Annexure 3a

Preliminary Assessment Report

Studies on Rejuvenation of River Godavari and Integrated Action Plan for Improvement of Environmental Status for Nashik Region, Maharashtra

1. Introduction

Water pollution, a global problem, is continuously growing due to indiscriminate and unscientific releases of huge quantities of untreated or partially treated domestic wastewaters and also industrial and agricultural wastes. In India, most of the major rivers are badly polluted resulting in non-compliance of the class specified for best designated uses based on river water quality standards. Almost 70 percent of the surface water resources and groundwater reserves are contaminated by biological, toxic, organic, and inorganic pollutants. In many cases, these sources have been rendered unsafe for human consumption as well as for other activities. Due to draught conditions and limited releases from dams in the downstream river stretch during non-monsoon months, the minimum required flow in the river is not maintained at many places. The degraded water quality and inadequate quantity contribute to water scarcity and ecological stress.

Godavari, the second longest river in India after the river Ganges is known as "Dakshin Ganga (Southern Ganges)" or "Budi Ganga". It is one of the large river basins. It is the only river in India that flows from west to south and has its catchment area in six states of India i.e. Maharashtra, Chhattisgarh, Madhya Pradesh, Andhra Pradesh, Karnataka and Odisha. The Godavari basin catchment area extends over an area of 312,813 km^2, which is nearly 10% of the total geographical area of the country. Its surface water potential is 110.54 km^3 and ground water potential is40.65 km^3.

The Indravati, Pravara, Wardha, Wainganga, Kanhan, Pench, and Penuganga rivers in Maharashtra pour a huge quantity of water into Godavari River System. Major tributaries of the river are Pravara, Manjira, Purna, Maner, Pranhita, Indravathi and Sabari with the drainage area of152,199 km^2. Nearly 350 major / medium dams and barrages are constructed in the Godavari river basin by the year 2012 which is the highest among all the river basins in India. Godavari, is the largest river in Peninsular India with Holy places located on the banks of the river at Nashik and Bhadrachalam. Kumbh Mela which attracts millions of devotees is organized at Nashik after every 12 years.

Nashik city covers following holi places like Someshwar Temple, Navsha Ganapati temple, Laxmankund, Ram Kund, Dutondya Kapaleshwar Maruti Temple, Chakradhar Swami temple, Shri KalaRam Parnakuti temple, Sita Gumpha, Tapovan etc. Lacs of devotees visit these places every day. Mass bathing, asthi visarjan and dashkriya vidhi adds pollutants to the river. Areas like Sawarkar Nagar, Asarambapu Ashram, Nashik Boat club, Kusumagraj Udhyan, Goda park, Gandhi Talav, Gangevarcha Bhaji Bazaar, Hindu Smashan Bhumi at the banks of Godavari river also contribute significant pollution through waste discharges.

There are two industrial areas at Satpur and Ambad. No CETP is constructed for the combined treatment of the industrial waste generated at the MIDC areas. It was reported by MPCB official that individual treatment schemes are constructed by the respective water polluting industries.

The River Godavari is the main source of water supply for Nashik city. It also is used for industrial and domestic waste disposal. Beyond urban area, agricultural activities are carried out at a very large scale on both the banks of river Godavari. The growing problem of degradation and human activities has made adverse impacts on river ecosystem and hence it important to monitor water quality of river and define the level of pollution.

Washing of clothes and vehicles in Godavari river at Balaji Mandir near Someshwar waterfall

Mr. Rajesh Madhukar Pandit and Ors filed a Public Interest Litigation (PIL No. 176 of 2012) against Nashik Municipal Corporation and Ors and the matter was placed before Hon'ble High Court on 18.4.2013. As per the PIL, the river does not meet the prescribed class –A-II category. During the non- monsoon period, the river water flow is reduced due to the limited release of water from Gangapur dam and more importance is given to irrigation, drinking water and water supply to thermal power plant in Eklahara. This leads to reduced ecological flow of the river and thus, water quality of river gets deteriorated due to disposal of wastewater and other contaminants.

It was decided that an expert agency like NEERI should be appointed to prepare a comprehensive action plan on cleaning and proper maintenance of the Godavari river. Accordingly all the necessary documents were received by NEERI for preparation of a project proposal. TOR was stipulated by MPCB. Hon'ble High Court has appointed National Environmental Engineering Research Institute (CSIR-NEERI) to prepare a comprehensive action plan on cleaning and proper maintenance of the Godavari river. Accordingly NEERI has submitted a proposal **(Annexure-I)** with respect to following objectives and scope of the work:

2. Objectives

The main objective of the study is to assist the Nashik Municipal Corporation in overall management of Environmental aspects of all the infrastructural facilities. It includes critical evaluation of current systems, monitoring and suggestions for mitigation measures.

3. Scope of Work

The scope of work given below has been derived from the PIL documents and issues raised. Primarily, the draft TOR suggested by the MPCB has been taken up as it addresses almost all the major issues concerned in cleaning River Godavari.

The scope of work is considered in three sub – categories mentioned as under:

1. Initial Survey to asses existing status of water quality of River Godavari and waste water disposal and treatment practices adopted;
2. Assessment of solid waste management impacting the river/nallas;
3. Social custom and practices (which are impacting the stream)

The major activities to be considered during the whole study are:

- Collection of secondary data for existing situation of water quality, wastewater systems as a whole, sanitation and solid waste management.
- Reconnaissance survey of the river Godawari from Gangapur dam upto downstream of Nandur Madhyameshwar Bandhara, covering about 60 km stretch.
- Assessment of water quality in 60 km stretch of Godavari river for pre monsoon and post monsoon season at upstream and downstream of confluence points of 19 natural streams which are converted into nallas carrying waste water.
- Suggest remedial measures to restore and maintain the river ecology for its designated use
- Finalize the appropriate monitoring stations in the identified river stretch and work plan for regular monitoring.
- Evaluation of existing STPs and assess the adequacy of planned and under construction STPs.
- Methods for Recycle and Reuse of treated effluents from wastewater treatment plants
- Assessment of current practices adopted for removal and ultimate disposal of Nirmalya, plastic bags and water hyacinth.
- Establishment of Special Environment Management cell along with analytical Laboratory requirement, staffing pattern, requirement of specialized qualifications and experience in environment protection, duties and responsibilities like O & M of Waste management, creation of vigilance squad
- Examination of issues in respect of O & M of waste Management systems for sewage and solid waste and suggest permanent measures to ensure proper administration, supervision and management of provided waste management facilities
- Suggest long term, medium term and short term solutions, especially for waste water disposal through nallas.
- Rejuvenation of river stretches and natural drains through adequate and appropriate design and implementation.
- Evaluation of adequacy and performance of current waste management systems and suggest corrective measures if required
- Development of a model for effective implementation of environmental protocols.
- To prepare detailed Management plan to be implemented during forthcoming “Kumbh Mela”

The proposal was submitted to High court on 6th May 2013. After scrutinizing the issues, the modifications in the modality of project activities were suggested by the jury.

4. Suggestions from Honorable High Court Authority:

Considering the magnitude of problem, The High court jury was of the opinion that by accepting the project proposal submitted by NEERI, a direction needs to be issued of appointing NEERI to complete the study and submit reports as provided in clause 7.0 of the project proposal (Copy of the proposal as Ann. I). The only modification which was proposed to be made of directing NEERI to submit a preliminary report in June, 2013 containing the recommendations as regards the immediate measures which are required to be taken. Thus NEERI is directed by the High Court to submit the preliminary report by 20th June 2013 stating the steps required to be taken immediately by Nashik Municipal Corporation authorities. Municipal Corporation is expected to extend all possible cooperation and assistance to NEERI to enable the NEERI to complete the assigned task.

5. Activities assigned for Preliminary Assessment Report

The following activities are considered for the Preliminary Assessment Report to be submitted by 20th June2013:

- Initial Survey of the study Area and Preliminary assessment of the complaints received under the PIL
- Collection and collation of secondary data pertaining to infrastructural facilities and City Sanitation Plan with specific reference to domestic and industrial waste disposal
- Site visit for Sampling and analysis of the identified stretch before monsoon along the river for Rapid evaluation of water quality.
- Identification of major areas of concern
- Suggestions/ Recommendations for immediate action to be taken by NMC.

