

9.3 DRAINAGE

9.3.1 Background

Drainage is an important element of physical infrastructure and constitutes removal and disposal of surplus rain/irrigation water from the land. It has two aspects namely flood protection and removal of storm water. National Capital Region in general, is a part of well integrated drainage system of the Ganga basin. The extremely gentle gradient that spreads almost all over the region restricts the degradational activities of the streams/drains. The storm water discharge in any basin/sub-basin of NCR is not local but has regional bearing covering areas of Haryana, Rajasthan, Uttar Pradesh and NCT of Delhi. It is, therefore, necessary to plan the drainage system at regional level in an integrated manner with adjoining States. Topography, rainfall intensity, soil characteristics, irrigation methods, crops and vegetative cover are important factors for deciding the type and design of drainage system. Since urban expansion is inevitable, increased run off would require remodeling of the existing drains as well as provisions of new/supplementary drains, implementation of appropriate flood protection measures, protection of natural drainage course, improved ground water recharge, and other environmental improvement measures such as prevention of sewer flows into the storm drains, pollution of river Yamuna etc. Provision of appropriate drainage in marginal settlements consisting of JJ clusters, resettlement colonies, informal/unauthorized colonies, etc, also requires due attention.

Regional Plan-2001 proposed that open drains, which are by and large the sources of nuisance and pollution, should be discouraged and discontinued. Areas where the annual rainfall exceeds 75 cm, separate systems for sewage and storm water are recommended. A combined sewerage system including drainage may be economical if the average annual rainfall is less than 75 cm.

During the review of Regional Plan-2001 in the year 1999, it was observed that nearly 60% towns are partially covered with the storm water drainage system and only two towns are fully covered. In all the cases, drains are open and in some of the towns there is combined system. The disposal of storm water is invariably unplanned and takes natural course on land, depressions, ponds etc.

9.3.2 Existing Situation and Issues

Studies have revealed that there is lack of integrated planning in the drainage for storm water which is not local but has got regional bearing covering areas in Haryana, Rajasthan, U.P. and NCT-Delhi Subregions. Untreated sewage continues to flow in most of the drains in the region and ultimately falls into the rivers Ganga and Yamuna. Encroachment by slum dwellers along the drains causes choking of drains and flooding in the upstream areas due to reduced carrying capacity. Dumping of solid waste in the drains also continues causing blockage. Master Plans have not been prepared district wise. Even the hydraulic survey has not been carried out regularly to assess the conditions of the drains.

- ***Lack of Regional Approach***

There is a need to adopt integrated regional approach for drainage planning and critically examine each major drainage system under basins/sub-basins of NCR at micro

level by each constituent State Government to assess the deficiencies in planning, design, maintenance and to suggest remedial measures including remodeling/improvement work wherever necessary.

- ***Lack of Funds***

Adequate funds need to be provided by the respective State Governments for upgradation and maintenance of the existing drainage system in the various Sub-regions for the improvement of internal and regional drainage system.

9.3.3 Policies and Proposals

In order to improve the regional and local drainage system in NCR, following strategies and policies are proposed:

- ***Regional Approach to Drainage***

Integrated Regional Drainage Plan at the regional level and Drainage Master Plans at the district level should be prepared after critically examining each major drainage system under basins/sub-basins of NCR at micro level by the State Governments incorporating the improvement proposals for enhancing the quality of regional and local drains taking into account the present/future development and settlement pattern in the region. All the related works at the regional level should be coordinated by a single agency. The area drainage plan should be considered as an integrated part of the Master Plan of the area and this drainage plan shall take into account the land development planning for the region. There is a need to conceptualize a drainage system before any area development programme is taken up. No area development project/new town/colonies/industrial complex should be sanctioned/allowed to be started or implemented unless integrated drainage plan is conceptualized and cleared by the designated authority. All developments in controlled areas falling in dark and over exploited block declared or to be declared in future by CGWB should aim towards zero run off within in the controlled areas. The ponds/lakes/wetlands (existing and proposed), bunds/check dams etc. should be developed/protected to increase the run off time of storm water in order to help in ground water recharging.

- ***Norms and Standards***

The urban drainage system may be designed for maximum rainfall of five years frequency storm for internal as well as peripheral drains and ten years frequency storm for the main drains. The likely time of concentration for each case may be worked out and corresponding storm values adopted. Usually the system is designed for a maximum rainfall of one-hour duration.

- ☞ The rural drainage system may be designed for three days rainfall of five years frequency to be drained in three days. An appropriate area dispersal factor should be adopted for computing the run off.
- ☞ The coefficient of run off may be calculated for areas with composite land use pattern on the basis of anticipated land use in the new areas and existing land use pattern for the areas already developed.
- ☞ Where it is not possible to work out the run off coefficient due to land use policies not indicated, run off coefficient not less than 0.2 may be adopted for rural areas with flat

to moderate slopes and 0.4 for steeper slopes. For urban area, run off coefficient not less than 0.6 may be adopted in absence of adequate details of the areas.

- ***Prevention of Storm Water Drains from Pollution***

Measures should be taken to prevent the use of storm water drains for conveying sewage and dumping of solid wastes and sludge in open drains. Enforcement should be done under the Environment Protection Act, 1986. Unauthorized development/encroachment/slum dwellings in the drainage system should be prohibited.

- ***Irrigation Water***

Where irrigation canal escapes including the tail escapes are out falling in the drains or in the neighboring ponds, the provision for efficient draining of surplus irrigation water by enhancing their capacity should be made during monsoon and on-monsoon period while planning for improvement in the integrated Regional Drainage System.

- ***Provision of Funds***

Provision of adequate funds should be made for upgradation and regular maintenance of the drains on the same lines as for the irrigation channels.

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

In order to implement the policies of drainage in the region, it is imperative to have a phase wise plan of action so that the implementation of policies and proposals in the Regional Plan can be dovetailed with the five-year plans. In view of this, each recommendation has been phased plan-wise where certain activities are to be completed within first five-year of the implementation of the Regional Plan whereas some activities will span over to all the four five-year plans.

Some of the activities which need to be implemented include preparation of Integrated Regional Drainage Plan at the regional level and Drainage Master Plans at the District level to manage regional and local drains, avert mixing of sewage and solid waste in storm water drains, creation of mass awareness, waste minimization through recycling of waste, regular maintenance and upgradation of drains etc. Investment requirement in this sector will depend upon the District Level drainage Master Plans to be prepared by the respective State Governments and the Integrated Regional Drainage Plan, therefore, Investment Plan cannot be proposed in the Regional Plan. Provisions for fund requirement will have to be made by the constituent State Governments in their five-year plans on the basis of District level Drainage Master Plans.

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