



## 5. EXISTING MUNICIPAL INFRASTRUCTURE

Nashik Municipal Corporation is responsible for the delivery of variety of services like water supply, sewerage, sanitation, drainage, and solid waste management, Roads & Transportation. It also provides services regarding medical facilities, preventive medicine, sanitation & conservancy, maternity and child welfare, control of food adulteration & some other function under the public health regulation.

### 1. Water Supply

#### 1.1. Sources of water

In 2001 the population of Nashik was 10,77,236. The present estimated population is 13.50 lacs. Presently NMC is pumping 280 MLD of raw water from following two sources. After deducting the losses NMC supplies about 210 MLD of water to the city. The average supply of drinking water to citizen is at 150 LPCD. The water loss is 26%.

Presently for supplying drinking water to citizen raw water is pumped from following two sources –

#### (i) Head at Gangapur Dam

From Gangapur dam headworks raw water is pumped and supplied to Shivaji Nagar filtration through 1200mm dia MS rising main pipe line and after filtration 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.



#### (ii) Head works in Darna River at Chehadi Village, Nashik Road.

From Darna river, which is another source of water for Nashik Road area, about 25 MLD of raw water is pumped and supplied to Nashik Road filtration plant. After filtration of water in these 5 treatment plants water is supplied to consumers through Elevated Service Reservoirs (ESR). There are total 69 (ESR) for distribution of water in the city.

#### 1.2. Filtration & Storage

Raw water pumped from sources is treated in treatment plants located at 5 different locations namely:



Sr. No.	Filtration Plant	Capacity (MLD)
1.	Shivaji Nagar Filtration Plant	97 MLD
2	Bara Bunglow Filtration Plant	81 MLD
3	Panchavati Filtration Plant	71 MLD
4	Gandhi Nagar Filtration Plant	26 MLD
5	Nashik Road Filtration Plant	73 MLD
Total =		348 MLD



**1.3. Service Area Coverage**

The Municipal Corporation is supplying water to above 95% developed area of this corporation. There are totally 140000 water connections in the city. The average supply hours of intermittent supply is 1.5 to 2 hours in the morning and 1.5 to 2 hours in the evening. In CIDCO (New Nashik) area, which is taken over from CIDCO authority supply is one time only. Out of 140000 consumers about 22000 consumers in CIDCO area and about 3000 consumers in old city area are being supplied water without meter. Other consumers are supplied water through meters only. There are about 1440 Km. of water supply lines ranging from 80 mm dia to 450 mm dia for distribution network and up-to 1700 dia for transport of water. 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 citizen through house service connection. In some areas in addition to the connection hand pumps are provided by NMC. On an average about 3500 new connection are being added every year. All new house service connections are metered.

**1.4. Quality of water/ Water Tariff**

Quality of water is maintain as per specification of CPHEEO manual i.e. turbidity less than 1 (norm is 5 NTU). Chlorine at tap end is about 0.20 ppm.

NMC has established a system for testing drinking water sample obtained from different area of city and also from slums these samples are got tested from State Government Public health laboratory a table showing a samples tested and found in order is given below -

<i>Sr.No.</i>	<i>Number of samples tested</i>	<i>Number of samples found in order</i>	<i>Number of samples found not fit for drinking</i>
2004-05	8070	8018	52 (0.64%)
2005-06	9043	8881	162 (1.79%)

Whenever the samples tested are found not fit for drinking, the location of the place of contaminated samples is thoroughly checked and the source of contamination rectified completely. From this location another sample is obtained for re-checking of the quality of water, and extensive precautions are taken regarding the quality of water in areas from which suspected sample were observed. If contamination of water is detected in the second successful sample also, an extensive leak detection survey is carried out to find the point of contamination. Carrying out the required works on war footing stops this contamination, and during this period, potable drinking water is supplied through NMCs Water Tankers to the suspected contamination areas.

**WATER TARIFF IN NMC**

<i>Sr.No.</i>	<i>Type</i>	<i>Rate / K.L.</i>
1	Residential	Rs. 03.50
2	Non-Domestic	Rs. 13.50
3	Commercial	Rs. 18.00
4	Timely supply without meter	Rs. 1080.00 per annum.