6. Initial Survey of the study Area for Preliminary Assessment Report:

A team from CSIR-NEERI had detailed discussions with the officials concerned with the subject. The Municipal commissioner, Mr. Sanjay Khandare briefed the NEERI experts about the actions taken so far by the corporation on the Godavari River Action Plan and steps planned for restoring the desired A-II status of the river Godavari within the study area. Mr. U.B.Pawar, SE. (sewerage), Mr. R.K. Pawar SE(Mech.) and Mr. S.R. Vanjari, EE were present during the discussions. The team visited MPCB officials and received information on the surveillance of river Godavari within the study zone. Mr A.S.Fulse, R.O. and Mr.R. Andhale, S.R.O. extended all support and provided the data and photographs taken during joint visit of NMC official and MPCB. The team had elaborate discussions with the Petitioner Mr. Rajesh Pandit and his associates and had patient hearing about their concern.

Next day, on 25th May, 2013, the team inspected a stretch of the Godavari river starting from Trimbakeshwar to downstream of Nashik city. It was reported that 55.83 MCFT quantity of water was released from Gangapur dam by Irrigation department during 24th to 26th May 2013 on request from Eklahara Thermal Power Plant authorities. Hence on the day of visit, the river had adequate water flowing and many of the drains releasing wastewater were not physically noticed.

Kushawarta at Trimbakeshwar

Intake well for drinking water supply at Gangapur dam

An elaborate sampling programme was organized covering an area of Godavari river from Trimbakeshwar upto Nandur Madhyameshwar dam on 29th May, 2013. Water and wastewater samples were collected to establish the quality.

7. Information on Study Area:

A) Godavari River: Godavari river rises in the Sahyadris near Triambakeshwar, about 80km from the shore of Arabian sea, at an elevation of 1067m in the Nashik district of Maharashtra. The river travels a distance of about 1465km flowing through the states of Central India and extends for over 9.5% of the total geographical area of India (Ref.: Hydrology and Water Resources Information System). **Figure 1 depicts the study area of Godavari river.**

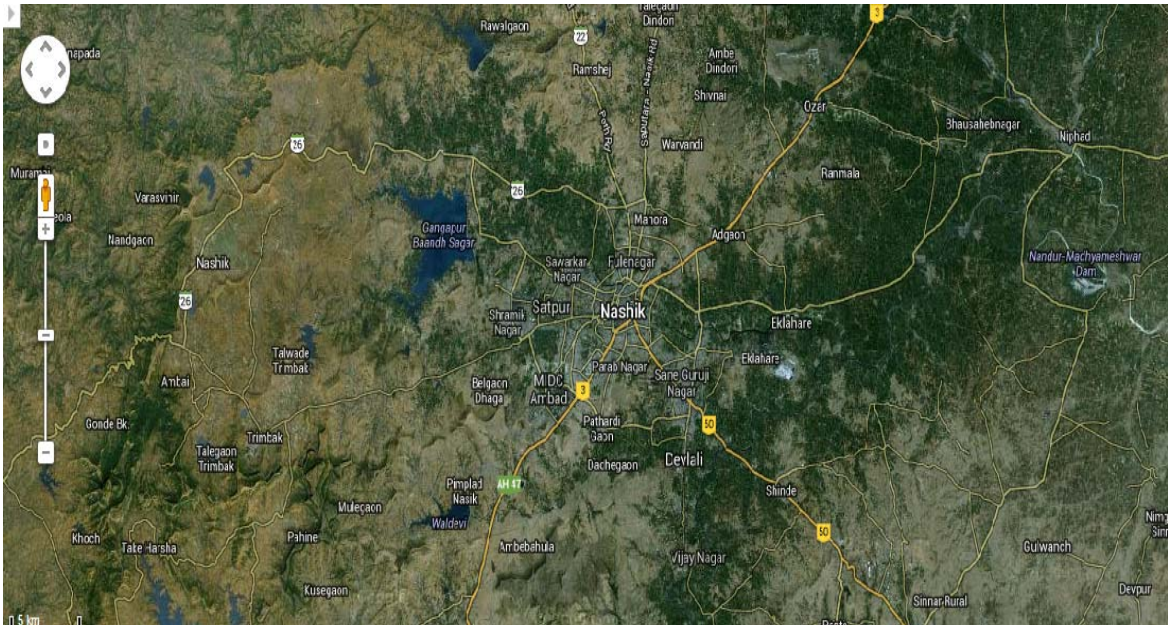


Figure 1: Study area covering a stretch of Godavari river from Trimbakeshwar upto

The Godavari River has a drainage area of 312,812 km² that includes more than one state which is nearly one-tenth of India and is greater than the areas of England and Ireland put together. The Pravara, Indravati, Wainganga, Wardha, Pench, Kanhan and Penuganga rivers, discharge an enormous volume of water into the Godavari system. Its tributaries include Indravati, Manjira River, Pranhita Purna river, Kolab Bindusara River and Sabari River. Some important urban centers on its banks include Nashik, Aurangabad, Nizamabad, Rajahmundry and Balaghat.

Nandur Madhyameshwar dam : River Godavari is very important for the economic development of Nashik region in Maharashtra. The river water is profoundly used for agriculture, as it is the only available water source. Over half of the river basin (18.6 million ha), is categorized as cultivable land. Major quantity of river water is drawn for irrigation. Downstream Trimbakeshwar, there is a big dam constructed and completed in 1957 called Gangapur dam. The dam at Gangapur with a catchment area of 357.40 sq.km and submergence area of 2231 ha. provides drinking water to the residents of Nashik. It also supplies water to the thermal power station located downstream at Eklahara which supplies power to the town. Two canals viz. left bank (62.4 km) and right bank (30.4 km) from Gangapur dam provide water for irrigation. The Godavari River is sacred to Hindus and has several temples built on its banks. One of the twelve Jyotirlingas and ancient temple of Lord Shiva is situated in Trimbakeshwar, situated at a distance of 29 kms. from Nashik. Every twelve years, Sinhastha Kumbh Mela is held on the banks of the Godavari river in Nashik. It has been held as a special place of pilgrimage for many thousands of years.

Asthi Visarjan and Mass bathing by devotees in River Godavari at Ramkund

Table 1: Towns/ Villages along the bank of Godavari river under study area

Name of the Town	Population (2001)	Class of the City	Name of the Town	Population (2001)	Name of the Town	Population (2001)
Trimbak	9804	Class - V	Lakhalgaon	3840	Chandori	12098
Gangapur	22325	Class- III	Chehedikhurd	885	Shingave	4940
Nashik City	1152326	Class - I	Lalpadi	807	Karanjgaon	5568
Talwade Trimbak	1773		Darnasangavi	1642	Nandur Madhyameshwar	3733
Beze	1119		ShimpiTakli	1616	Niphad	9274
Shilapur	1691		Chatori	5479		
Odha	2645		Saikheda	7199		

B) NASHIK CITY

Nashik, the fourth-largest city in Maharashtra, is the District headquarters of Nashik District. Spread over 259 sq.km, Nashik has population of 1,480,769 as per 2011 census. It is an important node of the industrial triangle with Pune and Mumbai. Located along the river Godavari, Nashik, located at a height of 565 meters above mean sea level at a distance of 180 Km from Mumbai is famous for its grape vineyards and is also an important pilgrim centre.

The main rivers flowing in the district is Godavari and its tributaries Kashyapi, Darna, Girna, Kadwa and Nasardi (Nandini), Mula, Prawara, Panjarakan, Gomai etc. Nashik city is an important and famous ancient city of Maharashtra. The banks or the Ghats of the river Godavari are considered to be sacred. People take holy dip in the "Kundas" (Ponds) constructed on the river banks. Panchavati is one of the densely populated areas of Nashik where Ramkund is a unique place of religious importance at all the times, especially in the "Kumbhamela".

