REVISED ACTION PLAN FOR REJUVENATION OF RIVER NONBAH WEST KHASI HILLS DISTRICT, MEGHALAYA IDENTIFIED AS RIVER POLLUTED STRETCH UNDER PRIORITY – IV

PREPARED BY

RIVER REJUVENATION COMMITTEE GOVERNMENT OF MEGHALAYA

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INTRODUCTION

This river rises from the uphill region of Nongstoin in West Khasi Hills District. The river is also joined by another source coming from Nondein and finally after passing the ravines and gorges joined the Kynshi River. This river runs a distance of approximately 5.6 Kms through the Nongstoin town which is the headquarter of the West Khasi Hills District. As it is in the commercial areas, the waste, garbage etc generated from the local markets, shops, houses are ultimately discharged into the water body thereby deteriorating the water quality. There is no industrial estate; however there are isolated small scale industries located in the catchment of the river. Map below indicated the catchment area of Nonbah River.



Figure 1: Map indicating catchment area of Nonbah River

- a) Localities in the catchment of Nonbah River: The villages located in the catchment of Nonbahriver are upper Nongstoin, new Nongstoin, ladweitang, Mawiong, Lumsyntiew, Tiehsaw, Pyndengrei, Mawrok, Porsohsat, seijlieh, Nonbah are Pynthornein, Mawrusyiar, Pyndenglawar, Nongritong, Mawkawah, Mawkhlam, Nongpyndeng
- b) **Major Industrial Areas in the Catchment of Nonbah River:** There is no major industrial estate but only some small scale industries are located in the catchment area of the River.

c) Major Drains contributing to Pollution in Nonbah River: There are 5 major drains which pass through Nongstoin town that discharge the untreated sewage and municipal wastes into the Nonbah River. Table 1 below indicated the identified drains and their co-ordinates and flow

SI.	Drains	locations	GPS Co-ordinates	Normal Discharge
No.				m³/sec
1.	Drain near fish market	New Nongstoin	N 25°31.121'	0.004
			E91°15.897'	
2.	Drain near Market Complex	New Nongstoin	N 25°31.132'	0.008
			E91°15.878'	
3.	Drain near Govt.LP School	New Nongstoin	N 25°31.170'	0.001
			E91°15.839'	
4.	Drain at Dong SpengTthawlang Mlah	New Nongstoin	N 25°31.232'	0.003
			E91°16.021'	
5.	Stream near Bishop House	New Nongstoin	N 25°31.530'	0.080
			E 91°16.194'	

TABLE 1: MAJOR DRAINS CONTRIBUTING TO POLLUTION IN RIVER UMKHRAH

2.0 OBJECTIVES/ACHIEVABLE TARGETS FOR RESTORATION OF POLLUTED

In pursuance of the Hon'ble National Green Tribunal (Principal Bench), New Delhi, orders dt. 20.09.2018 and 19.12.2018 in original application No. 673/2018 in the matter on News item published in "The Hindu" Titled more river stretches are now critically polluted - Central Pollution Control Board, an action plan has been evolved with the objective of restoration of Nonbah River at Nongstoin to meet the bathing standards.

3.0 Water Quality of the River, drains and ground water sources (located in the catchment of the river of the Nonbah River)

3.1 Water quality data Nonbah River

The river water quality data for the year 2019 (Jan to December) is provided at Table 2 below (The regular monitoring is carried out by Pollution control Board).

PARAMETERS	рН	DO mg/L	BOD mg/L	FC MPN/100ml	TC MPN/100ml
JAN	6.8	6.0	5.1	430	2200
FEB	6.9	6.5	4.5	480	2300
MARCH	6.9	5.5	5.2	490	2600
APRIL	6.8	5.0	5.0	430	2200
MAY	6.8	5.6	5.6	330	1700

Table 2: WATER QUALITY DATA OF NONBAH RIVER AT NONGSTOIN 2019

JUNE	7.1	6.6	4.5	270	1300
JULY	7.0	6.9	4.0	170	920
AUGUST	7.2	7.2	3.5	170	900
SEPTEMBER	7.1	7.3	3.3	150	520
OCTOBER	7.5	6.9	3.5	140	430
NOVEMBER	7.2	7.1	3.4	120	410
DECEMBER	7.2	7.4	3.2	140	440

