

NEED AND CHALLENGES TO PREVENT POLLUTION FROM EXISTING RIVER STREAMS PASSING FROM THE CITIES, AND CONVERTING THE EXISTING HAZARDOUS ENVIRONMENT INTO A PUBLIC WATER FRONT

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ABSTRACT

The catchment areas of major storm water drains in Jodhpur, Rajasthan, are comprehensively covered with sewerage network. Even though almost all storm water drains carry sewage as dry weather flow round the year. Raw sewage flowing in these drains remain stagnant at many locations due to heaps created by solid waste dumping causing mosquito breeding and odor problems and pose a threat to the health of the inhabitants of the surrounding area. The stagnant sewage in storm water drains also causes pollution to the ground water which is very shallow 2-5 meter below ground level in many areas of the city areas.

Thus, Raw sewage flowing in major storm water drains (MSWD) discharging directly into Jojari river are one of the major causes of pollution in Jojari River.

Similarly, MSWD terminating within the city areas i.e. not extended up to Jojari River are also causing environmental problem in city areas through which these drains flow and or terminating near habituated areas. Previous study has found that the channel section is inadequate to pass design flood safely. It has been reported that during the rainy season of 1979 unprecedented flood occurred and flood water over flanked the river banks to an average distance of 300m either side at many locations between Banad and Jhalamand. Since then due rapid increase in city's population, many new habitation have developed near the banks of river.

Therefore, in our study we shall focus on Need and Challenges to Prevent Pollution from existing river streams passing from the cities, and converting the existing Hazardous environment into a public water front.

Keywords: Need And Challenges, Storm Water Drains, Analysis, Investigation, Research.

I. INTRODUCTION

The Jojari, a non perennial river flows from north east to south west of Jodhpur city. It is the ultimate carrier of city's storm water as well as treated or untreated waste water. Due to expansion of water supply and sewerage system of Jodhpur city the treated and untreated sewage flows in the river round the year. City's solid waste also finds its way into the river through storm water drains, trunk sewers yet to be connected to a sewage treatment plant and direct dumping into river flow area by near by habitants. As such the river has become an environmental hazard for the city, causing foul smell, spreading of infectious diseases among people living in nearby areas and contaminating ground water sources in downstream areas of the stream. It also gives a shabby look for a city of tourism importance. The above mentioned objective would necessitate preparation of a comprehensive project having following components;

1. Abatement of Pollution from river
2. River Channelization

SCOPE OF STUDY AREA

- a. Condition assessment of existing sewerage infrastructures like Sewage Treatment Plants (STPs), Sewage Pumping Stations, Sewerage Network created in the city under various schemes;
- b. Condition assessment of existing drains (with measurement of discharge and water quality information) for all the existing major drains discharging waste water directly/indirectly into the river Jojari or terminating within the city area causing environmental problems and contamination of ground water and suggest I&D (Interceptions or diversions) works.

GEOGRAPHICAL LOCATION OF STUDY AREA

- a. Jodhpur is centrally situated in the western region of the state, and covers a total geographical area of 22850 Sq. Km. Jodhpur district lies between 26 degrees 0 minutes and 27 degrees 37 minutes north

latitude and 72 degrees 55 minutes and 73 degrees 52 minutes east longitude. It is bounded by Nagaur in the east, Jaisalmer in the west, Bikaner in the north and Barmer and Pali in the South. The total length of the district from north to south is about 197 Km and from east to west it is about 208 Km. The district of Jodhpur lies at a height of 250-300 meters above sea level

II. METHODOLOGY

1. CONDITION ASSESSMENT AND INTEGRATION OF EXISTING STPs

50 MLD PLANT AT SALAWAS – ASP PROCESS (PHASE 1)



1. DISPOSAL OF TREATED EFFLUENT

The treated effluent from proposed and existing STPs is proposed to be disposed into Jojari river. So that the treated water can be reused for agriculture purpose.

2. EXISTING AND FUTURE PLANS OF REUSE/RECYCLING OF TREATED WATER

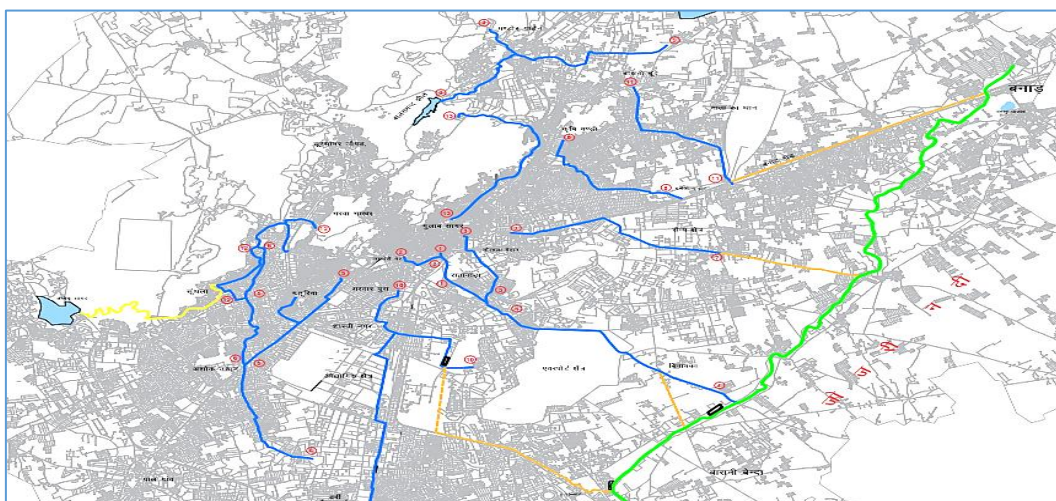
Currently the treated water from Nandri STP is being supplied for agriculture purpose directly to the farmers. For this purpose, there are two outlet pipe lines of dia 900 mm and 700 mm are being used for the supply of treated water from Nandri STP. Remaining volume of treated water is being disposed directly into the Jojari River.