There are two industrial estates namely Satpur having 1600 Acres and 750 no. of units and Ambad having 1400 Acres area with 850 nos. of units. As of today there is no common effluent treatment plant in this region for the treatment of effluent generated from SSI Unit. It is the need of the hour to provide common effluent treatment plant in these industrial areas. The M.I.D.C. has not provided any underground drainage system for collection of industrial and domestic waste water. There is no common hazardous waste dumping site identified in the area.

Collection of Sample from Chikhali Nalla

Impact of Industrial effluent on the rockey areas on the banks of Chikhali Nalla

The river water quality is being monitored regularly by MPCB at 28 locations. The monitoring is being carried out by the Sub Regional offices, for their respective jurisdiction. The overall coordination is being done by the Regional office at Nashik to ensure proper monitoring, analysis of samples and correct and timely submission of data.

B-1 Water Supply in Nashik

According to the ESR (2011) report of NMC, 99.8% of the total population extensively uses surface water i.e. piped water supply. Only 0.2% is dependent on ground water supply which is available in the form of bore well. Nashik city gets its drinking water supply from two sources viz Gangapur Dam and Darna river.

Raw Water Sources

Gangapur Dam :From Gangapur dam headworks, raw water is pumped and supplied to Shivaji Nagar Water treatment plant through 1200mm dia MS rising main pipe line and after treatment water is supplied to CIDCO & Satpur area. There is another pumping main from Gangapur Dam headworks. Raw water is pumped at balancing tank situated within the headwork premises and from there water is supplied to Nashik WTP, Gandhinagar WTP, Panchavati WTP and Nashik Road WTP, through prestressed concrete gravity lines

Darna river: It is another source of water for Nashik Road area. About 30 MLD of raw water is pumped and supplied to Nashik Road filtration plant.

Water Treatment Plants: The raw water is treated at five water treatment plants. Total quantity of treated water is 350 MLD.

Table: 2- Water Treatment Plants at Nashik and their capacity

Water treatment plants (WTP)	Capacity (MLD)
Nashik WTP	81
Panchavati WTP	71
Nashik Road WTP	73
Shivajinagar Hill WTP	145.5
Gandhinagar WTP	52
Total	422.5

Source: ESR 2011

Conventional water treatment processes including aeration, coagulation, flocculation, sedimentation, filtration and disinfection are adopted at all five treatment plants. Alum is used as coagulant and chlorine gas is used as disinfectant. There are total 78 Elevated Service Reservoirs (ESR) for distribution of water in the city. The average supply of drinking water to a citizen is 150 LPCD. Slum areas get the supply at low rate (40 lpcd).

Large amount (About 25%) of water is being wasted at different points in the distribution system. The loss is mainly due to leakage from old & improper joints and faulty valves and also from taps from head-works to supply points. In old and congested city areas, there are unauthorized illegal connections, which also contribute to unaccounted water loss through theft. This wastage and unaccounted loss for water is about 40% of total raw water pumping (water audit done by NMC through consultant).

Distribution System for Potable Water

The Municipal Corporation is supplying water to above 95% developed area of this corporation. There are totally 1.6 lac water connections in the city. The average duration of intermittent supply is 1.5 to 2 hours in the morning and evening. In CIDCO (New Nashik) area, supply is one time only. About 22000 consumers in CIDCO area and about 3000 consumers in old city area are without water meter. The city has about 700 Public Stand post for water supply to weaker section/ Slums of the society. After year 2000 no new stand posts are erected as a policy. For weaker section and slum dwellers, group connections at concessional rate are provided as per their demand and all these

connections are metered. Water is supplied to the citizens through house service connection. In some areas, hand pumps are provided by NMC. On an average, about 3500 metered new connections are being added every year.

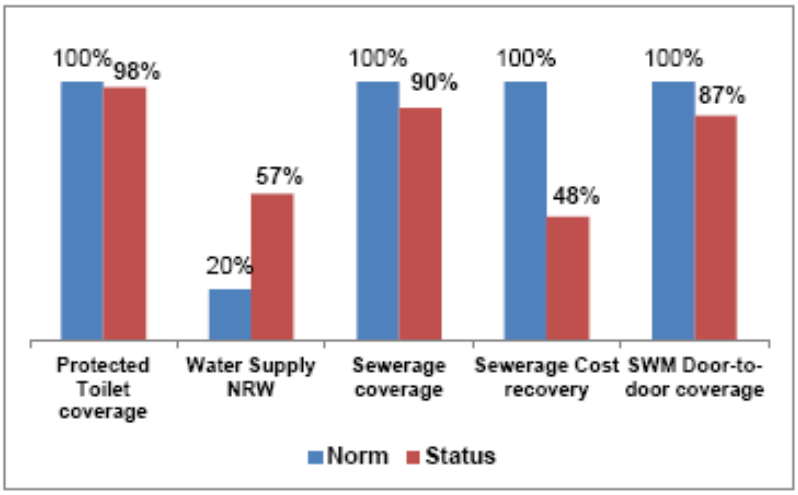
Key Issues & Challenges for Water Supply in Nashik city identified in City Development Plan of Nashik Municipal Corporation under JNNURM (2005-06)

1. No comprehensive Master plan for the city.
2. 5% area to be covered under water supply scheme.
3. 25000-house connections are without meter.
4. High amount of distribution losses and unaccounted for water,
5. Unequal distribution of water.
6. Low pumping efficiency.
7. Lack of professional approaches, less revenue collection due to improper meter
8. reading system.
9. Inadequate water network distribution in some area.
10. Lack of public awareness regarding the conservancy of water.
11. In some area water supply scheme is not in a position to cope up with the demand,
12. since rapid increase of population.
13. The treatment facility has been set up with conventional process & not utilized to
14. the extent of full capacity.
15. At present no systematic approach is adopted from maintenance of water supply
16. distribution system, which leads to high cost of O&M system.
17. Gap between quantity of water actually supplied and quantity of water billed.

The Master plan has already been prepared in Nov 2009 and the above issues are addressed to be taken care during implementation. Augmentation of Water Supply has also been planned. The revised draft City Development Plan (CDP) has been prepared for the city. The above issues of previous CDP (2005-06) are addressed in the revised draft CDP.

B-2 Sanitation in Nashik City

While Nashik does not fare too badly on sanitation indicators, a recent exercise of the Ministry of Urban Development Government of India (MoUD) placed Nashik at 42nd rank among 423 cities covered in the survey. Though Nashik is well covered with water supply and sewerage infrastructure, open defecation is still prevalent in more than a quarter of its slums. Nashik has a fairly extensive door-to-door waste collection system and is among the few cities to have a waste processing facility. However, pollution in river Godavari is emerging as a key concern. While NMC has taken a number of pro-active measures in terms of preparation of master plans and DPRs for Water Supply, Sewerage and SWM, there is a need for synchrony across these through integrated planning and wider stakeholder participation. Financial sustainability of sanitation service provision is another concern area, given the scale of projects currently under implementation. Given this context, this initiative to develop a CSP for NMC is indeed timely.



Source: CSP Exe Summary 2011

Foam in Godavari river at Dasak bridge

Solid waste disposed in River Godavari near Talkuteshwar Bridge

Vegetable Market on the banks of River Godavari (Gangevarcha Bhaji bazaar)

Growth of Water hyacinth at Saikheda-Chandori bridge

B-3 Sewerage System and Waste Water Treatment

Sewerage system infrastructure that conveys sewage encompasses receiving drains, manholes, pumping stations, storm overflows, screening chambers, etc. Sewerage system ends at the entry to a sewage treatment plant or at the point of discharge into the environment for the disposal without treatment.

As per the information incorporated in ESR of Nashik city 2011 the Sewerage and Sewage scheme is not yet completed for hundred percent coverage. The remaining work for installation of underground Sewerage is in progress and about to be completed by the end of the year 2013. The untreated sewage is generally let out in river Godavari and its tributaries like Nasardi, Waldevi. Out of 25,910 ha of total area of the NMC, only 10,430 ha is covered under the project of underground sewerage scheme. Total length of intercepting sewer line of approximately 45 km., total length of trunk sewer line approximately 84 km. and total length of branch sewer line approximately 600 km. are constructed during implementation of sewerage scheme (Envi. Status Report, NMC, 2011).

