

# Abatement of Polluted Stretch of River

\_\_\_\_\_ from \_\_\_\_\_ to \_\_\_\_\_



## Detailed Project Report

Submitted to



Water Resources Department  
Government of Kerala

**Water Resources Department,  
Government of Kerala**

Prepared by

**( COLLEGE LOGO )**

**Department of \_\_\_\_\_**

**(Name of the College)**

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## Executive Summary



## 1. Introduction

### 1.1 Background

Background of NGT order, Tie-up of WRD (ISWC) with Engineering Colleges, selected river by the concerned college.

Brief description about the river basin, the origin, length, catchment area, the importance like cultural, religious, historical and archeological importance etc.

Some statistics about demography, economic status of residents, livelihood activities etc.

Details on the meteorological parameters like climate, monsoon, temperature, and hydrological aspects of streams and other rivers joining the river, variation of river flow, dry weather flow, availability of dams, barrages

Ecological aspects of the river mentioning the species of flora and fauna, any observations of reduction in biodiversity reported in literatures

Environmental concerns, issues related with pollution load, degradation of water quality, dwindling of water flow due to interventions

Figure showing the geographical location in India, Kerala, showing the river basin

### 1.2 Polluted Stretch of the River

Brief description of the polluted stretch, observations of monitoring agencies and classification for best designated usage, Priority class, mentioning the range of water quality parameters.

Cities, Towns, Villages, Panchayats etc. near the polluted stretch (Appendix A-1, A-2), Wetlands and water bodies (Appendix A-3), possible sources of pollution, industries, solid waste dumping sites, agricultural fields, etc. – brief description

Figure showing the polluted stretch

## 2. Objectives and Outcomes of the Action Plan

### *Objectives:*

The main objective of the Action Plan is to restore the water quality of priority [redacted] polluted stretch of [redacted] river (from [redacted] to [redacted]) to Class B (IS 2296:1992).

### *Outcomes:*

The outcomes envisaged after the implementation of Action Plan include:

- Enhancement in river water quality to Class B
- Maintenance of minimum environmental flow
- Improvement in river biodiversity

## 3. Pollution Inventory

### 3.1 Details of Drains Contributing Pollution

Brief description of the drains joining the river, outlet drains carrying domestic sewage, industrial effluent, natural drains carrying sewage. Details in Appendix A-4.

Figure showing location of drains

### 3.2 Details of Sewage Pollution Sources and Treatment Systems

Identification of sources of sewage, estimated sewage quantity, location of Sewage treatment plants (common or decentralized) and their details, details of STPs in pipeline, gaps in sewage treatments

Figure showing location of STPs and drains discharging treated effluent

### 3.3 Details of Waste Management

#### 3.3.1 Municipal Solid Waste

Existing system of solid waste collection, treatment and disposal specifying collection points, method of transport and management, panchayats covered, Location of any dumping sites near the river, gaps identified (Appendix A-5)

Figure showing location of open dumping sites

#### 3.3.2 Bio-medical Waste

Location of health care facilities, method of treatment and disposal in practice, gaps identified

### 3.3.3 Hazardous Waste

Details of hazardous waste generated and treatment facilities.

### 3.3.4 E-Waste

Details of e-waste disposal facilities specifying collection centers, dismantling and recycling facilities, any gaps in the recycling as per e-waste rules, 2016. (Appendix A-6)

## 3.4 Details of Industrial Pollution Sources

Details of any industries in the locality, effluent treatment plants details and their efficiency, discharge points, any gaps identified. (Appendix A-6)

Figure showing location of industries and their associated drains

## 3.5 Sources from Agricultural Areas

Details of agricultural practices, usage of fertilizers, pesticides, etc.

Map showing location of agricultural fields

## 3.6 Any Other Sources

Details of any other sources that are not covered above

## 4. Flow Inventory

Streamflow over the years, the seasonal variations, minimum flow during lean period

## 5. Status of Groundwater

Details of groundwater usage, groundwater levels, any observation of over-exploitation, quality of groundwater for designated purposes (drinking or irrigation for which the water is used for)

Table showing details of location of wells and associated water quality parameters

(Secondary data collected from CGWB may be used)

## 6. Monitoring of Pollution Sources

### 6.1 Monitoring of Drains

Details of monitoring of the drains joining the river

### 6.2 Monitoring of River

Details of monitoring of the river sampling and analysis (Appendix A-7)

### 6.3 Monitoring of Polluting Industries

Details of monitoring of the industries polluting the river

## 7. Analysis of Environmental Flow

## 8. Detailed Gap Analysis

Key issues causing pollution to be identified from the collected primary and secondary data that are explained in sections 3 to 7.