The treated waste water from STP will be primarily used to Recharging the Jojari River, due to which it shall first fill the check dams created within the River Channel bed and then the surplus water shall begin flowing in the Jojari River. Some water would be used for:

1. Requirements for Landscape proposed to be developed along the Jojari River.
2. Green Landscape proposed to be developed at certain open spaces identified along the Jojari River.

III. MODELING AND ANALYSIS

DRAINS



Map Showing Existing Storm Water Drainage Network inside Jodhpur City

1. The existing storm water drainage system in Jodhpur comprises of 11 Major drains with Jojari River as the ultimate carrier.
2. The four major drains 1-1, 2-2 and 3-3 merges into drain no 4-4 at Ratanada and flows from city areas up toJojari.
3. The drain no 10-10 Nehru Park -Jojari is presently terminating at Polytechnic college. The construction work for extending this major drain up to Jojari is in progress and expected to be completed by the end of this year.
4. Similarly, extension of drain no 7-7 (Udaimandir- cantonment area -Digari) up to Jojari is also expected to be completed by the end of this year.
5. The drain no 9-9 originating from overflow of Balsamand and Naga Dari lakes and terminates at Surapura Dam Water spread area.
6. The major drain no 5-5 joins BharwaBhakhar Nalla (drain no 6-6) near Khema ka kua. The BB Nalla terminates near ShobhawatoKi Dhani. Similarly, the major drains 8-8 and 11-11 abruptly terminates in city area as mentioned in the table-

GROUP A: MAJOR DRAINS DISCHARGING SEWAGE INTO JOJARI RIVER			
Drain No.	Drain Alignment	Length in KM	Remark
1-1'	Sojati Gate – Anand cinema- Old power house- Central Jail – Shiv Mandir- Ratanada	2.26	Tributary of drain 4-4
2-2'	Rog Nidan Kendra inside Jalori gate- Jalori Bari - MG Hospital- Jaswant Sarai -Rly. Joining drain 1-1 near Anand Cinema.	1.1	Tributary of drain 4-4
3-3'	Bamba Mohalla (Old Stadium) – Darpan cinema - Gaushala Ground - Ajeet Colony- Ratanada - joining drain 1-1 at RatanadaSabji Mandi Junction	2.64	Tributary of drain 4-4
4-4'	Starting from Ratanadajunction to Nigam ward office – Sansi colony- Civil airport – sewerage farm –Binayakiya and joining Jojari River near Basni Benda STP site	5.25	Directly discharging sewage into Jojari near Basni
10-10'	Bhakat Sagar- (Nehru Park)- Medical College – MDM Hospital- Section-7 - Bhagat Ki Kothi – Mahaveer Nagar-terminating at Polytechnic college -Golf course-.Construction up to Jojari is in progress	4.47	Will be directly discharging sewage into Jojari
7-7'	From Uday Mandir – BaldevMirdha Circle- Paota Circle - Rasala Road – Prithvipura – Cantonment at Jaipur road-Digari Saran Village - Army Area presently terminating afterDigari. Construction in about 500m length up to Jojari is in progress	8.77	Will be directly discharging sewage into Jojari
GROUP B: MAJOR DRAINS TERMINATING WITH IN CITY AREA			
5-5'	From NaktiPuliaChopasni Road -- MDM Circle-Pal Road- Khemakuan joining – Bhairwabhakah – Shobhavatokidhani drain 6-6	3.7	Tributary of drain 6-6
6-6'	From Soor Sagar -ChandnaBhakar-Kamla Nehru Nagar- Lal Pulia -Chopasini Housing Board- KhemaKuan- Ambika Nagar-Sobhawaton Ki Dhani	6.8	Terminating near ShobhawatoKiDhani
8-8'	Drain from Krishi Mandi- Bhadwasia- Vishwakarma Nagar- Vidya Nagar - RTO Office-Gulab Nagar-	4.13	Terminating at Jaipur Road NH- 25.