Treated Effluent with excessive foam released from Tapovan STP into River Godavari

Collection of STP effluent sample at Tapovan

Excessive foam formation in treated effluent from Tapovan STP

Treated effluent from Chehadi STP outlet with BOD more than permissible limit of 30 mg/L

Underground Sewerage System

Intercepting sewers were laid on both banks of Godavari, terminating in a pumping station at Ganeshwadi on left bank of the river. The sewage is pumped from this pumping station through 750 mm dia rising main about 3.3 km length in to a distributory of Gangapur left canal. There are brick masonry sewers in gaothan area of Nashik city existing since olden days. These sewers collect the waste water from households as also the storm water run off. These old sewers are joined to the piped sewerage system created later. Due to inadequate capacities of these sewers, during monsoon, the storm water mixed with sewage runs off to join the river. It is necessary to provide separate system of sewers for exclusive collection of sewage for old gaothan area & join it to the main sewer system.

There are some old sewers laid along banks of Godavari prior to phase 1 works. These sewers need rehabilitation. NMC has commenced the hydrostatic modeling of these sewers.(2005-2006) During the planning of new works, the capacity, condition & utility of these sewers need to be examined thoroughly & replacements as required need to be proposed.

As per CDP of Nashik Municipal Corporation under JNNURM report the phase 1 project is designed to cover populated area of city including Nashik city, Satpur, Nashikroad-Deolali, Dasak Panchak. Considering population projections made earlier by various consultants & agencies, WAPCOS projected population of Nashik city as 16.77 lakh in the year 2021. Corresponding population allocated to project area is 12.16 lakh. Draft development plan of NMC prepared wrt year 2005 population (13.5 lakh). The Govt of Maharashtra accorded Administrative Approval to Phase 1 project excluding the part to be under taken as Godavari Action Plan vide GR BhuGaYo /1095/1400/ Prakra 144 / Pa Pu 17 dated 27 April, 1998. The said works are completed.

Three major rivers cutting across NMC area running from west to east are Godavari, Nasardi & Waldevi. Nasardi is tributary of Godavari meeting in Corporation limits. River Waldevi runs on southern outskirts and merges in to river Darna, the tributary of river Godavari, near Chehedi beyond NMC limit. The project area is divided in three drainage basins, namely, Godavari, Nasardi & Waldevi which are further divided in various water sheds on the basis of topography & convenience of collection of sewage flow. Each of the water sheds has its own intercepting sewer.

Table 3: Network and Pumping Stations for Nashik City

Godavari Basin		
Godavari left bank sewerage shed A served by existing LB intercepting sewer Sewerage shed B on left bank of Godavari with sewer along Waghadinalla	Sewerage District- I	Ganesh Wadi
Godavari right bank sewerage shed served by right bank sewer Sharanpur intercepting relief sewer shed to cater for the area south of Sharanpur road	Sewerage District- II	Ganesh Wadi
Sewerage shed D gravitating to pumping station near Tapovan STP	Sewerage District- IV	Pumping station at STP
Sewerage shed C gravitating to pumping station at junction of rivers Kapila & Godavari	Sewerage District - V	Pumping station at jn. of Kapila and Godavari
Dasak Panchak sewerage shed gravitating to a point near Panchakgaothan	Sewerage District- VI	Pumping station at Panchak
Nasardi Basin		
Nasardi left bank sewerage shed gravitating to right bank intercepting sewer Nasardi right bank sewerage shed gravitating to a point near Takli village	Sewerage District- III	Takli pumping station
Waldevi Basin		
Nashik Road Deolali sewerage shed draining to Waldevi pumping station near Chehedi	Sewerage District VII	Nashik Road pumping station

Source: CDP (2005-06)

Table 4: Monthly Pumping Details for Nashik City (Source :Information from NMC)

Month	Old Ganesh wadi	New Ganesh wadi	Takali SPS	Kapila SPS	New Kapila SPS	Tapovan STP	Chehedi SPS & STP	New Chehedi SPS & STP	Panchak SPS & STP	New Panchak SPS & STP	Nandur Dasak	Total MLD
April 2012	21.04	36.21	13.91	11.11	12.91	95.17	16.36	2.27	9.64	0.00	-	123.44
May 2012	20.04	39.63	13.18	10.65	12.33	99.03	16.20	4.30	8.97	0.36	-	125.66
Jun 2012	19.15	33.86	11.33	11.08	6.03	81.44	16.08	9.34	8.68	1.41	-	116.94
July 2012	19.16	34.09	18.46	10.98	13.41	99.30	14.42	13.40	8.44	4.89	-	137.25
Aug 2012	17.83	32.87	22.21	11.14	20.30	104.35	15.54	13.18	7.54	9.47	9-.47	150.09
Sep 2012	20.28	33.19	18.96	11.10	25.01	108.54	17.63	16.65	7.68	9.63	9.63	160.13
Oct.2012	20.20	35.84.21.21	21.21	10.64	23.79	111.68	16.63	15.55	7.43	11.85	11.85	163.14
Nov. 2012	20.81	33.16	22.12	11.09	19.16	106.33	16.89	19.77	7.52	10.12	10.12	160.64
Dec 2012	20.24	35.48	21.45	10.75	28.05	115.97	15.73	18.44	7.18	9.99	9.99	167.30
Jane 2013	20.20	32.91	22.49	9.48	22.78	107.86	15.31	18.13	7.54	8.89	8.89	151.71
Feb 2013	21.06	41.39	22.71	8.78	19.13	113.07	15.65	17.67	7.67	9.41	9.41	163.47
Mar 2013	19.02	42.46	22.21	8.44	15.97	108.10	14.67	14.19	7.54	7.43	7.43	151.93
April 2013	18.86	45.30	22.48	8.34	14.19	109.16	14.58	12.14	7.72	7.60	7.60	151.20

There are six Sewage Treatment Plants (STP) in Nashik viz .Panchak, Tapovan, Chehedi constructed in two phases. Four more plants are under construction and at various stages of completion. The total capacity of existing STPs is 200.5 mld and the proposed plants have a capacity of 160 mld. The Technology adopted for treating the waste water is either activated sludge process or UASB. The treated domestic effluents are discharged into the water bodies like tributaries and nallas. (**NMC ENV Status report 2011**).

Table 5: Details of Sewage Treatment Plant at Nashik

Sr. No.	Location	Scheme	Technology	Date of Commissioning	Capacity MLD
Sewage Treatment Plants in Operation					
1.	Panchak STP	UGSS	ASP	2003	7.5
2.	Tapovan STP	Godavari Action Plan	UASB	2003	78
3.	Chehedi STP	Godavari Action Plan	UASB	2006	22
4.	Tapovan STP (New)	JNNURM Package I	UASB	Aug-10	52
5.	Panchak STP (New)	JNNURM Package I	ASP	May-12	21
6.	Chehedi STP (New)	JNNURM Package I	ASP	Feb-12	20
Total Treatment Capacity					200.5
Sewage Treatment Plants under Construction					
7.	Agar Takli STP	JNNURM Package I	ASP	Under Construction	70
8.	Agar Takli STP (New)	JNNURM Package II	MBBR	Under Construction	40
9.	Panchak STP (New)	JNNURM Package II	MBBR	Under Construction	32
10.	Gangapur STP	JNNURM Package II	---	Tendering process	18
Total Treatment Capacity					160

Source : Nashik Municipal Corporation: Mechanical Department

- The work for STPs at Gangapur and Pimpalgaon Khamb has recently been initiated. However, the untreated domestic wastewater is currently released into nearby water bodies.
- The treated domestic effluents are discharged into the Nasardi River and then to the various nallas. According to the municipal corporation, the quality of the effluent is monitored regularly.
- The issue of water pollution due to effluent discharges from STPs in Nashik is due to many problems like Non performing of all the STPs, Foam formation in the river near the Tapovan effluent,
- The New Ganeshwdi pumping station is situated at the left bank of Godavari. The right bank intercepting sewer crosses the river upto new Ganeshwadi pumping station.