The water connection charges details are as follows:

Type of connection	Diameter (mm)	Deposit	Road damage charges			Ferrule charges
			WBM	Bitumen	Concrete	
Household Connection	12.50	200	750	1000	1400	50
	19.00	400	750	1000	1400	75
	25.00	800	750	1000	1400	100
Non-Household Connection	12.50	400	750	1000	1400	50
	19.00	800	750	1000	1400	75
	25.00	1600	750	1000	1400	100
Commercial Connection	12.50	800	750	1000	1400	50
	19.00	1600	750	1000	1400	75
	25.00	3200	750	1000	1400	100

### 1.5. Unaccounted for Water

- 1) Water loss through leakage's: - Large amount of water is being wasted at different points in the supply 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
- 2) Water revenue loss: - NMC supplies free water through public stand post & to NMC Gardens & various NMC establishment. Also in the peripheral and fringe area due to tardy supply wastage is high. Many of public stand post either leak or taps are stolen frequently resulting in wastage of water during supply hours. In addition to this the unmet red connections that are around 25000 in number causes large amount of wastage of water, as most of these don't have taps.
- 3) Water loss through theft: - In old and congested city areas there are unauthorized illegal connections, which are also contribute to unaccounted water.

This wastage and unaccounted for water is about 40% of total raw water pumping. This 40% loss is calculated at the basis of water audit done by NMC through consultant. The loss due to leakages is 26%.

### 1.6. Energy Audit

NMC has carried out the Energy audit for water pumping & filtration pumps. Consultant suggested some repairs & replacement of pumps. NMC has carried out work @ one filtration plant (Panchavati) & with a period of 30 months pay back amount is recovered.

### 1.7. Key Issues & Challenges

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



## 2. Sewerage

### 2.1 Underground Sewerage :

The city, till recent times, did not have well planned sewerage scheme. The untreated sewage was generally let out in river Godavari & its tributaries like Nasardi, Waldevi.



In 1895, a sewer starting from Tiwari Mahal up to river Godavari meeting just down stream of ghats was laid . The diameter of sewer is 400-500 mm. Old Nashik town on right bank of Godavari had a system of brick / stone masonry drains covered with stone slabs, running along narrow streets for conveying sullage & storm water to the river.

“Nashik underground drainage scheme – Part 1” was executed during 1955-68 by municipal council. Under the scheme, intercepting sewers were laid on both banks of Godavari terminating in a pumping station at Ganeshwadi on left bank of the river. The sewage was pumped from this pumping station through 750 mm dia rising main about 3.3 km length in to a distributory of Gangapur left canal.

In view of Sinhastha fair in the year 1991, Maharashtra Water Supply & Sewerage Board executed an emergency scheme to arrest flow of sullage & sewage in various drains, discharging in to river Godavari upstream of holy ghats. The scheme envisaged augmenting intercepting sewers on both banks of river & enhancing capacity of existing Ganeshwadi pumping station. Sewers 300 mm to 450 mm dia was laid on the left bank & 350mm to 800mmdia laid on the right bank and pumping installations at Ganesh wadi pumping stations were overhauled & augmented to deal with increased flow.

There are brick masonry sewers in gaathan 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 gaathan 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 are in deteriorated condition. 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.

### 2.2 Sewerage Scheme Phase -I Project

In 1991, Water & Power Consultancy Services (India) Ltd (WAPCOS) were appointed for framing DPR for Under Ground Sewerage Scheme, Phase 1 (UGSS-Ph1). The phase 1 project is designed to cover thickly populated core 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) & land use proposed therein was taken as a basis of planning by WAPCOS. The sewerage system has been



designed wrt sewage flow @150 lpcd considering water supply rate of 180 lpcd & sewage flow to the extent of 80%.

The DPR prepared by WAPCOS estimated to cost Rs. !56.38 crore was sanctioned by NMC vide General Body Resolution 102 dated 4-10-94. Maharashtra Water Supply & Sewerage Board gave the Technical clearance to DPR on 19-10-94.

During same period, Govt of India launched a programme and assured funding for the projects for abatement of pollution in major rivers in various states, on the lines of Ganga Action Plan . Some part of Phase 1 project including interception & diversion works for Godavari, Nasardi & Waldevi basins under Phase 1 project area, related pumping stations & conveyance systems and treatment works costing around Rs.60 crore, were transferred under “Godavari Action Plan” The Pre Feasibility Report for Godavari Action Plan including some works other than sewerage costing Rs. 72 crore was approved by Govt of India in July 1995.

The Govt of Maharashtra accorded Administrative Approval to Phase 1 project excluding the part to be under taken as Godavari Action Plan vide GR Bhu Ga Yo /1095/1400/ Pra kra 144 / Pa Pu 17 dated 27 April, 98 for Rs. 82.78 crore.

There are three major rivers cutting across NMC area running from west to east . These are, Godavari, Nasardi & Waldevi Nasardi is tributary of Godavari meeting it in Corporation limits. River Waldevi runs on southern outskirts of the project area. It merges in to river Darna, the tributary of river Godavari, near Chehedi beyond NMC limit.