3.2 Water quality characteristic of waste water from the drains is provided at Table 3

Names of	рН	Dissolved	BOD	Total	Feacal	Zn	Cr	Ni	Cu	Mn
the		oxygen	(mg/l)	Coliform	Coliform	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l
sampling		(mg/l)		(MPN/100ml)	(MPN/100ml)					
stations										
Drain	5.3	2.0	10.0	8,000	2400	0.15	BDL*	BDL*	BDL*	0.6
near fish										
market,										
Drain	6.9	3.5	8.4	5000	2000	0.1	BDL*	BDL*	BDL*	0.22
near										
Market										
Complex										
Drain	6.6	3.8	8.0	4800	2000	0.19	BDL*	BDL*	BDL*	0.93
near										
Govt. LP										
School										
Drain at	6.7	2.6	9.5	7500	2200	0.13	BDL*	BDL*	BDL*	0.37
Dong										
Speng										
Thawlang										
Mlah										
Drain	6.6	5.0	4.3	630	220	0.06	BDL*	BDL*	BDL*	0.14
near										
Bishop										
House										

TABLE 3: WATER QUALITY DATA OF THE DRAINS DISCHARGING INTO THE NONBAH RIVER -

3.3 GROUND WATER GROUND QUALITY

The Meghalaya State Pollution Control Board is monitoring the water quality of ground water located in the catchment of Nonbah river in Nongstoin and the water quality is provided at Table 4 below

TABLE 4 : GROUND WATER QUALITY IN THE ACTCHMENT OF NONBAH RIVER

	Sampling Locations→	Drinking Water	Spring at	Spring at	Spring near
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Parameters	Standards as per IS	Spengthawlang	lad Tihsaw	Nongstoin
↓	10500:2012	Miah		Market
рH	6.5-8.5	6.8	7.5	6.5
Conductivity (mg/l)	-	85.0	50.0	101.0
Turbidity (NTU)	1.0	0.8 1.0		1.0
Chloride (mg/l)	250.0	10.0	10.0	17.0
Alkalinity (mg/l)	200.0	26.0	24.0	32.0
Total Hardness(mg/l)	200.0	36.0	26.0	44.0
Nitrate-N (mg/l)	45.0	3.7	1.7	4.3
Iron (mg/l)	0.3	0.3	0.28	0.30
Total Coliform	Shall not be	Not Detectable	Not	Not Detectable
(MPN/100ml)	detectable		Detectable	
Faecal Coliform	Shall not be	Not Detectable	Not	Not detectable
(MPN/100ml)	detectable		Detectable	
Zn (mg/l)	5.0 mg/l	BDL	0.05	BDL
Cr (mg/l)	0.05	BDL	BDL	BDL
Ni (mg/l)	0.02	BDL	BDL	BDL
Cu (mg/l)	0.05	BDL	BDL	BDL
As (mg/l)	0.01	BDL	BDL	BDL
Lead (mg/l)	0.01	BDL	BDL	BDL
Nickel (mg/l)	0.02	BDL	BDL	BDL
Cadmium(mg/l)	0.003	BDL	BDL	BDL
Manganese(mg/l)	0.1	BDL	BDL	BDL

The analysis result indicated that the water conforms to the Drinking Water Norms as per IS

10500:2012 for all parameters tested

4.0 IDENTIFICATION OF SOURCES OF POLLUTION:

Major sources of pollution in River Nonbah are:

- a. Sewage / municipal drainage from the town.
- b. Improper disposal of solid waste into the drains.
- c. Industrial effluents from the Small scale Industries

5.0 COMPONENTS OF ACTION PLAN

Following components have identified for preparation of action plan for rejuvenation of river in compliance to the Hon'ble NGT Orders as detailed below:

The proposed action plan covers following components:

5.1 Channelization, treatment, utilization and disposal of treated domestic sewage

- a. Identification of towns and villages in the catchment of river Nonbah and estimation of quantity of sewage generation.
- b. Storm water drains now carrying sewage and sullage joining the river and interception and diversion of sewage to the STP to be proposed.