- The chambers constructed along the river are meant for inspecting carrying sewer lines. There is every possibility of leakages or overflow through these chambers thereby releasing untreated sewage into the river.

Key issues & challenges identified in JNNURM scheme report (2005) for sewage system were as under:

- NMC needs to prepare Master Plan considering Phase I & Phase II schemes with respect to the projected population for year 2031 considering Nashik city as a whole.
- The Present sewerage system serving for only 70% population.
- In some areas sewerage system is over loaded due to rapid increase of population in vertical direction.
- Old existing treatment plants and pumping stations in CIDCO Area need renovation, augmentation, and rehabilitation of existing system.
- Need of curative maintenance system for sewer network, pumping stations and STP.
- Existing system are under utilize in some areas due to insufficient number of drainage connections.
- Lack of sewerage network and treatment facility in Industrial area.
- The Master plan has already been prepared by NMC in the year 2009 and activities have already been started. The city Sanitation plan report has covered the proposed activities. As per Master plan document (2009), new STPs are planned. Revised CDP is under preparation.

B-4 Limited efforts towards wastewater recycling and reuse, waste to energy conversion.

As per census 2011 the population of NMC is 14.87 lakh which is estimated to reach at 48.5 lakh by 2041. With the population quadrupling in next three decades, the net demand for potable water will also increase substantially to 727 MLD. It would be a challenge for NMC to get this much quantity of water reserved from irrigation department as there would be other demands such as agriculture, industry etc. Therefore, as one of the measures of conservation of water, NMC can explore options to recycle waste water and reuse for non-potable use such as gardens, process water for industries etc. During the discussion with NMC officials it was informed to NEERI team that the issue of recycle and reuse of treated wastewater has been initiated by Water Resource Department and an agreement has been made for purchase of treated effluent with Ms India Bulls. The administrative formalities are in progress.

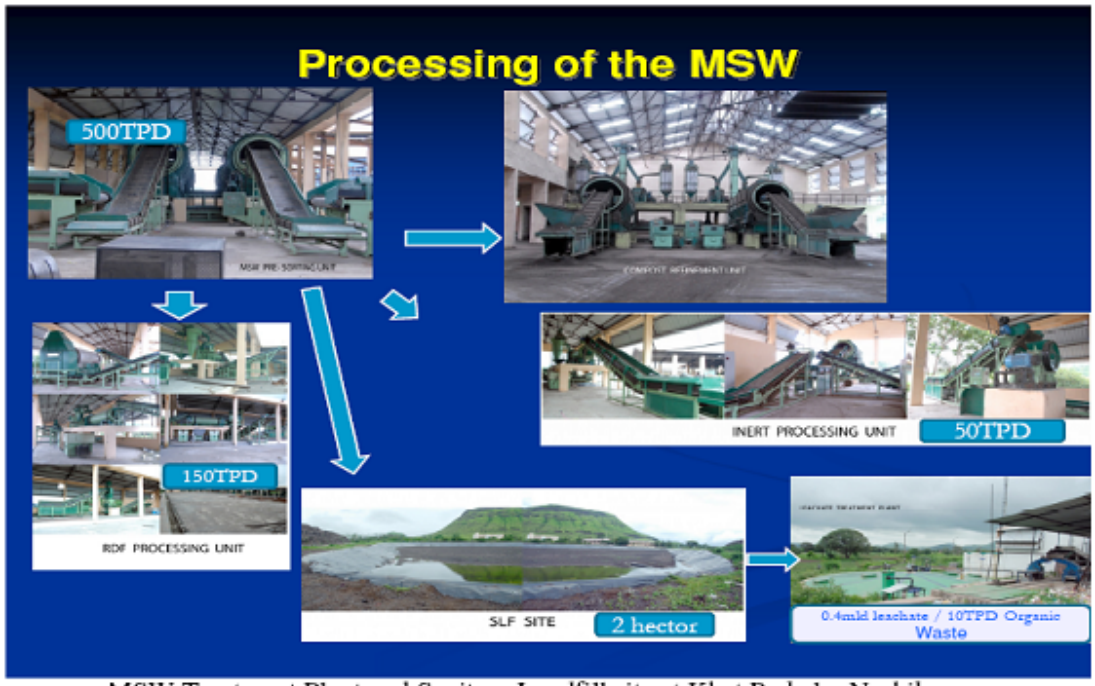
B-5 Solid Waste Management in Nashik

An average about 330MT of solid waste is generated per day in Nashik Municipal corporation area as per figures of year 2011-12. Solid waste mainly comprises of 30% wet garbage containing 30% moisture, 30% dry garbage, 10% other material including sand, silt , plastic etc. A compost plant has been established by Nashik Municipal Corporation to convert solid waste into compost. There is an efficient system of collection of house to house collection of Solid waste with the help of vehicles named ‘Ghantagadi’ .Collected solid waste is transferred to Solid waste management plant. Solid waste management plant in Nashik mainly composed of following units.

a) **Presorting unit (Capacity: 500 MTPD):** Solid waste is segregated in four different categories using mechanical sieves. Sand, silt is segregated from the solid waste and is sent to inert processing unit. Material with high calorific value is sent to RDF unit. Recyclable material like plastic, paper is segregated and is sent for recycling.
b) **Aerobic composting unit:** NMC has adopted Windrow composting technique for composting. Solid waste collected is kept in composting sheds for 30 days. After composting it is passed through the sieves of 100, 35 and 16 mm size and sent to the composting refining unit. After composting refining unit, waste is again kept for composting for 15 days. This part of waste is then passed through the sieves of 4mm. The compost obtained thereafter is packaged and sold off at reasonable rates. NMC has set up a laboratory to analyze garbage and the compost for general parameters.
c) **RDF (Refuse derived fuel) unit: (Capacity: 150TPD):**Materials having high calorific value like Woody materials, paper products, textiles, jute are collected in the RDF unit for generation of fuel pellets. The treatment includes refinement of MSW through material re-combinations, segregation, drying, size reduction, blending and homogenization. This material is further refined for separation of sand, dust, metals, glass etc before shredding. Shredded materials are then converted into pellets.
d) **Animal Carcass Incinerators** (Capacity: 250Kg per hr): Dead animals are incinerated in Animal Carcass Incinerators.
e) **Leachate treatment plant**(Capacity: 0.4MLD): In accordance with the Municipal solid waste rules, 2000, leachate quality is monitored. Leacahte formed is collected through underground drainage system and treated.
f) **Inert processing unit** (Capacity: 50TPD): Sand, silt collected form presorting unit is sent and processed in the inert processing unit.
g) **Sanitary landfill site**: Solid waste which cannot be recycled or products of the processing units are sent to landfill site. Landfill site is covered with sand.

Nirmalaya Kalash for disnirmalaya posal of at Ramkund

Natural wetland at Nandur Madhyameshwar dam



MSW Treatment Plant and Sanitary Landfill site at Khat Prakalp, Nashik

Source: Municipal Solid Waste Management Plan for Nashik Municipal corporation report (2011)

On an average, 2000 kg of Biomedical waste is generated from the hospitals in the city. Nashik Municipal Corporation has taken special efforts to treat biomedical waste in the city. As per Biomedical Waste(M and H) Rules, 1998, Biomedical waste is collected in the specific vehicle and specific coloured plastic bags. The collected biomedical waste is treated in at Common Biomedical waste Management Project near Dwarka on Mumbai Agra Highway. Treatment system mainly includes.

a) **Incineration**: The incineration system includes a double chambered incineration with receiving chamber, ventury scrubber, cyclone separator, water sprinklers, ID fan and chimney.
b) **Autoclaving and shredding**: Ash generated out of incinerators is chemically inert. It is about 5% of the total biomedical waste generated. Treated Biomedical waste is disposed off at Kannamwar Bridge having capacity of 300Kg/h.

