

9 SEWERAGE, SOLID WASTE MANAGEMENT, DRAINAGE AND IRRIGATION

9.1 SEWERAGE

9.1.1 Background

Sewerage is the core element of physical infrastructure that determines the environmental status of any settlement and as such requires minute planning, development and management. Development of appropriate sewage carriage system with efficient treatment is the key element, which acts as a prerequisite for facilitating balanced and harmonized development. Augmentation of existing inadequate systems/treatment facilities as well as adoption of new technologies of waste treatment for small and marginal settlements and rural areas presents a gigantic task demanding special efforts.

In the Regional Plan-2001, it has been proposed that the DMA and priority towns should treat sewage before it is discharged into the watercourses or on land or used for irrigation. The other towns where it is not possible to provide a proper system due to topography and for want of resources, low cost sanitation measures may be adopted which can be replaced by regular sewage system subsequently. Sewage should be treated to bring the pollution level to permissible limits as stipulated by the Bureau of Indian Standards (BIS) and Pollution Control Boards irrespective of the type of disposal of the sewage. As far as possible, areas where the annual rainfall exceeds 75 cm, separate systems for sewage and storm water are recommended. Rural areas, where piped water supply system exists, should be provided with sewerage system with treatment facilities. Low cost sanitation measures such as sanitary latrines with septic tanks and soak pit should be provided in the villages with hand-pumps based water supply.

A review of Regional Plan-2001 was done in the year 1999, in which it was observed that only 20% towns of NCR were covered with partial sewerage system, while the rural areas did not have any access to such facilities. Since the last decade, no major progress has been made with regard to sewage treatment plants. The rivers (mainly Yamuna) and various seasonal streams had been converted into "*Nallahs*" which carry untreated sullage polluting downstream areas. Some newly developed urban areas namely Faridabad, Gurgaon (in Haryana) and NOIDA (in U.P.) have installed sewage treatment plants provided by development authorities but reportedly not fully functional due to a variety of reasons.

9.1.2 Existing Situation and Issues

Recent studies reveal that at present barring Delhi, where 80% population is covered under sewerage and 1,500 mld of waste water is being treated, the sewerage cover ranges from 30 to 70% in U.P. and 60% to 80% in Haryana in the DMA (now CNCR) towns only. Among the CNCR towns, treatment facilities are available in Faridabad, Gurgaon, Ghaziabad and NOIDA. No sewerage treatment facility is available in any of the priority towns of U.P. Sub-region or Rajasthan Sub-region. Coverage of sewerage system in various priority towns ranges from 40.0% to 70.0% in Haryana, 3.0% to 5.0 % in Rajasthan and 0.0% to 30% in Uttar Pradesh. Status of availability of sewerage system and treatment facilities in some of the NCR towns in the year 2000 is given at Annexure 9/I. Not enough database is available to determine the position of sanitation in

rural areas. However, the overall picture is dismal. High incidence of water borne diseases in NCR is indicative of the poor state of sanitation in the region.

- ***System Drawbacks and Lack of Coverage***

The expansion of sewerage network has lagged behind the growth of population resulting in overflow of sewage into drains causing river pollution or creation of cess pools in low lying areas of the towns/settlements. There are imbalances in the coverage of municipal sewerage systems in various parts of the cities. Significant portion of the city population living in marginal settlements, unauthorized colonies and urban villages etc. has been devoid of regular municipal sewerage systems. In old cities like Delhi, sewerage system of the walled city is quite old and overloaded, which requires phased replacement or rehabilitation.

Development authorities which are associated with development of new areas in various towns/cities tend to take care of sewerage system in newly developed sectors only. Many a times no sewage treatment facilities are provided there and untreated sewage is allowed to flow into the nearest open drain/water bodies or even just allowed to spread over large tracts of land. Provision of sewerage system and treatment facilities in the existing areas is considered as the sole responsibility of the local bodies which have neither sufficient financial resources nor appropriate technical staff to provide such facilities. They are totally dependent upon the State Government for this, whose resources are also limited.