The project area is thus divided in three drainage basins, namely, Godavari, Nasardi & Waldevi. These drainage areas are further divided by the consultants in various water sheds as below on the basis of topography & convenience of collection of sewage flow. Each of the water sheds has its own intercepting sewer.

**Network and Pumping Station**

<i>Sewer shed</i>	<i>Sewerage District</i>	<i>Pumping station</i>
<b>Godavari Basin</b>		
Godavari left bank sewerage shed A served by existing LB intercepting sewer		
Sewerage shed B on left bank of Godavari with sewer along Waghadi nalla	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 Panchak gaathan	Sewerage District- VI	Pumping station at Panchak
<b>Nasardi Basin</b>		
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
<b>Waldevi Basin</b>		
Nashik Road Deolali sewerage shed draining to Waldevi pumping station near Chehedi	Sewerage District VII	Nashik Road pumping station



**2.3 Sewerage Treatment Plants** - Following sewage treatment plants have been proposed as part of Phase-I project.

<i>STP</i>	<i>For treating sewage from</i>	<i>Capacity</i>
Tapovan STP on left bank of Kapila river	Sewerage district - I to V (Flow from pumping stations Ganesh wadi, Kapila , Takli )	140 MLD
STP near Panchak	Sewerage District –VI (Flow from pumping stations at Panchak and P.S. at STP)	10 MLD
STP near Chehedi	Sewerage District –VII (Flow from pumping station at STP)	50 MLD
<b>TOTAL =</b>		<b>200 MLD</b>

The created STP capacities under Phase-I Projects are as follows :-

<i>STP</i>	<i>For treating sewage from</i>	<i>Capacity</i>
Tapovan STP on left bank of Kapila river	Sewerage district - I to V (Flow from pumping stations Ganesh wadi, Kapila , Takli )	78 MLD
STP near Panchak	Sewerage District –VI (Flow from pumping stations at Panchak and P.S. at STP)	7.5 MLD
STP near Chehedi	Sewerage District –VII (Flow from pumping station at STP)	22 MLD
<b>TOTAL =</b>		<b>107.50 MLD</b>

**2.4 Sewerage Scheme Phase-II Project**

Nashik Municipal Corporation’s recent Development Plan (DP) for Corporation area was approved in 1995. It was prepared to form basis for orderly development of various facilities wrt developments expected by year 2011. Some agricultural zones were converted to residential zones to cater for rapid urban growth anticipated. These areas are not covered in Phase 1 Sewerage project discussed above.

It was found necessary to extend comprehensive sewerage system to the rapidly growing areas beyond Phase 1 project area in all directions & urbanizing villages merged in NMC to keep parity with Phase 1 area.

NMC appointed M/S Consulting Engineering Services (CES) for framing the DPR of Under Ground Sewerage Project , Phase 2 . The DPR of CES was received in Sept 2001

CIDCO developed residential area with infrastructure facilities on western side of Mumbai-Agra road (NH3) extending from NH 3 up to Nasardi river to accommodate influx of population due to growth of the city. During late eighties, CIDCO provided network of sewers, conveyance system & 3 STPs [Bhujbal farm-12 MLD, Morewadi 4.5 MLD & Untwadi 2.5 MLD] for disposal of wastewater generated. The effluent from plants is let in river Nasardi. The sewerage works were planned in isolation by CIDCO with limited view of catering need of their own development area. The sewerage infrastructure developed by CIDCO was handed over to NMC in stages during 1990-96 for civic administration. These CIDCO STPs are deteriorated and hence to be discarded and the sewage collected at these STPs is to be conveyed to proposed STP at Agar Takali.

The Phase 2 project area is scattered mainly on either side of NH 3. The area is divided in 6 zones. The zones are named as -



Zone	River Basin
A. Bhujbal Park	Nasardi
B. CIDCO	Nasardi
C. Kamatwada-Ambad- Chunchale	Nasardi
D. Pathardi	Waldevi
E. Makhmalabad	Godavari
F. Adgaon	Godavari

Of the 14 villages covered under Phase 2 project, 6 villages (Kamatwada, Ambad, Chunchale, Pathardi, Makhmalabad & Adgaon ) are part of the above zones & remaining 8 villages (Gangapur, Pimpalgaon Bahula, Pimpalgaon Khamb, Vadner, Chadegaon, Dadhegaon, Manur & Nandur) are isolated from zone areas requiring separate systems. The area covered by the Phase 2 project is 3943ha.