B-6 Storm Water Drainage System

In Nashik Municipal Corporation area there was no comprehensive storm water drainage system available. The ground slopes are steep in certain areas (Panchavati area), especially near the Godavari and its tributaries. The average low-lying ground level is 569 m. and the highest ground elevation is at 700 m. The old city is located at low-lying areas while the developed areas are mostly on higher grounds. There are 3 main River basins in corporation area as under :

- The Godavari River flows west to East across approx. 18 kms of the central area of the city. Nearly 8 nallas meet the river Godavari in this stretch
- The river Nasardi also flows west to east and joins the Godavari on the south bank at Takli.

- The river Darna flows at the South – Eastern boundary of NMC, and its tributary Waldevi flows from the North – West to South – East and meets it near Chehedi. The Nasardi and Waldevi (which meets Darna river) are the tributaries of river Godavari. The drainage pattern lies within the respective ridges of the catchment area.

Under the JNNURM, a comprehensive storm water drainage system has been laid. However, pre-monsoon curative works needs to be considered.

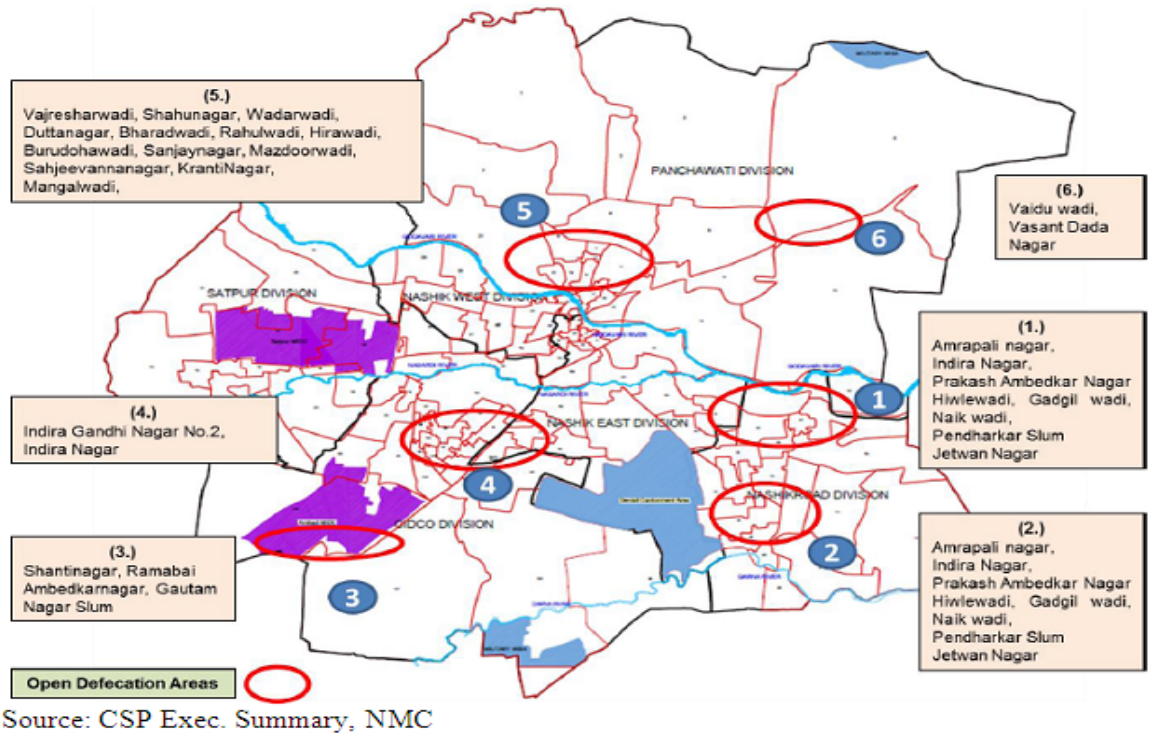
Issues for Storm Water systems:

- The river and their tributaries needs special attention to cope-up with inputs of storm water drains during rainy season.
- Water ways of all cross drainage works to be verified
- Pre-Monsoon curative maintenance to be considered

Source:(CDP of Nashik Municipal Corporation under JNNURM 2005 -06)

B-7 Prevalence of open defecation in slums and around religious areas and open urination at public places.

Prevalence of Open defecation is high in Wards 1, 2, 8,10,11,59,69,76,94 and 96. In 13 of the 65 slums covered in the slum mapping exercise, OD was due to a lack of facilities or poor maintenance. Hygienic conditions in Public Toilets were poor with 34 of the 65 slums ranking the toilets as poor. 35 of the 74 toilet blocks surveyed did not have lights and were inaccessible during night time. In 26 slums, there is no water connection to individual toilets and people have to carry water from home.



Source: CSP Exec. Summary, NMC

While 51 slums that have access to toilet within slum had a toilet seat to person ratio of 1:65 when seats unavailable due to poor maintenance are factored which goes up to as high as 1:330 in Kazichigadhi, the largest slum in Nashik. Even though 62 of the 65 slums surveyed were in the vicinity of the sewerage network, most of them are not connected. Waste-water from septic tanks in about 18 slums percolates into river and water bodies. Further, Open urination is rampant around Ramkund area, Central Bus Stand (CBS) and Railway Station where there is very high floating population. Ramkund area has only two Public toilet complexes which are inadequate considering number of persons visiting it. Maintenance of Public Toilet complexes at the central bus stand and railway station is poor. Such sanitation facilities also contribute to river pollution which needed to be attended on priority (**Source: CSP exe. Sum)**. NMC needs to implement the recommendations of action plan of city sanitation plan.

8. Results of the Water Quality Survey conducted in the identified stretches of River Godavari during May 2013

Water quality assessment is important to evaluate the existing water environment and the expected impact due to the tourist activities. The study of water environment aims at :

- To understand the baseline characteristics,
- To identify water polluting sources;
- To identify critical parameters of water characteristics and their origin;
- To predict impact on water quality
- To suggest appropriate preventive and mitigation measures

Methodology:

The area between Trimbakeshwar to Godavari at Nashik downstream was considered for present study. The Godavari River flows through Nashik from its source, which lies to the southwest of the city, in Trimbakeshwar. The samples were collected from various sites of the upstream and downstream of the rivers, from the Dams situated on the bank of the river and also from the places where major human activities are carried out along with the water samples from the working STPs. Water sampling locations within study area were finalized based on

- Preliminary site visits
- Approachability of areas
- Identification of major water bodies through Google maps
- Frequent human activities
- Disposal of Nirmalaya and Asthi into the river
- Inlet and outlet of STPs

Altogether 26 samples were collected from the study area. These samples are representative of samples from dam, from different stretches of rives, from site where Asthi and nirmalaya were being thrown in the river, from the downstream of the Godavari River and influent and effluent from the STPs.

Sample collection at Ahilyabai Holkar Bridge

Sample collection at Ramkund

Sample collection at Dasak bridge

Table 6: Sampling Locations selected during Survey in May 2013.