## 9. Management Planning Framework

Formulation of management objectives, definition of targets comprehensively to fulfill each objective, quantitative description of performance indicators that represent the attainment of targets, proposal of strategies to achieve the indicators, identification of DPR components

Eg.

Objective:

Reduction in pollution load from drains

Targets:

- (i) Control of pollution from industry discharging effluent into drains
- (ii) Control of solid waste dumping near the drains
- (iii) Control of pollution from households

Performance Indicators:

- (i) BOD < 3 mg/L; TC < 500 MPN/mL

Strategies:

- (i) Status of industries w.r.t consent, ETP installation and adequacy, final discharge point
- (ii) Strict enforcement of discharge limit of effluent into drains
- (ii) Collection and segregation of solid waste
- (iii) Untapped drains to be provided with in-situ bioremediation or phyto-remediation

## 10. Action Plan for Restoration of Polluted River Stretch

### 10.1 Short Term Action Plan

Sl. No.	Action	Timeline	Implementing Department / Agency	Remarks
<b>Component I: Sewage Management</b>				
<b>Component II: Industrial Waste Management</b>				
<b>Component III: Solid Waste Management</b>				
<b>Component IV: Environmental Flow</b>				

**10.2 Long Term Action Plan**

SI. No.	Action	Timeline	Implementing Department / Agency	Remarks
<b>Component I: Sewage Management</b>				
<b>Component II: Industrial Waste Management</b>				
<b>Component III: Solid waste management</b>				
<b>Component IV: Environmental Flow</b>				

## 11. Third Party Monitoring and Evaluation

Monitoring of the performance indicators by means of result based logical framework analysis and evaluation of the effectiveness of project implementation to be done for each activity/component.

Activity/Component	Performance Indicators	Means of Verification	Frequency of Monitoring

**Appendices****A-1 Details of Cities and Towns**

<b>SI. No.</b>	<b>District</b>	<b>Name of town / city</b>	<b>Population (2011)</b>	<b>Estimated Population (2021)</b>	<b>Sewage Generation (2021)</b>	<b>Estimated MSW (kg/day)</b>



**A-2 Details of Grama Panchayat and Revenue Villages**

Sl. No.	District	Name of village	Population in 2011	Decadal growth (%)	Estimated population in 2021	Sewage generation (MLD)	Estimated MSW (kg/day)
<b>Villages located on the right bank of the river</b>							
<b>Villages located on the left bank of the river</b>							

**A-3 Details of Wetlands and Water Bodies**

SI. No.	District	Name of nearby Village	Latitude	Longitude	Distance from river (km)	Location of wetland	
						Left Bank	Right Bank

**A-4 Pollution Source Mapping of River \_\_\_\_\_ from \_\_\_\_\_ to \_\_\_\_\_**

<b>Drain ID</b>	<b>Name of drain</b>	<b>Latitude</b>	<b>Longitude</b>	<b>Domestic / Industrial / mixed</b>	<b>Tapped / Untapped/ Partially Tapped</b>	<b>Bar screen status</b>

**A-5 Details of Municipal Solid Waste Management**

SI. No.	District	Name of City / Town / Panchayat / Village	No. of Collection Points	Status of Segregation	Details of Disposal System / Site	Remarks

**A-6 Status of E-Waste Management**

<b>Sl. No.</b>	<b>Name and Address</b>	<b>Regional Office</b>	<b>Status of Authorization</b>	<b>Status of Registration</b>	<b>Type</b>	<b>Capacity (T/Annum)</b>

**A-7 Details of Industries**

SI. No.	Name and Address	Latitude	Longitude	Type of Industry	Treatment Mechanism (ETP/CETP)	Effluent discharge (KLD)	Effluent discharge drain (distance from river)	Remarks

**A-8 River Water Quality Data**

**Graph showing seasonal variation of pH, DO, BOD, TC and FC for one year (preferable January 2020-December 2020 obtained from KSPCB)**