- ***Lack of Operation & Maintenance and Management Effort***

Poor maintenance of the sewerage system by the local bodies and development authorities (in their respective areas of maintenance) has resulted in blocking and overflowing of sewers, open manholes and back-flows. The inadvertent act of throwing street sweepings and garbage by street sweepers into manholes/open drains results in blocking of sewers and creates cess pools resulting in environmental degradation, foul smell and disease. Re-densification of population in the existing townships and lack of proportionate improvement in sewerage systems have resulted in overflowing of sewers and manholes due to insufficient carrying capacity of sewers, thus, resulting in environmental degradation of the towns. Age old system of cleaning of sewers is still followed instead of use of modern machines like jetting cum suction machines, which are quick and do not damage the skin of the sewers, which is one of the main causes of subsidence of sewers.

- ***Lack of Waste Minimization and Recycling/Reuse***

The emphasis should be on waste minimization, which will help in improving the environment as a whole. Recycled waste water should be promoted for non-drinking purposes. Hotels, industrial units and large installations should be asked to recycle their waste water. Fiscal measures such as quantum based taxation for waste water should be taken up which will not only reduce the cost of treatment for the municipalities but will ultimately help in improving the overall environment of the cities

- ***Other Areas Lacking Adequate Focus***

Besides, other aspects/areas, which need attention include:

- ☞ Population living in marginal settlements and slum areas lack coverage.
- ☞ Small and medium towns and large villages, having population above 5,000 persons, should be provided with the requisite sewerage/sanitation facilities.
- ☞ Phased augmentation/replacement of sewers in congested areas of the cities.
- ☞ Suitable legislation/amendments to check mixing of industrial waste with domestic sewage and disposal of untreated sewage into open drains.
- ☞ Rural settlements need special focus where presently no sanitation exists.

9.1.3 Policies and Proposals

In order to improve the overall situation in the National Capital Region for the harmonized and balanced development for the perspective 2021 following policies and strategies are proposed:

- ***Preparation of Master Plan for Sewerage System and its Treatment***

Each participating State with the help of the specialized agencies, experts and NGOs should take up the preparation of detailed Master Plans for laying/augmenting sewerage system and its treatment for all the towns. The Master Plans should also have a provision for recycling the treated effluent for irrigation, gardening and cooling in industries/hotels. Common effluent treatment plants in planned industrial estates should compulsorily be set up.

- ***Norms and Standards***

Norms and standards provided in the CPHEEO Manual for sewerage and its treatment should be followed.

All towns identified for development in the Regional Plan-2021 should have cent percent sewerage system and should treat their sewage up to the desired standards including coliform, under the Environmental Protection Act, 1986 before it is discharged on land for irrigation, plantation, gardening etc. or into the water bodies. Towns within NCR, which do not have sufficient resources or have unsuitable terrain to provide proper sewerage system and treatment facilities, may initially be provided with low cost sanitation systems which can be upgraded in the later stages within the time frame of this Plan.

All the urban villages should be provided with the facilities equivalent to the towns, within whose controlled areas they are located. Large villages may be provided with low cost sewage treatment facilities with appropriate sewerage system. Other rural areas should be provided with low cost sanitation measures such as sanitary latrines, septic tanks and soak pits.

These norms and standards should be implemented in the phased manner in the region.

- **Rehabilitation/Augmentation of Sewerage System and Treatment Facilities**

Poor condition of existing sewerage system in townships/cities should be rehabilitated and wherever, this facility is not available or is not up to the desired level, augmentation schemes, should be taken up. Since treatment facilities in most of the townships are insignificant, emphasis should also be given to provide the same, as per the requirement. Sub-region wise sewage generation is in Table 9.1.1. Total sewage expected to be generated in the region by the year 2021 is 6,935 mld which includes 1,123 mld in Haryana Sub-region; 282 mld in Rajasthan Sub-region; 1,480 mld in U.P. Sub-region and 4050 mld in NCT-Delhi Sub-region.