The works of Phase 2 project have been planned as under for facility of phasing of construction.

Sewer network, Pumping Stations (civil works)

Rising mains, Land acquisition : For 2031 requirements

Pumping machinery, Sewage treatment &

Disposal works : For 2016 requirements

As seen from para 3.2, the 6 villages are cohesive part of respective zones. 5 villages shown in table above are included in the system of zones. Remaining 3 of the 14 total villages, namely, Gangapur on bank of Godavari, Vadner & Chadegaon on bank of Waldevi are isolated from Zone areas. Individual sewerage systems for these villages including collection, conveyance & treatment have been proposed.

The Phase 2 project envisages collection systems (designed for 7.34 lakh population in the year 2031), 12 sewage Pumping stations, rising mains & 9 STPs.

## 2.5 Sewerage Tariff :-

NMC is charging one time connection charges to user while connecting the house-hold sewerage to NMC sewer network and charges are as under

- 1) For individual house - Rs. 1000/-per connection
- 2) For Society/Apartment - Rs. 2000/- per connection
- 3) For commercial establishment - Rs. 3000/- per connection

In addition to this sewerage benefit tax up-to 5% of house tax is charged every year from the beneficiaries.

The revenue collection is under:

(Rs. In Lakhs)

Year	One time Sewage Connection charges	Revenue @ 5% of General Tax		Total	O / M
		Demand	Recovery		
2001-02	23.89	260.50	251.60	275.49	-
2002-03	73.45	320.00	258.88	332.33	138.03
2003-04	96.97	320.00	286.30	383.27	274.31
2004-05	66.38	457.00	309.80	376.18	447.40
2005-06	24.42	460.00	330.40	354.82	515.50



**Performance Indicators as on April 2006**

Sr. No	Indicators	NMC
1	Sewerage network Coverage	70%
2	Access to sewage connection	50%
3	Treatment plant capacity	107.50 MLD
4	% sewage treated	75%
5	% Waste water cycled as reused	0%
6	Method of Treatment	Extend Aeration UASB followed by Aerated lagoon and Activated sludge process

**2.6. Key issues & challenges :**

- 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 needs renovation, augmentation, 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.

**1. Storm Water Drainage System**

**3.1. Physiography**

In Nashik Municipal Corporation area there is 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 –

- 1) 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
- 2) The river Nasardi also flows west to east and joins the Godavari on the south bank at Takli.
- 3) The river Darna flows at the South – Eastern boundary of NMC, and its tributary Valdevi 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.

**3.2. Climate**

The climate in Nashik is quite pleasant and moderate. The winter is cold from December to February with temperatures ranging from 50 C to 250 C. The summer is hot and dry from March to May with temperatures ranging from 300 C to 410 C. The relative humidity is maximum at 86% and minimum at 46%. The monsoon is brought by the south – west monsoon winds and rainfall decreases as we move eastwards. The average annual rainfall is about 737 mm. The monsoon lasts for about 15 days, between June and September. The weather after the monsoons, in October and November is pleasant.





### 3.3. Rainfall

The rainfall in Nashik district is under the influence of Southwest monsoon. There is an uneven distribution of the rainfall. On the one hand, the extreme west of the district receives maximum rainfall of 1202.3 mm, while on the other hand, it dwindles down in the Central and Eastern Sectors of the district.

The rainfall data of Nashik rain gauge station (IMD/ Collector Office) is collect for 1951 to 2005. The average rainfall is 737.00 mm / year. The maximum yearly and daily rainfall is 1202.3 mm (year 2005) and 152 mm (Sept. 2005) respectively.

### 3.4. Soils

Nashik City falls in the Nashik district. The great trap region of the Deccan covers the whole district. The volcanic portion consists of compact, stratified basalts and an earthy trap. The basalts are the most conspicuous geological feature.

As regards the soil, the valleys are filled with disintegrated basalt of various shades from gray to black, washed down by rain. It is of argillaceces nature. The black soil contains high alumina and carbonates of calcium and magnesium with variable amounts of potash, low nitrogen and phosphorus. The red soil is less common.

### 3.5. Existing Storm Water Drainage

Godavari, Nasardi and Waldevi are the three major rivers, which traverse through Nashik Municipal Corporation area. Darna River lies outside the project boundary.