5.2 Industrial Pollution Control

- a. Inventorization of industries
- b. Category of industry and effluent quality
- c. Treatment of effluents, compliance with standards and mode of disposal of effluents

5.3 Solid Waste Management

- a. Collection, segregation, transportation, disposal and treatment of municipal solid wastes generated from town in accordance of provisions of the Solid Waste Management Rules, 2016.
- b. Restriction of illegal disposal of solid waste along the river bank of Umkhrah River and flood plain zones.
- c. Burning of solid waste should be strictly prohibited.
- d. Construction and demolition wastes should be disposed in designated areas and no case it should be disposed into river beds or flood plain zone.

5.4 Flood Plain Zone

- a. Regulating activities in flood plain zone.
- b. Management of Municipal, Plastic, Hazardous, Bio-medical and Electronic wastes.
- c. Afforestation in the catchment and aesthetic plantation programs.
- d. Improve irrigation practices.

5.5 Ecological/Environmental Flow (E-Flow)

- a. Issues relating to E-Flow
- b. Irrigation practices

6.0 DETAILED GAP ANALYSIS

6.1 SEWAGE MANAGEMENT: Nonbah Catchments

The sewage flow is considered as 80% of the net water supplied to the consumer. Considering 135 lpcd water supply, the rate of sewage generation works out as 108 lpcd and the same has been adopted. The population in the catchment of Nonbah river as per 2011 census is about 28742 and projected population is about 38151. The detailed gap analysis is given in the Table 4 below for the Nonbah River

Rivers	Towns	S Population Pc (2011)	_	Projected Total Water Consumption (135 lpcd) (MLD)	Projected	Exis		
			Population (2032)		Estimated Average Sewage Generation(MLD)*	Nos	Capacity	Gap (MLD)
Nonbah	Nongstoin	28742	38151	51.50	4.12	-	-	4.12

TABLE 4: GAP ANALYSIS WITH RESPECT TO SEWAGE

Base on the projected population, the estimated gap in sewage management is 4.12

Presently, under SBM (G), the households along the stretch are being granted schemes for construction of septic tanks along with soak pits

6.2 INDUSTRIAL EFFLUENT MANAGEMENT

In the catchment of the Nonbah River there is no industrial estate but the industries are isolated in pockets which are in operation. The total number of industries which fall in the catchment of Nonbah River are 20(twenty) in number. The number of industries categorically located in and around the catchment area of the Nonbah river stretch are as provided in Table 5

TABLE 5 : NUMBER OF INDUSTRIES OPERATING IN THE CATCHMENT

SI.	River	Identified River Stretch	Type of Industries/category	Number of Industries
No.				
1.	Nonbah	Nongstoin to Wahriat	Red Category	2
			Water polluting	32
			/small scale	

The total water consumption of the industries, the total effluent generated and number of

captive ETPs along with the Gap Analysis within the catchment of Nonbah River are given in the Table 15

TABLE 6 : GAP ANALYSIS OF EFFLUENT GENERATED BY INDUSTRIES

SI.	River	Type of	No. of	No. of	No. of	Total Water	Industrial	Industrial	GAP	Mode of
No.	1	Industries/	Industries	Industries	Industries	Consumption	Effluent	Treated		Disposal
		category		having	not having	by the	Generated	Effluent		
				Captive	Captive	Industries	by the			
				ETPs	ETPs	(MLD)	Industries			
							(MLD)			

1.	Nonbah	Red Category	2	2						Treated Effluent is
		Water polluting /small scale	32	30	2	0.345	0.276	0.2745	0.0015	Disposed off to Drains

6.3 SOLID WASTE MANAGEMENT

SI.	Town or	Population	Expected	Future	Existing treatment	facility	GAP
No.	City	(2011)	population (in 2032)	Total solid waste generation (at 0.35 kg per head per day) in TPD	Total no. of Treatment facilities	Total capacity	
1.	Nongstoin (Catchment of Nonbah river)	Population 28,742	28742	38151		-	13.35

6.4 INDUSTRIAL HAZARDOUS WASTE

Automobile Service Centers are already covered under consent mechanism under Water Act (Prevention and Control of Pollution) Act 1974.The Committee advised the Meghalaya State pollution Control Board to bring all these under the HW & OW (M&H) Rules, 2016 and regulate them through authorization process.