	SirkariyaBera –Ganesh Market		
11-11'	Basni Bund – Mataka Than – Central academy	4.6	Terminating near Central Academy-
9-9'	From Balsamand overflow- Sanghvi School (Mandore Road)- Mandavato Ki School- Phoolbagh to Surpura Dam water spread area	2.75	

Method and analysis which is performed in your research work should be written in this section. A simple



Infront of Anand Cinema



Behind Shiv Mandir



Old Power House, Near Jodhpur



Ratanada Junction Point 1 & 3

Drainage 1-1

ANALYSIS

Model and Material which are used is presented in this section. Table and model should be in prescribed format.

SUMMARY OF WATER SAMPLES TAKEN AT DIFFERENT LOCATIONS							
S.No.	Location	IS-3025					
		P-11	P-17	P-39	P-58	P-44	P-38
		Parameters					
		pH	TSS	Oil & Grease	COD	BOD	DO
		Limits Max as per MOEF					
		5.5 to 9.0	100	10	250	30	-
	mg/l	mg/l	mg/l	mg/l	mg/l		
1	Near Pali Road Bridge at	7.25	50	9.25	224	40	Nil

	Joari River						
2	Sewage Water Near Dangiawas Bypass Flyover at Joari River	7.67	64	7.8	256	26.7	0.2
3	Sewage Water (1200 mm Sewer Outlet) at Joari River	7.87	320	132	1680	210	0.2
4	Sewage Water (Near Basni Benda Aniket) at Joari River	7.64	28	6.2	144	10	1.3
5	STP at Nandri (Outflow, Treated water)	7.08	68	20	312	60	0.1

Summary of water samples taken at different locations is given in following table-

CAUSES OF POLLUTION IN JOJARI RIVER

Following are the main causes of pollution in Jojari River:

- Untreated and partially treated sewage discharging into river through sewers not connected to STP
- Disposal of sewage flowing in storm water drains into Jojari
- Shortfall in sewage treatment capacity
- Quality of treated effluent from existing STPs not as per new standards for treated sewage
- Dumping of solid waste in storm water drains and directly into River

RAW SEWAGE QUALITY ASSUMED FOR DESIGN STPs

PARAMETERS	VALUE	UNIT
BOD5 @20°C	250	mg/l
COD	1680	mg/l
Total Suspended Solid	320	mg/l
Total Kjeldahl Nitrogen	Upto 55 mg/l	as N mg/l
Total Nitrogen	Upto 35 mg/l	as N mg/l
Total phosphorus	Upto 16 mg/l	as P mg/l
Nitrogen	Upto 35 mg/l	as N mg/l

IV. RESULTS AND DISCUSSION

SALIENT OBSERVATIONS ON EXISTING STORM WATER DRAINAGE NETWORK-SUMMARY

1. The catchment areas of these major storm water drains are comprehensively covered with sewerage network.
2. Even though almost all storm water drains carry sewage as dry weather flow round the year.
3. Raw sewage flowing in these drains remain stagnant at many locations due to heaps created by solid waste dumping causing mosquito breeding and odor problems and pose a threat to the health of the inhabitants of the surrounding area.
4. The stagnant sewage in storm water drains also causes pollution to the ground water which is very shallow 2-5 meter below ground level in many areas of the city areas.
5. Thus, Raw sewage flowing in major storm water drains(MSWD) discharging directly into Jojari river are one of the major causes of pollution in Jojari River.
6. Similarly, MSWD terminating within the city areas i.e. not extended up to Jojari River are also causing environmental problem in city areas through which these drains flow and or terminating near habituated areas.

V. RECOMMENDATIONS

1. Condition assessment of existing drains by visual inspection and water quality analysis reports clearly establishes that the DWF in MSWD is almost raw sewage.
2. Thus, need for interception and diversion (I&D) DWF flowing in major drains into the nearby passing trunk sewer is an essential step required for preventing environmental pollution in city area and water pollution in Jojari river.

After discussions with Nagar Nigam field staff and officers from JDA and JNN the locations and type of I&D works were identified.

Flow measurement in MSWD at these locations were carried out by Float Method as recommended in Chapter 3 design and construction of sewers page 3-11 para 3.10 of Manual on sewerage and sewage treatment systems part a published by CPHEEO, MoUD, GOI.

The data pertaining to the design capacity and present flow condition in related trunk sewer were also collected from office and field observations.

The results of these clearly show that the existing sewers to be used as interceptors are having surplus capacity to accommodate diverted flow from drains.

Therefore, I&D works as mentioned in table are proposed to intercept and divert DWF from storm water drains to trunk sewers and carry it further to STPs for treatment before disposal into Jojari or treat it by proposing STPs as decentralized system and reuse the treated waste water.

VI. CONCLUSION

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VII. REFERENCES

- [1] <http://jodhpurmc.org/>
- [2] <https://urban.rajasthan.gov.in/content/raj/udh/jda--jodhpur/en/home.html>
- [3] http://cgwb.gov.in/aqm/naquim_report/rajasthan/jodhpur.pdf
- [4] <https://www.indiastat.com/data/meteorological-data/meteorological-data>
- [5] <https://cpcb.nic.in/displaypdf.php?>
- [6] Performance Evaluation of Sewage Treatment Plants in Central Zone.