**Analysis of Water Quality Parameters as part of River Survey (January-February 2021)**

**Details of Sampling Stations**

<b>Sample ID</b>	<b>Landmark</b>	<b>Latitude</b>	<b>Longitude</b>	<b>Remarks</b>

**Date of Sample Collection:**

**Date of analysis:**

Station ID	Temperature (° C)	pH	EC (µS/cm)	DO (mg/L)	BOD (mg/L)	COD (mg/L)	NH <sub>4</sub> -N (mg/L)	NO <sub>3</sub> <sup>-</sup> (mg/L)	Chlorides (mg/L)	PO <sub>4</sub> <sup>3-</sup> (mg/L)	TC MPN/100 mL	FC MPN/100 mL

**Classification of water for best designated uses****CLASS OF WATER AS PER IS:2296**

Classification	TYPE OF USE
ClassA	Drinking water source without conventional treatment but after disinfection
ClassB	Outdoor bathing
ClassC	Drinking water source with conventional treatment followed by disinfection.
ClassD	Fish culture and wild life propagation
ClassE	Irrigation, industrial cooling or controlled waste disposal



## Surface Water Quality Standards (IS 2296:1992)

Characteristics	Designated best use				
	A	B	C	D	E
Dissolved Oxygen (DO)mg/l, min	6	5	4	4	-
Biochemical Oxygen demand (BOD)mg/l, max	2	3	3	-	-
Total coliform organisms MPN/100ml, max	50	500	5,000	-	-
pH value	6.5-8.5	6.5-8.5	6.0-9.0	6.5-8.5	6.0-8.5
Colour, Hazen units, max.	10	300	300	-	-
Odour	Un-objectionable			-	-
Taste	Tasteless	-	-	-	-
Total dissolved solids, mg/l, max.	500	-	1,500	-	2,100
Total hardness (as CaCO <sub>3</sub> ), mg/l, max.	200	-	-	-	-
Calcium hardness (as CaCO <sub>3</sub> ), mg/l, max.	200	-	-	-	-
Magnesium hardness (as CaCO <sub>3</sub> ), mg/l, max.	200	-	-	-	-
Copper (as Cu), mg/l, max.	1.5	-	1.5	-	-
Iron (as Fe), mg/l, max.	0.3	-	0.5	-	-
Manganese (as Mn), mg/l, max.	0.5	-	-	-	-
Chlorides (as Cl), mg/l, max.	250	-	600	-	600
Sulphates (as SO <sub>4</sub> ), mg/l, max.	400	-	400	-	1,000
Nitrates (as NO <sub>3</sub> ), mg/l, max.	20	-	50	-	-
Fluorides (as F), mg/l, max.	1.5	1.5	1.5	-	-
Phenolic compounds (as C <sub>2</sub> H <sub>5</sub> OH), mg/l, max.	0.002	0.005	0.005	-	-
Mercury (as Hg), mg/l, max.	0.001	-	-	-	-
Cadmium (as Cd), mg/l, max.	0.01	-	0.01	-	-
Selenium (as Se), mg/l, max.	0.01	-	0.05	-	-
Arsenic (as As), mg/l, max.	0.05	0.2	0.2	-	-
Cyanide (as CN), mg/l, max.	0.05	0.05	0.05	-	-
Lead (as Pb), mg/l, max.	0.1	-	0.1	-	-
Zinc (as Zn), mg/l, max.	15	-	15	-	-
Chromium (as Cr <sup>6+</sup> ), mg/l, max.	0.05	-	0.05	-	-
Anionic detergents (as MBAS), mg/l, max.	0.2	1	1	-	-
Barium (as Ba), mg/l, max.	1	-	-	-	-
Free Ammonia (as N), mg/l, max	-	-	-	1.2	-
Electrical conductivity, micromhos/cm, max	-	-	-	-	2,250
Sodium absorption ratio, max	-	-	-	-	26
Boron, mg/l, max	-	-	-	-	2

## Plates

### Plate-1 River Basin Map

## Plate-2 Watershed Map

## Plate-3 Land Use Map

## **Plate-4 Location of Rain Gauge and River Gauge Stations**

## Plate-5 Map showing Irrigation Assets

## Plate-6 Map showing Road Networks

**Plate-7 Map showing Drains joining the River**



**Plate-8 Map showing Water Quality Sampling Stations**