6.5 BIOMEDICAL WASTE MANAGEMENT

There is one common bio-medical waste treatment facilities in the state of Meghalaya which at present is nonfunctional.The Common Bio-medical Waste Treatment Facility (CBMWTF) is under repair and renovation.The HCF have their own treatment facilities like Deep burial pits and sharp pits constructed in accordance to Biomedical Waste Management Rules 2016.The biomedical wastes are disposed by deep burial and the liquid portion by direct discharge into drains after chemical disinfection. Some of the HCF also have autuclaves ,shredders and incinerators for the treatment of the Biomedical wastes.

6.5 CONSTRUCTION & DEMOLITION WASTE

No major large scale construction or demolition is carried out within the catchment area of the river. Small scale housing construction and demolition is carried out where in the waste is used for land filling and levelling

7.0. NONBAH RIVERS REJUVENATION PLAN:

7.1 Action plan for management of sewage:

- a. Each household within the catchment area of the Nonbah river needs to have a septic tanks and a soak pit.
- b. The flow in each drain should exclude monsoon flow. Further, any drain if receiving fresh water from any escape channel etc, should be examined for its diversion rather than mixing with sewage.
- c. No proposal for Sewage Treatment Plants (STPs) has been prepared.

Action plan for management of industrial effluents:

- a. All the industries (water polluting) will be directed to have captive ETPs and ensure to compliance to effluent discharge norms.
- b. Industries will be directed to adopt best practices to minimize water consumption and for recycling of treat waste water.
- c. Provision of waste water treatment system.
- d. Hotels/Restaurants particularly located on road-side should not dispose untreated sewage and solid waste into nearby public drain or rivers. Such establishments should be properly regulated and levied with fines in case of any violation.

7.3 Action plan for management of Solid Waste Management:

- a. Implementation of Door-to-Door collection.
- b. Source segregation as biodegradable and non-biodegradable wastes.
- c. Identification of suitable site for setting up common waste processing and secure landfill facility.
- d. Transportation, disposal and treatment facilities of municipal solid wastes generated from town in accordance of provisions of the Solid Waste Management Rules, 2016.
- e. Restriction illegal disposal of solid waste along the river bank and flood plain zones.
- f. Prohibition on burning of solid wastes.
- g. Development of integrated solid waste management facility (provision of segregation, treatment, compost, pellats making as well as landfill with leachate treatement provision in accordance with solid waste management rules, 2016 as further amendments made thereof.

7.4 Flood Plain Zone (FPZ)

a. Department of Water Resources should identify /demarcate Flood Plain Zone and

regulate the activities. Such regulations would also cover;

- b. Plantation in Flood Plain Zone (FPZ) By Forest and Environment Department, Meghalaya
- c. Checking and removal of encroachments periodically- District Administration

5 Greenery development- Plantation plan/Biodiversity Parks:

A land for setting up of Bio-diversity park has been identified and a proposal for has been send to the government. Green plantation will taken up to protect soil erosion and further encroachment into the river

7.6 Sand Mining in river stretches:

There has been no account of sand mining in the Nonbah river stretch.

7.7 Environmental Flow (E-Flow):

The river Nonbah carries natural waters during the monsoon and even during the lean season as the rivers is perennial. Provisions of roof top rain water harvesting in Govt. building, commercial buildings, hotels and Houses will be emphasized. By-laws are made in the Urban Affairs Department for provisions of roof top rain water harvesting. Hydrological Stations will be set up along the stretch of the river Nonbah by Water Resources Department.

8 MONITORING OF ACTION PLAN

In compliance with the order passed on OA No. 673/2018 dated 20.09.2018 by the Hon'ble National Green Tribunal (NGT) Principal Bench, New Delhi, "River Rejuvenation Committee" was constituted by the Governor of Meghalaya vide order NO. ENV.5/2018/44 Dated 24.01.2019. The proposed Action Plans will be monitored by the River Rejuvenation Committee (RRC) which has been constituted by Government of Meghalaya. CPCB experts also shall be invited for the RRC review meetings for taking feedback and suggestions.