As per topography, the entire region under study is divided into three different sub-basins namely Godavari Sub-basin, Waldevi Sub-basin and Nasardi Subbasin. Various nallas / stream lying in these sub-basins carry rainwater from the basin area and discharge into respective rivers. Most of these nallas are untrained and NMC have constructed pucca pitching / lining in few of the nallas. It has been observed that due to rapid urbanization, unplanned building construction activities, has caused blocking or reduction in waterways of the nalla. Roadside storm water drains exist at few locations only especially in the highly developed city area. During heavy rains inundation and flooding are observed at number of locations where natural course of nail as are contracted due to unplanned and phased development activities. Under the prevailing circumstances, there is an urgent need to provide a well-planned storm water drainage system in the corporation area.

### 3.6. Methodology and Design Norms

Methodology and Design norms are divided in two major groups:

- 1) Rainfall and analysis
- 2) Storm water drainage design for NMC area.

Reconnaissance survey will be conducted where in primary and secondary storm water drains, existing condition of storm water drains structure, locations of obstructions, encroachments, locations of low lying areas, general ground elevations, social establishment on both sides of the storm drains, location



of culverts, bridges crossings etc. location of existing sewage / sullage points to open drains, identification of roads will be identified. Also existing water supply network and sewerage network will be identified.

Some flooding and low-lying areas have been identified. Storm water drainage planning requires identification of the rivers, tributaries, streams, nallas etc. where storm water can easily disposed off. This will be identified.

The Satellite maps and data from MRSAC will be used to design the system.

Network of roadside drains which generally form the laterals for collection of storm water runoff and conveyance of the same to the natural outfall like nallas and sub-nallas, will be identified.

If there will be local natural lakes (ponds) open land or garden etc. such depressions will be identified and feasibility to collect storm water into this natural lake open area for holding purpose till the time required for draining of the same into nearby river, tributary or local nalla. This will not only help re-charge and rejuvenate local water bodies but also give some buffer storage for building and optimum & economical drainage system.

### **3.7. Design Norms**

The design criteria stated in the following will be generally followed. Manual on sewage and sewage treatment (1993) Central Public Health and Environmental Organization – Ministry of Urban Development, New Delhi. Manual on water supply and treatment (1999) Central Public Health and Environmental Engineering Organization, Ministry of Urban Development, New Delhi.

Design of small bridges and culverts as per Indian Road Congress – IRC (SP) 13, New Delhi.

### **3.8. Rainfall Intensity**

Whenever precipitation occurs, part of it gets evaporated before reaching the earth. The part of precipitation, which reaches the earth, gets infiltrated in the strata and reaches the ground water table. Once the strata is saturated, the precipitation reaching the earth starts flowing over land and fills the low laying areas depression on its way before reaching nalla / river. Any storm water drainage system essentially means proper collection and conveyance of this rainfall precipitation to the corresponding disposal point / out-fall (nalla, stream, river etc.). However it is well known that the intensity of rainfall and duration for which it occurs is not constant over a period. Hence rainfall precipitation with the duration equal to or more than the time required for over land flow (time of concentration) needs to be analyzed for finalizing the design rainfall intensity. Analyzing the historic data and guidelines as per Manual will do this. It is stated in terms of reference to adopt design rainfall intensity of 65 mm / hr for the project area for 3 hrs. to identify water lodge areas and its depth. This will be examined and if any alternation requires to be made will be done.

### **3.9. Estimation of Storm Water Runoff**

Storm runoff is that portion of the precipitation, which drains surface (run-off) over the ground surface. Estimation of such runoff reaching the storm water system therefore is dependent on intensity and duration of precipitation, characteristics of the tributary area and the time required for such flow to reach the drainage system. The storm water flow for this purpose may be determined by using the



rational method, hydrograph method, rainfall-runoff correlation studies, digital computer models, inlet method or empirical formulae.

The empirical formulae that are available for estimating the storm water runoff can be used only when comparable conditions to those for which the equations were derived initially can be assured.

A rational approach, therefore, demands a study of the existing precipitation data of the area concerned to permit a suitable forecast. Storm drains are not designed for the peak flow of rare occurrence such as once in 10 years or more but, it is necessary to provide sufficient capacity to avoid too frequent flooding of the drainage area. For the purpose of economic and techno-feasibility, there may be some flooding when the precipitation exceeds the design value, which has to be permitted. The frequency of such permissible flooding may vary from place to place, depending on the importance of the area. Though such flooding causes inconvenience, it may have to be accepted once in a while considering the economy effected in storm drainage costs.

The maximum run-off, which has to be carried in a drainage section should be computed for a condition when the entire basin draining at that point becomes contributory to the flow and the time needed for this is known as the time of concentration (t) with reference to the concerned section. Thus, for estimating the flow to be carried in the storm sewer, the intensity of rainfall, which lasts for the period of time of concentration, is the one to be considered contributing to the flow of storm water in the sewer out of the different methods; the rational method is more commonly used.