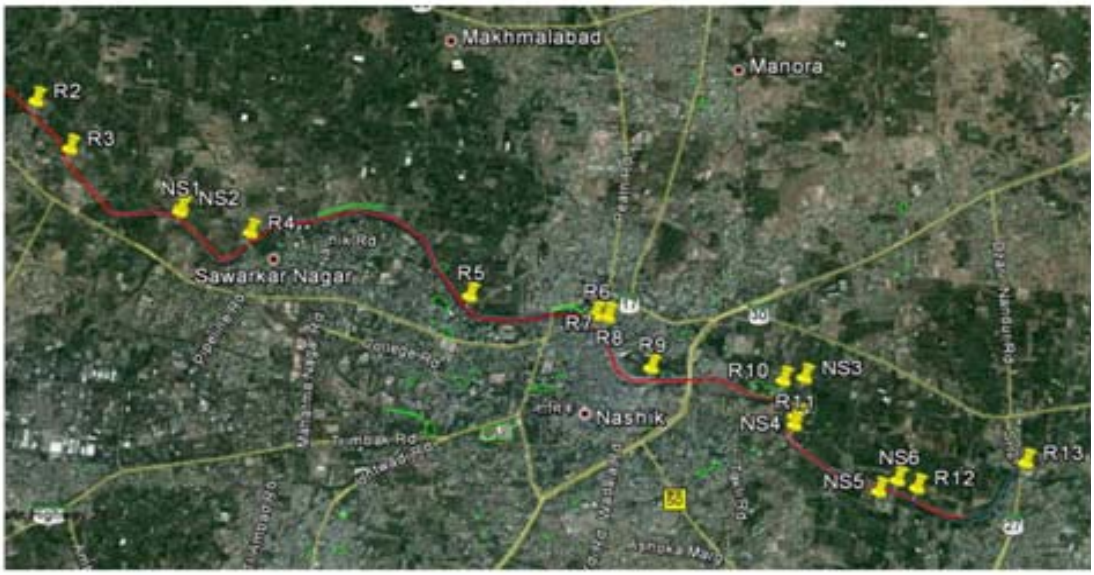
Sr. No.	Name	Sample Code	Latitude (N)	Longitude (E)
Dam and Holy tank at Trimbak				
1	Kushawarta	**D-1**	32 °24’53.0”	77 °14’09.0”
2	Gautami Dam	**D-2**	19 °59’18.4”	73°34’3.3”
3	Gangapur Dam Intake Well	**D-3**	20 °02’21.2”	73°40’48.5”
4	Nandur Mdhyameshwar dam	**D-4**	20°00’27.5”	74°07’59.5”
Riverine Water Samples				
5	Gangapur Dam Downstream	**R-1**	20 °02’55.7”	73°40’49.9”
6	Gangapur Village	**R-2**	32 °20’17.3”	77 °13’07.4”
7	Balaji Mandir	**R-3**	20 °03’15.8”	73 °43’00.1”
8	Anandvalli Bridge	**R-4**	20 °01’12.3”	73 °44’46.0”
9	Chopra Lawn	**R-5**	20 °00’40.4”	73 °46’22.6”
10	Holkar Bridge	**R-6**	20 °00’34.7”	73 °47’24.7”
11	Ramkund	**R-7**	20 °00’33.3”	73 °47’29.1”
12	Asthi Vishajan	**R-8**	20 °00’33.3”	73 °47’29.1”
13	Talkuteshwar Bridge	**R-9**	20 °00’09.0”	73 °47’49.8”
14	Godavari River Near Tapovan	**R-10**	20 °00’04.5”	73 °48’51.1”
15	Godavari River downstream of Tapovan STP	**R-11**	19 °59’45.2”	73 °48’55.6”
16	Godavari River downstream Nashik	**R-12**	19 °59’04.6”	73 °51’31.4”

Table 6 (Contd..) : Sampling Locations selected during Survey in May 2013.

Sr. No.	Name	Sample Code	Latitude (N)	Longitude (E)
17	Dashak Bridge	**R-13**	19°59’49.4”	73°50’49.4”
18	Chandori Saikheda Bridge	**R-14**	20°00’38.8”	74°00’18.2”
Nallas and STPs				
19	Chikhali Nallah	**NS -1**	20 °01’21.2”	73 °44’11.7”
20	Chikhali Nallah meeting river	**NS -2**	20 °01’21.7”	73 °44’13.1”
21	Tapovan STP Inlet	**NS -3**	20 °00’05.6”	73 °48’59.8”
22	Tapovan STP Inlet	**NS -4**	19 °59’47.8”	73 °48’56.4”
23	Panchak STP Inlet	**NS -5**	19 °59’12.6”	73 °51’22.2”
24	Panchak STP Inlet	**NS -6**	18 °59’10.8”	73 °51’31.1”
25	Chehedi STP Inlet	**NS -7**	19°56’10.9”	73°52’00.8”
26	Chehedi STP outlet	**NS -8**	19°56’04.7”	73°51’59.0”

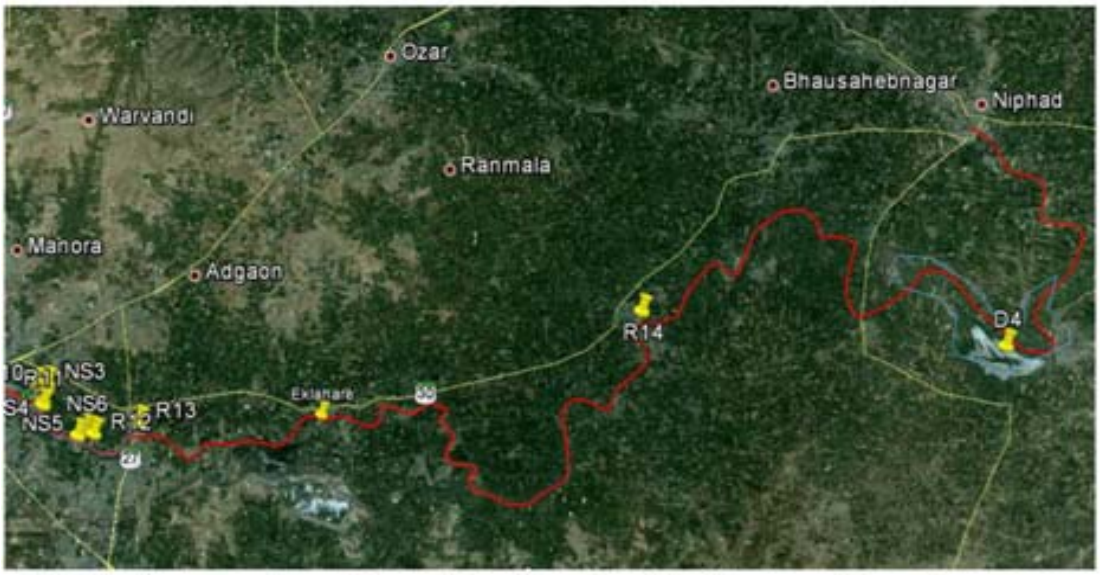
A] Study area from Trimbak to Gangapur Dam

Figure 3A: Study area from Trimbak to Gangapur



B] Study Area between Gangapur Village and Dasak

Figure 3B: Study Area between Gangapur Village and Dasak



C] Study area from Dasak to Nandur Madhyameshwar Dam

Figure 3C: Study Area between Dasak and Nandur Madhyameshwar Dam

Sampling Procedure

The water quality was assessed for various physico-chemical and microbiological parameters specified under "Uniform Protocol on Water Quality Monitoring Order, 2005" prescribed by Ministry of Environment & Forests **(Annexure II).** The samples were analyzed as per the procedures specified in 'Standards Methods for the Examination of Water and Waste Water' published by American Public Health Association (APHA) 21st edition (2005). Samples for

chemical analysis were collected in polyethylene carboys. Samples for microbiological analysis were collected in sterilized glass bottles. Basic parameters like pH, temperature, colour, odour, turbidity and dissolved oxygen were analyzed at sampling sites using portable water testing kits. The methodology for sample collection and preservation techniques was followed as per the Standard Operating Procedures (SOP).

All the results are compared with standards for drinking water as per "BIS: 10500-2004 (revision) Specifications for Drinking Water", **(Annexure-III)** MPCB water quality standards **(Annexure-IV)** and standards for discharge of effluents in inland surface waters **(Annexure-V).** The analytical results of all the water samples are presented in **Annexure-VI.**

9. Observations Made by the NEERI team During Preliminary Survey

Godavari originated from Trimbakeshwar and its water flows through Kushawarta a small tank made for holy dip. Gautami Godavari dam is constructed as medium irrigation project.