Action Plan for River Rejuvenation of polluted river stretches shall be prepared and monitored by the Committee.

River Rejuvenation Committee:-

1.	PCCF & HOFF, Forest & Environment Department, Meghalaya	-	Chairman
2.	Director, Urban Affairs Department, Meghalaya	-	Member Secretary
3.	Director, Commerce and Industries Department, Meghalaya	-	Member
4.	Member Secretary, Meghalaya State Pollution Control Board	-	Member

ACTION PLANS WITH TIME LINES AND EXECUTING AUTHORITIES WITH THE BUDGET ESTIMATES ARE GIVEN IN THE FOLLOWING TABLE BELOW:

SI.	Action Plan for rej	uvenation	Execution	Time	Amount	Remarks	
No	of River Nor	nbah	Agency/	Target	(in		
Department rupees)							
 	o-remediation of		MSPCB	April 2021		DPR to be prepared	
	Drains						
Cor	nstruction of septic		PHED			Under swach Bharat	
latr	ines with soak pits					Mission (G	
2.	INDUSTRIAL POLLUT	ION CONTRO	<u>DL</u>				
	Action against	t the	MSPCB	Continuous		Directions, show	
	industries not	installed		Process		cause notices and	
	ETPs or ETPs e	exist but				Closure notices are	
	not operating or ETP					issued.	
	outlet or treated						
	effluent is not	t complying					
	to the effluen	t discharge					
2		GEMENT.					
5.	Solid Waste	OLIVILINI.	Urban Affairs	1		Site has been	
	Management	Project	Department			identified	
	a A Solid W	aste	Department			Budget vet to be	
	Managem	nent				estimated	
	Project is	being				connacca	
	initiated k	by the					
	Urban Aff	airs					
	Departme	ent for the					
	developm	nent of the					
	scientific	waste					
	managem	ient					
	facilities f	or Umtrew					
	Town						
	b. Developm	nent of					
	integrated	d solid					
	waste ma	nagement					
	facility (pi	rovision of					
	segregatio	on,					
		i, composť,					
	well as sa	nitany					
	landfill wi	th leachate					
	treatmen	t nrovision					
	in accord:	ance with					
	solid wast	te					

-								
	management rules,							
	2016 as further							
	amendments made							
	thereof.							
4	BIO-MEDICAL WASTE MANAGEMENT:							
	Development of one Commo	n Urban Affairs	30 th		Cost is included in			
	Biomedical waste treatment	Department,	January,		Umkhrah Action Plan			
	facility	Shillong	2021					
		Municipal Board						
5	GROUNDWATER QUALITY		1					
	Groundwater quality	Meghalaya State	Continuous	-				
	monitoring in the catchment	Pollution	process					
	of river Nonbah							
6	FLOOD PLAIN ZONE:		1	I				
	Prohibition on illegal disposal	District	Continuous	-				
	of waste and removal of	Administration &	activity					
	encroachment from river	Urban Affairs						
-		Department						
1	ENVIRONMENTAL FLOW (E-FLO	JW) AND GROUNDW		JE MIEASU	RES:			
	Provisions of roof top rain	District	Continuous	-	By-laws are made in			
	water narvesting in Govt.	Administration/	activity		the Urban Affairs			
	buildings, botals and Houses	Department			Department.			
	buildings, noters and houses	Department						
	Setting up of Hydrological	Water Resources	30 th June,	0.054	Funding through			
	Stations. (non- recurring cost)	Department	2021	Crores	State Government			
8	GREEN DEVELOPMENT & BIO-	GREEN DEVELOPMENT & BIO-DIVERSITY PARK						
	Plantation on both sides of	Forest &						
	the river and in the private	Environment						
	land and individual land	Department						
	owner	&						
		NGO						
	Land for bio-diversity park				Proposal to be send			
_		N (1715)			to the Government			
9	CLEANING & AWARENESS ACT							
	Public awareness programme	Forest	Regular					
	through add on media	Č Environment	ACTIVITIES					
		Environment						
		MSDCP District						
		Administration						
1			1	1	1			