**3.10. Storm Frequency**

The frequency of storm for which the sewers are to be designed depends on the importance of the area to be drained. Commercial and industrial areas have to be subjected to less frequent flooding. The suggested frequency of flooding in the different areas is as follows:

<i>Sr</i>	<i>Locations</i>	<i>Duration</i>
a)	Residential Areas	
	i) Peripheral areas	Twice a year
	ii) Central and comparatively high priced areas	Once a year
b)	Commercial and high priced areas (Administrative & Public importance)	Once in 2 years

**3.11. Intensity of Precipitation**

The intensity of rainfall fluctuates with duration. Analysis of the observed data on intensity duration of rainfall of past records over a period of years in the area is necessary to arrive at a fair estimate of intensity duration for given frequencies. The longer the record available, the more dependable is the forecast. In Indian conditions, intensity of rainfall adopted in design is usually in the range of 12 mm / hr to 20 mm / hr. (As per CPHEO)

**3.12 Coefficient of Runoff**

The portion of rainfall, which finds its way to the drain, is dependent on the imperviousness and the shape of tributary area apart from the duration of storm.



### 3.13 Imperviousness

The percent imperviousness of the drainage area can be obtained from the records of a particular district. In the absence of such data, the following may serve as a guide.

Type of area	Percentage of Imperviousness	Proposed
Commercial and industrial area	70 to 90	80
Residential Area		
I) High density	60 to 75	65
II) Low density	35 to 60	40
III) Parks & undeveloped areas	10 TO 20	30 (Rockv)

### 3.14 Tributary Areas

For each length of storm sewer, the drainage area should be indicated clearly on the map and measured. The boundaries of each tributary are dependent on topography, land use, nature of development and shape of the drainage basins. The incremental area may be indicated separately on the compilation sheet and the total area computed.

### 3.15 Duration of Storm

Continuously long light rain saturates the soil and produces higher coefficient than that due to heavy but intermittent rain in the same area because of the lesser saturation in the later case. Runoff from an area is significantly influenced by the saturation of the surface nearest the point of concentration, rather than the flow from the distant area. The runoff coefficient of a larger area has to be adjusted by dividing the area into zones of concentration and by suitably decreasing the coefficient with the distance of the zones

### 3.16 Storm Water Drainage Design

Based on the contours ridges and valleys will be marked on NMC map and storm water drainage layout plan will be finalized. For each section, contributing runoff (flow) will be calculated. Existing drains will be analysed and increase in size will be proposed.

Open drains (V/U or trapezoidal shape as required) will be designed for less developed areas, less populated areas where more space is available and green belt and open areas where surface / storm water runoff is estimated to be low. Manning's formula will be used and appropriate 'n' value will be adopted as per the use of construction material.

For open drains & culverts software, Hydraulic Modeling Software of SWMM Version 5.0 will be used.

Following specific criteria for designing open drains will be considered.

1. Minimum free board will be decided for maximum discharge condition in open drains.
2. Minimum depth and width of drain will be decided.
3. Slope proposed will be equal to the local ground slope. Only in certain critical cases if required, slope may be selected to be greater than ground slope.
4. Underground (closed) storm sewers will be designed for developed areas, areas of congestion and critical low-lying areas that are found proper to flooding or water logging. Hazen-Williams formula will be used. 'C' value of 120 for concrete (RCC & PSC) as per CPHEEO Manual will be adopted.



5. Minimum 0.3- 0.6 *m/sec.* velocity will be adopted as no silting may take place and maximum velocity limit of 3.0 *m/sec.* will be kept as no scouring cavitations would take place. This is as per CPHEEO manual.

To ensure a minimum velocity of 0.6 *m/sec.* following recommended slopes will be adopted.

As per CPHEEO Manual storm water drains will be designed @0.8 running full.

R.C.C. pipes will be as per IS 458-2003.

Maximum size of RC.C. pipes will be 2000 mm and thereafter either box culvert will be proposed or multiple storm water drain will be proposed.

Minimum soil cover will be 1.0 m. as these are RC.C. pipes or as per site conditions.

The spacing of manholes above 90 to 150 m may be allowed on straight runs for drains of diameter 900 to 1500 mm. Spacing of manholes at 150 to 200 m may be allowed on straight runs for drains of 1.5 to 2.0 m dia. Which may further be increased upto 300 m for drains of over 2 m diameter. A spacing allowance of 100 m per 1 m diameter of drain is a general rule in case of very large drains.