Development authorities should provide sewage treatment facilities simultaneously while developing the area in phased manner. No untreated sewage/waste water should be allowed to flow in the neighbouring areas/States. Piecemeal approach to laying of sewer should be avoided.

Table 9.1.1: Sewage Generation in Urban Areas of NCR		
Sub-region	Sewage Generation (MLD)	
	2001	2021
NCT-Delhi	2,493	4,050
Haryana	394	1,123
Rajasthan	53	282
Uttar Pradesh	576	1,480
Total	3,516	6,935

Note: This does not include the UAF 2001.

- **Operation and Maintenance**

Operation and maintenance should be given priority by the local bodies using modern technology/equipments.

- **Policy of Dual Agencies**

The policy of having dual agencies for the construction and operation & maintenance of these facilities in some of the constituent States should be discouraged. In order to have better environmental management and to avoid over-loading/under-loading of the system and for focused accountability, overall management of sewerage system and surface drains with its effluent treatment facilities should be with single agency in a given town.

- **Allocation of Land for Sewerage Schemes**

Master/Development Plans of the towns and cities should incorporate land allocations at appropriate locations for following components of the sewerage schemes:

- ☞ Adequate space for underground laying of sewers along roads as per standard cross sections.
- ☞ Depending upon quantity of sewage to be pumped, land area for sewage pumping stations needs to be allocated. On an average, area of 0.25 hectare should be reserved for each pumping station.

☞ 0.2-1.0 hectare/mld land area should be reserved for sewage treatment plant as per the technology adopted, keeping in view the size of the town/area.

- ***Recycling of Waste Water for Non Drinking Water Use***

All new development areas should have two distribution lines, one for drinking water and other for non-drinking water/recycled treated waste water for reuse. All the waste requirements for non-drinking purpose in big hotels industrial units, central air-conditioning of large buildings/institutions, large installations, irrigation of parks/green areas and other non-potable demands should be met through treated recycled waste water.

At least 50% of the treated waste water should be recycled for these purposes and emphasis should be laid towards waste minimization, which will also help in improving the environment on the whole. Government may also provide liberal tax rebates for institutions/industries adopting recycled waste water to compensate for the cost involved in treating waste water for recycling. Fresh water should not be used for irrigation purpose, if treated waste water is available. If required, enabling provisions in the respective acts of the local bodies may be made by the respective State Governments.

- ***Creation of Mass Awareness***

It is imperative to create mass awareness among public through mass media with regard to saving of water, waste minimization and utilization of treated waste water for non-drinking purposes.

- ***Commercial Approach for Tariff***

With the increased requirement of improved quality of life, Government alone does not have financial capacity to continue with the subsidies for improving the sewerage system and treatment facilities in the times to come. Commercial approach should be adopted by the local bodies for revenue generation. Tariff should be so fixed as to meet at least the operation and maintenance cost of the sewerage system, if not the capital cost of the system. Introduction of sewage tax and improved recovery of taxes may help in reducing the revenue-expenditure gap.

The structure of the sewage tax should be demand based and increased telescopically depending upon the monthly consumption of water and should be reviewed periodically as a built-in mechanism to make the service self sustaining and a deterrent to wastage. Public-Private Partnership (PPP) needs to be introduced for operation and maintenance of the sewerage schemes and sewage treatment plants.

- ***Institutional Capacity Building***

Institutional capacity building measures for management of sewerage system and sewage treatment plants in the towns should be done for efficient operation and maintenance of the system. Simultaneously, it should contribute towards improvement in the self sustainability of the system.