- The Gangapur dam, downstream of Goutami Godavari dam has not overflow after the year 2008 due to inadequate rains. Significant siltation has occurred resulting in reduction of storage volume. The removal of silt is being attempted in April- May in 2013.
- Due to scarcity of water the priority to drinking and irrigation is given. During non-monsoon months insignificant flow of fresh water is observed. Irrigation department releases water from gates of Gangapur dam to meet water requirement of Eklahra thermal power plant.
- Gangapur dam is a major source of water supply to Nashik city. About 370 MLD of water is abstracted through intake well from the dam and treated at 5 water treatment plants. 30 MLD of raw water is also pumped from Darna river.
- About 20-25 % of wastage of treated water through leaks is estimated resulting in about 280 MLD of water supply to the various parts of the city. Assuming 80% of the water supply as the quantity of wastewater generated about 200- 220 MLD of wastewater is generated. The sewerage system handles about 150- 160 MLD of wastewater and the same is diverted for treatment in 3 major STPs constructed with two phases of units. The data on quantity of average monthly pumping confirms the estimated volume of the wastewater generated. Uncollected wastewater joins river Godavari at multiple locations.
- Out of two irrigation canals originating from Gangapur dam , right bank canal is defunct. Only left bank anal is functional carrying water for a stretch of 62Km
- As per the information provided by Irrigation division Nashik, total 1031.35 MCFT water was released in Gangapur dam in Godavari river during the period of November 2012 to May 2013. The duration of such water releases varies from 1-5 days. During January 2013, 314.43MCFT water was released in a period of 12 days. Similarly in May 2013, 374.85MCFT water was released in a period of 15 days.
- During the visit of NEERI experts on 24th and 25th May 2013 adequate water was observed in the river due to release of 55.83 MCFT water from Gangapur dam. This has resulted in submergence of wastewater outlets along both banks of river.
- NMC has taken up a project for removal of water hyacinth between a stretches from Anandvalli Bhandhara to Holkar Bridge. A contract is awarded to a firm which removes water hyacinth by plying the boats. The same boats are used for recreation by formation of a boat club.

- At Someshwar, activities like washing of clothes and vehicles were observed. It was informed that strict action is enforced on the owners of the vehicles who are cleaning and washing their vehicles in Godavari river. Hoardings warning the public at large area being displayed at various locations.
- The industrial zone at Satpur has electroplating industries which generate toxic effluents. However, no CETP has been provided. It was reported that such water polluting industries have their own water treatment plants and treated effluent is released in Nasardi river, a tributary to Godavari which meets Godavari at downstream of Nashik. Downstream of Someshwar, Chikhli nalla carries wastewater from Satpur industrial zone thereby adding industrial pollution.
- At Anandvalli, discharges of wastewater from unauthorized slums are observed, in addition to input of pollutants from Smashan bhumi and intercepting sewer lines which are having leakages.
- At Holkar bridge a barrage has been constructed to store water for daily releases in pilgrim places like Ramkund. This helps to maintain adequate water flow for devotees to take Holy dip and immerse ashes as per mythological rituals. On 25th May due to release of water from dam, water flow at the bank of river was about 3 inches high over the sidewalls of Ramkund.
- Nirmalya Kalash have been placed at various locations near Holy places and temples. NMC has appointed staff to collect Nirmalya discharged into flowing water through screens and transfer the same for proper treatment and disposal.
- Organic waste in terms of rotten vegetables from ‘Bhaji Bazzar’ also adds to unsanitary conditions. ‘Pind dann’ a ritual activity is performed at the banks of river which contributes significant amount of organic waste near Ramkund.
- About 3-4 Kms downstream of Ramkund treated effluent from Tapovan STP is released into the river flow. A severe problem of foam formation was observed within river bed which was due to presence of detergents.
- The wastewater from Panchak STP joins river Godavari at upstream of Dasak bridge. Foam formation was observed at Dasak bridge. The effluent from Chehadi STP is discharged into Darna river, about 25 - 30 Kms upstream of Nandur Madhyameshwar dam.
- As per City Sanitation Plan report (Nov. 2011), the domestic waste treatment plants are functioning effectively, with reuse of waste, composting and Refuse Derived Fuel. The location of Solid waste processing unit is away from river Godavari and hence the chances of leachate joining river Godavari are remote.
- Water quality survey has been conducted to evaluate quality of water samples from dams, river, upstream and downstream of effluent releases of STPs and input and output of STPs. Preliminary assessment of water quality at dam indicates good water quality with absence of coliforms. The pH of water samples at Asthi visarjan and Talkuteshwar was more than 8.5 indicating the impact of ashes and disposal of solid waste material and washing activities.
- BOD of Kushawarta and Nandur Madhyameshwar dam was 18.0 and 9.8mg/L respectively, indicating significant pollution. The BOD has exceeded the permissible limits of A2 class in nine out of fourteen riverine samples starting from Holkar bridge to Chandori-Saikheda bridge. This observation confirms the impact of Holy dip, Dashkriya rituals and release of treated wastewater.

- The samples collected from Chikhli nalla showed presence of significant biodegradable material with BOD ranging from 12.5 to 21mg/L. The influent at all the three STPs was dilute waste with BOD ranging from 80 to 100mg/L. 83-85% BOD removal was observed at Tapovan and Chehadi STPs and the effluents were meeting the discharge standards however STP at Panchak had poor performance showing only 56% BOD removal.

10. Issues of Concern

Studies on Rejuvenation of River Godavari and formulation of Integrated Action Plan for improvement of Environmental status for Nashik Region will require critical evaluation. Following are the major topics which require immediate attention.

- Inadequate collection of domestic waste water and health of existing sewer lines.
- Discharge of untreated and treated effluents from domestic waste water treatment plants into the river without due consideration of Assimilative capacity of the river.
- Status of Intersections of sewer lines within and across the river bed through Chikhali nalla and other places.
- Upgradation and proper maintenance of all the sewage treatment plants
- Use of Godavari as the common platform for washing, cleaning, bathing etc.
- To discharge human body ash at Asthi Visarjan,
- Throwing of Nirmalaya in the river
- Mass bathing by devotees and disposal of Nirmalaya in Godavari. River
- Discharge of untreated or partially treated industrial effluent into the river directly or through land application.
- Releases from solid waste dump site 15 km away
- Open defecation in slums at the banks of river.

11. Recommendations

- Allotment of water from Gangapur dam should be rescheduled so that the minimum ecological or environmental flow is maintained downstream of the dam.
- In the light of minimum availability of flow in the river, the expected dilution, dispersion and decomposition of the treated wastewater is not occurring. This has resulted in non-compliance of the water quality standards for designated use as A-II. More stringent standards for discharge of treated effluent should be imposed by MPCB.
- Efforts to stop misuse of river by people for washing of clothes or vehicle should be strengthened.
- Effective collection of wastewater and its transfer to STPs should be taken up on priority basis.
- Functioning of the Sewage Treatment plants should be improved.
- The treated effluent from the STPs should be reused either by industries or for irrigation. By improving the quality of effluent, the water can also be used for gardening and other related activities. This will also restrict the inputs of pollutants in the river stream.
- Recycle and reuse of treated effluents from STPs for irrigation and transfer the equivalent flow into the river is recommended.

- The list of industries generating wastewater in the MIDC zone along with the details of individual ETPs installed should be made available to NEERI by MIDC authorities.
- MIDC should construct a common effluent Treatment Plant for water polluting industries and its performance should be regularly monitored.
- The ETPs constructed and operated by individual industries within MIDC area should be monitored by MPCB.
- The sanitation facilities for the devotees need to be increased. Sulabh sauchalaya type facility should be created in the areas where open defecation is rampant.
- Artificial pond for conducting “Dashkriya” ritual activities should be generated so that the organic material used during the religious practice will not get into the river flow. The water in the artificial pond should be replaced and separate treatment should be provided to this polluted water.
- Awareness programme to stop the throwing of Nrimalya or other organic pollutants should be well-organized and made more efficient for protecting the ecology of river.
- Small Audio visuals can be prepared and relayed through mass communication like TV, radio etc. Repeated announcements of “Good Practices of Environmental Protection can be made near Panchavati which is visited daily by lacs of devotees.
- In schools, the participation of children in maintaining “Clean Environment” should be enhanced.
- In highly polluted areas in Nallas tributaries or river with marginal flows, a recent technology of “Phytorid” or “Floating wetland” can be adopted to restrict entry of pollutants in the river.