Methods for Assessment of Surface flows.

Rational method as per catchment area shall be used.

The Project Area is divided into basins of Godavari river, tributary, Nasardi & Waldevi as per topography study. Plate No.4 exhibits the drainage basins in the project area.

### 3.17 Godavari River Basin

River Godavari originates at Trimbak at about 25 kms from Nashik. Trimbak is an important pilgrim center, River Godavari flows through Nashik city and flows towards south east. Total area of Godavari basin from NMC limit is about 14022 Ha. The drainage basin of Godavari covers major portion of corporation area. Godavari basin is further divided in to two sub-basins.

- a) Godavari Left Bank Drainage Sub-basin.
- b) Godavari Right Bank Drainage Sub-basin
- c) Nasardi Tributary Basin
- d) Waldevi Tributary Basin - It is Darna River's Basin.

### 3.18 Bench Marks Fixing

In Nashik City, G.T.S. / other permanent bench-marks been fixed and utilized for several works in the city area. Keeping G.T.S. bench-mark value as base, about 300 benchmarks will be fixed in various places. The distance between two bench marks will be kept 1.5 kms or more as per site conditions.

### 3.19 Key Issues:

- There is no comprehensive storm water system available
- The river and their tributaries needs special attention
- Water ways of all cross drainage works to be verified
- Pre-Monsoon curative maintenance to be considered

## 4. Traffic & Transportation



#### 4.1. Existing Infrastructure :

##### General

Nashik City is the headquarter of Nashik Administrative Division which comprises of four districts. Nashik is situated 185 kms from Mumbai and 200 kms from Pune. It is thus part of Golden Triangle of Maharashtra Viz. Mumbai-Pune-Nashik. The National



Highway No.3 i.e. Mumbai Agra road connects Nashik to important cities of Nashik and National Highway No.50 connects Nashik to Pune. Nashik also has good railway connectivity as it is situated on the main line of Central Railway on Mumbai-Bhusawal Section.

In addition to this four state highways i.e. Nashik-Dindori-Wani (SH-11) Nashik Peth (SH-12), Nashik Aurangabad (SH-60) Nashik-Trimbak (SH-4) also provides additional connectivity former two state highways also connect Nashik to Gujrat State.

One Major river i.e. Godavari flows through the city and its three tributaries i.e. Darana, Nasardi and Waldevi also flow through NMC area.

#### 4.2 Existing Road Network

Nashik Municipal Corporation is spread over area of 259 sq.km. Such a large area is broadly divided into five distinct zones geographically. Each of the following zones have their arterial roads and their link roads with other zones. Besides these roads, inner and outer ring roads as per the sanctioned development plan of Nashik (Sanctioned in 1995) are being developed by NMC. Thus existing road network of NMC is based on all these roads.

##### a) Nashik City



Existing road network of Nashik city zone consists of following arterial roads. Old Mumbai-Agra road, Tilak road from Dwarka Hotel to Shalimar Point, Gangapur Road, Sharanpur-College Road, M.G.Road, Main-road, Wadala Pathardi Road etc.

##### b) Panchavati

Panchavati area, which is on the left bank of river Godavari, is connected to Nashik city by nine bridges and four causeways. Panchavati zone has main arterial roads in form of old Agra road, Dindori road within city limits. Peth Road. within city limits, Makhamalabad road, Ganeshwadi road, Makhamalabad-Mhasrul-Adgaon link road, Inner ring road and outer ring road, Aurangabad road, etc., are the other roads in this zone.

##### c) Nashik Road-Deolali

Nashik Pune Road is the main feeder road for Nashikroad Deolali area, Jail road, Lam road, Subhash Road, M.G.Road, Vihitgaon-Pathardi road etc area major arterial and link roads in this zone.



d) **Satpur**

Satpur area is flanking Trimbak road with satpur gaathan to its south and the main industrial complex of MIDC to its north. Trimbak road is the main linkroad with Nashik city. Mahatma nagar road, Ambad link road, ITI to Trimurti chowk road, A.B.B. Circle to Untawadi, Shivajinagar to Gangapur roads of this zone.

e) **New Nashik Developed by CIDCO**

New Nashik (CIDCO) zone is mainly connected through the National highway (NH3) and Untwadi road, Kamathwade road, inner ring road Ambad link road are major link roads. On South and South west side of this zone Ambad industrial estate of MIDC is situated.

Besides the above zone 19 villages are incorporated within NMC. All these villages have connecting roads.