- ***Funding of Sewerage and Sewage Treatment Schemes through Five-Year Plans***

Present state of affairs of utility and service infrastructure in the region barring NCT-Delhi is dismal due to non-availability of funds for these sectors. Therefore, some mechanism should be devised under the five-year plans so that funds are made available to the State Governments for the development of infrastructure in their respective Sub-regions for balanced and harmonious development. Provision for Special Component Plan should be made by the Planning Commission for the National Capital Region. Centrally Sponsored Schemes (CSS) for infrastructure development in NCR should be formulated, which should include sewerage and sewage treatment schemes as one of the component. The scheme should be structured as follows:

State share	25%
Central Government Grant	25%
NCRPB Interest Bearing Loan	50%

The share of State Government should be provided in the plan as a part of the Sub-component Plan for NCR Sub-region of the respective States, while the Central Government grant could be a part of the NCR Planning Board's central budgetary provision. The loan component can be met by the NCR Planning Board through its Internal Extra Budgetary Resources (IEBR). Augmentation and upgradation of sewerage schemes/sewage treatment plants in older areas should be financed through this funding. External Development Charges (EDC) collected by the development authorities from a town should be invested within the same town in proportion to the population of existing town proposed to be developed. In all new areas being developed, the capital cost of sewerage schemes/sewage treatment plants should be self financing and be met from EDC.

9.1.4 Plan of Action and Phasing of Implementation of Strategies/Policies/Proposals

In order to implement the policies of sewerage system in the region it is imperative to have a plan of action along with phasing so that the implementation of policies and proposals in the Regional Plan can be dovetailed with the five-year plans. In view of this, it is necessary that each recommendation should be phased plan-wise where certain activities are to be completed within the first five-year of the implementation of the Region Plan, whereas some activities will span over to all the four-five year plans. Some of the activities which need to be implemented in the first five years of the Regional Plan implementation include, preparation of the Master Plans for sewerage system and its treatment, creation of mass awareness, allocation of land, recycling of waste water and industries/hotels/large institutions to be compelled to use at least 50% of their waste water in their institutions itself and no fresh water should be allowed to be used for agriculture/horticulture purpose in the inhabited areas to promote use of treated waste water. Amendment in act/statute, if required, should be carried out for the reuse and recycle of wastewater. Improvement/augmentation in the existing sewerage system and construction of sewage treatment plants in the region, as recommended above have been proposed to be carried out in a phased manner in all the five-year plans.

Phased programme and plan of action have been worked out to give effect to the proposal and implementation thereof, which is given in Annexure 9/II.

9.1.5 Investment Plan

Total estimated sewage generation in the urban areas of the region is estimated to be 6,935 mld by the year 2021. Accordingly, there will be need to strengthen/expand the sewerage system and its treatment capacities. Total investment required for laying of sewerage system would be Rs.3,467.47 crores by the year 2021 and for treatment of waste water, the investment would amount to Rs.4,854.46 crores. It is based on the existing situation given in para 9.1.2 above. However, Sub-region wise and Plan wise fund requirement for the region has been given in the following tables:

Table 9.1.2: Sub-region wise Investment requirement for Sewage (Rs. in Crores)			
Sub-region	Sewerage System (@ Rs. 0.50 crores per mld)	Sewage Treatment Plant (@ Rs. 0.70 crores per mld)	Total
Haryana	561.49	786.08	1,347.57
Rajasthan	140.80	197.13	337.93
Uttar Pradesh	740.18	1,036.25	1,776.43
NCT-Delhi	2,025.00	2,835.00	4,860.00
Total	3,467.47	4,854.46	8,321.93

Table 9.1.3: Plan wise Investment requirement for Sewage		
Plan Period	Percentage (%)	Amount (Rs. in Crores)
2002-2007	15.0	1,248.29
2007-2012	35.0	2,912.68
2012-2017	30.0	2,496.58
2017-2021	20.0	1,664.39

Land for the total plan period should be acquired at the first instance. Phasing of investment has been proposed on the basis of plan of action for implementation given in Annexure 9/II.