

5.3 Identified organizations responsible for preparation and execution of the action plans

Urban Local Body will be responsible for the preparation and execution of the action plan.

5.4 Monitoring mechanism proposed for implementation of action plans

ULBs/P&RD will be the parent body for implementation of the following action plans through its various agencies as mentioned below

Table IX: Action Points

Type	Action Plan	Responsible Authority	Time Targeted	Budget Estimate (In Crores)
Beel Conservation/ Sewage Management	Cleaning of Beel	**ULBs/P&RD**	**6 months**	**0.35**
	Installation of Mechanical Aerators	**ULBs/P&RD**	**1.5 years**	**1.40**
Solid Waste Management	City wise proper management of solid waste along scientific disposal landfill site	**ULBs/P&RD**	**Continuous**	**0.10**
Water Quality assessment of the Beel	Assessment of water quality of the polluted stretches on monthly basis has already been commencing	**Pollution Control Board Assam**	**Monthly basis**	**NIL**
Total				**1.85 Crores**

5.5 Public mass awareness etc.

Public awareness campaign for proper solid waste management shall be undertaken by Urban Local Body/P&RD Department. Public shall be sensitized on good solid waste management practice through social media, print media, electronic media etc.

Approved by River Rejuvenation Committee (RRC)

Secretary to the Govt of Assam
Environment & Forest Department

Secretary to the Govt of Assam
Urban Development Department

Commissioner
Industries and Commerce Assam

Member Secretary
Pollution Control Board Assam