

Rehabilitation of the sewerage system in Raipur City, Chhattisgarh State

Context

In 2008 Ministry of Urban Development (MoUD) approved the National Urban Sanitation Policy (NUSP) with the aim to improve the sanitation situation in urban areas of India.

According to official figures, 12.6% of urban households do not have access to latrines and defecate in the open. Although sewerage systems widely exist, over 37 per cent of faecal matter is not disposed of safely. These critical conditions impose significant public health and environmental cost to urban areas threatening the long-term growth trajectory of the India's urban centers that currently contribute 60% to the national GDP¹.

The National Urban Sanitation Policy (NUSP) based on the 74th Constitutional Amendment Act (1992), aims to strengthen Urban Local Bodies (ULBs). The overall goal of the policy is to transform urban India into sanitised, healthy and liveable cities and towns. Particular focus is given to improvement of hygienic conditions for the urban poor and women through cost-efficient technologies. The NUSP incorporates a paradigm shift and follows integrated concepts in the design and implementation of sanitation strategies. All cities and states are requested to act at par with the NUSP to develop State Sanitation Strategies (SSS) and City Sanitation Plans (CSPs) respectively. A City Sanitation Plan is a planning document that shall achieve the stepwise implementation of the goals spelt out in NUSP whereas SSS creates an enabling environment for the latter.

As part of its programme 'Support to the National Urban Sanitation Policy (SNUSP)', Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH supports the MoUD in the aforementioned implementation of policy guidelines.

Sewerage infrastructure that is well planned and operated supports urban sanitation and related activities in a city. A well functional sewerage network is essential for maintaining the integrity of the ecosystem and for keeping the city healthy. As other Indian cities also in Raipur city it was found that the existing sewerage system comprising of the sewer network, pumping stations and the treatment system is presently non-functional and the waste water is discharged through storm water drains into the urban lakes and river. This situation is causing health and environmental hazards in the city.

Raipur Municipal Corporation (RMC) has a population of 10.1 lakh* (2011 census) and generates approx. 124 MLD** of sewage. The existing sewerage system was commissioned in 1992 and covers about 25% of the city area. As it is presently non-functional, the wastewater of the city is discharged through storm water drains into the urban lakes and rivers. To solve this issue construction of a new system is not always feasible as it is very resource and time consuming. In comparison rehabilitation of the existing sewerage system is more workable. It is expected to provide a resource-efficient, sustainable and more manageable option for improved service delivery in the urban sanitation sector. Therefore rehabilitation of the existing sewerage system has been identified as one of the initial interventions during the CSP preparation for the

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Commissioned by	German Federal Ministry for Economic Cooperation and Development (BMZ)
Project Region	Raipur, Chhattisgarh
Leading Executing Agencies	Raipur Municipal Corporation, Raipur, Chhattisgarh; State Urban Development Agency, Chhattisgarh
Country	India
Overall term	One year

city. This may specially benefit the urban poor, as a huge number of slum settlements are located around the existing sewerage system but are yet to be connected to it.

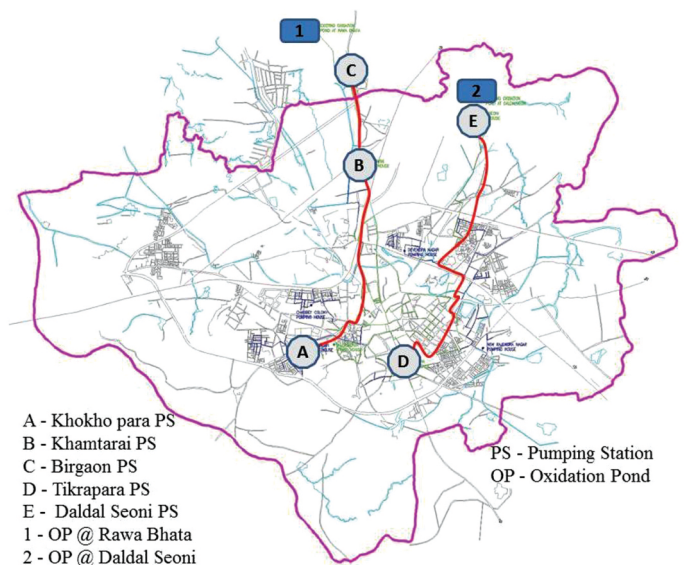
GIZ supported Raipur Municipal Corporation (RMC) in doing the assessment of the existing sewerage system and recommended rehabilitation measures to be taken up in a stepwise manner.

Objectives

The overall objective of the intervention is to implement the CSP and use the existing sanitary infrastructure of Raipur up to its potential by rehabilitating the existing sewerage system. Before taking any concrete steps of upgradation and refurbishment, the goal is to achieve a clear understanding of the current condition of the system and only then identify the detailed recommendations for a rehabilitation strategy.

Approach

The existing sewerage system was analysed in a step-wise approach consisting of primary and secondary research using a variety of methods including desk review, field survey, manhole assessment



Key Map – showing sewage pumping stations in Raipur city

1 National Urban Sanitation Policy, Ministry of Urban Development, Government of India, October 2008

and CCTV video investigation. The system was furthermore mapped in an appropriate GIS supported format and its adequacy for the actual and future needs of the population in the target area was calculated. The consultant M/s Michel Bau took the lead in carrying out this mixed-method approach supported by RMC and GIZ to achieve a precise and comprehensive picture of the existing system.

A desk review of the available information, e.g. design reports, technical drawings, cross or longitudinal sections and base maps of the sewerage system was conducted.

A field survey covering approximately 22 km of trunk sewer was conducted to identify manholes and the existing sewerage network across the city.

A manhole assessment was conducted through opening of individual manholes and classifying their condition at par with international standards. The sewer diameter and material were assessed and the results have been registered and mapped in the L-sections.

A CCTV Video investigation was done as a sample survey to understand the structural condition of the sewers. About 1% of the trunk sewer length was analysed. Prior to the CCTV survey desilting of sewers was carried out. A robotic waterproof camera was sent inside the sewer and the recorded videos were used for analysing the detailed physical condition of the sewer and for identifying any illegal connections or misuse.

All safety measures according to the current labour regulations (IS: 11972 - 2002) were strictly followed prior to entering the manholes and during the entire process.

Findings and Output

The main findings of the assessment were on the one hand that the complete system and all its components need substantial improvement. On the other hand it was found that the existing infrastructure would cater to the need of actual and future population of the catchment area since the population is not projected to increase. This supported the decision of RMC to choose rehabilitation as a resource-efficient, technically sound and sustainable intervention for improving service delivery in the urban sanitation sector as indicated by the CSP.

Looking at the more detailed outcomes, the assessment showed that no authorized documents (asset register and built up drawings) of the existing system were available except a few design drawings of L-sections. An overview map was available but was not geo-referenced, which makes future improvement work difficult.

Almost 70% of the manholes were buried under road surface or were on private properties and more than 50% of the manholes were in structurally unacceptable conditions. A major portion of the existing infrastructure had been damaged and is in a dilapidated state.

The CCTV survey showed a weakened condition of existing pipes due to cracks and exposure of their steel reinforcement. Displacement between pipes was witnessed leading to soil intrusion and contamination.

Due to non functioning of sewage pumping stations the sluice gates at the inlet of few pump houses generally remained shut. Therefore the sewage flows backward and over flows upstream into the storm water drain, nullahs or canals which go through populated areas of the city thus becoming a sanitary environmental risk.

On the basis of the study, recommendations were formulated and presented to RMC. The rehabilitation of pumping stations and refurbishment of oxidation ponds to receive sewage needs immediate attention followed by the refurbishment of manholes as well as pipes. For that the CCTV inspection needs to be extended to the whole sewer network (where laying pipes by open cut excavation is not feasible). A full inspection will help to get a clear picture of the actual status of the complete infrastructure, detect areas, where immediate action is required and prepare a map of priorities for refurbishment.



Flow measurement by 'V' Notch

These findings and recommendations led to the development of a Detailed Project Report (DPR) under JNNURM on the rehabilitation of the existing system by RMC. The results furthermore fed into the formulation of the slum-upgrading strategy and a DPR under Rajiv Awas Yojana (RAY) by connecting un-served households in the target area to the existing trunk sewer.

Next Steps

Currently the DPR under JNNURM produced as output of this project is awaiting approval at the state level. After approval from the state and then central government the next formal step is to tender the project. The project to be tendered out should include a complete assessment of the condition of the existing sewer as so far only 1% of the sewerage system has been investigated.

For supporting the RMC to monitor the project and for taking care of the proper maintenance and operation of the rehabilitated system the capacities of the operating staff of the RMC need to be enhanced. Trainings on Standard Operating Procedures of sewerage management for engineers could be one part of this capacity enhancement strategy. Developing an institutional model within the Corporation (e.g. a nodal officer or a sewerage improvement team) is recommended for ensuring sound management and giving the sanitation sector the necessary priority. This kind of institution model will prevent any overlap of project implementation (example: Sewer Rehabilitation DPR and DPR for sewerage system for the city of Raipur) in future.

The rehabilitation of the existing sewerage system in Raipur based on a technically innovative and accurate assessment methodology, could be a model for other cities wanting to make use of their existing infrastructure and reach more sustainable, resource-efficient and inclusive service delivery in the urban sanitation sector.

*10.1 lakh = 1010000

**MLD = Million Liters per Day