**4.3. Details of Existing roads of NMC**

The average carriageway width of arterials, subarterials and colony roads including all important roads in Nashik is 7.50 m, 5.50 m and 4.00m respectively. The average percentage of road network is in between 8% to 9% the total city area. Which is very inadequate to address the traffic and parking demand.

The main circulation pattern inside the city as described above is through arterial and link roads including ring roads.

Nashik city traffic consists of mixed traffic of slow and fast moving vehicles. Also cycles and pedestrian traffic is encountered on arterial and sub arterial roads.

Due to inadequate width of carriage way and low speed vehicles the carrying capacity of roads is hampered causing frequent congestions. There is a substantial increase in the volume of motor vehicles, cycles and pedestrian traffic due to high rate of population growth and opening up of the economy. Earlier there were more two-wheelers and cycles, while today the number of motorcars has increased. There is also a lack of footpaths for pedestrians and there are separate cycle tracks.

Nashik Municipal Corporation has taken up major steps on improving the road infrastructure in order to cope up with increased traffic and transport demand and insufficient parking spaces by taking up projects for roads construction and upgradation work costing around Rs. 50.00 crores.

Existing and new colonies are being connected to the arterial link roads and ring roads by improving the road infrastructure. The break up of existing road infrastructure is as follows –

**Road Infrastructure**

<b>Sr.No</b>	<b>Type of Road</b>	<b>Length (km)</b>
1	Cement Roads	262
2	B.T. Roads	1282
3	W.B.M.Roads	430
	Total =	1974



#### 4.4 Vehicular Growth and Composition

The total number of vehicles registered in Nashik Regional Transport office as on 31-3-05 was 523289.

Details of growth of vehicles are shown in table below –

**Table Growth of Vehicles in Nashik Region**

<i>Year</i>	<i>Vehicle Population</i>	<i>% 5 year Growth</i>	<i>Consider 60% vehicle population in Nashik City.</i>
1985	65594	-	39356
1990	133726	103.86	80236
1995	182672	36.60	109603
2000	352117	52.75	211270
2005	523289	48.61	313973
2010	892208 (Projected)	70.50 (Projected)	535325 (Projected)
2015	1521214 (Projected)	70.49 (Projected)	912728 (Projected)
2020	2593670 (Projected)	70.50 (Projected)	1556202 (Projected)

Source : RTO, Nashik.

#### 4.5 Public transport system

The predominant public transport modes in Nashik are City Busses and Auto Rikshaws & Taxi. There are 185 busses playing through 32 routes and serves around 46000 passengers per day in and around the city. Auto rikshaws ply on all major routes and also on sub arterial roads. Presently shared auto rikshaw services are given on major routes shared taxi service available on Nashik-NashikRoad Station routes.

#### 4.6 Key Issues and Challenges

- No detailed master plan for road and traffic / transport infrastructure development.
- Increased travel times due to insufficient links across river
- The development not as envisaged in the master plan will have a direct bearing on the city. The service sectors will be strained due to the influx of population and other activities.
- Absence of link roads and bye pass road causing traffic problems.
- Environment deterioration due to motorized traffic.
- Increasing the share of public transport to the desired levels.
- Very heavy inflow at vehicles and pilgrims during kumbhamela, which is held every 12 years.
- Poor pedestrian infrastructure (RUBs / ROB / Footpaths, Pedestrian crossing etc.)
- Inadequate parking
- Traffic Safety
- Traffic problems due to increased number of Auto Rikshaws and Auto) and private vehicles.
- Heavy traffic congestion in core areas of the city
- Infrastructure accountability and co-ordination between different agencies.
- No separate cycle tracks
- Bus Parking Bays at Bus-stops





### 5. Street Lighting

Major functions are providing street light facility on Municipal Roads, Gardens Public Places, Jogging track. Street light department is decentralized in 6 division for maintenance purpose. There are 48,236 no. of poles in Nashik NMC has installed following High mast in various Chowks of city to facilitated cross over traffic during Night hours.



#### Street Light

Sr.No	Division	No. of Poles	HPSV 70W	HPSV 150W	HPSV 250W	HPSV 400W	40 W Tube Light
1	Nashik (East)	7870	2263	4614	1409	-	179
2	Nashik (West)	5569	1086	2702	1895	96	50
3	CIDCO	9656	4344	3655	1278	-	629
4	Satpur	7193	4078	1488	1540	236	211
5	Panchavati	9534	4524	2790	1774	-	502
6	Nashik Road	8941	2175	3532	3446	191	45
<b>TOTAL =</b>		<b>48263</b>	<b>18470</b>	<b>18777</b>	<b>11342</b>	<b>523</b>	<b>1616</b>

#### High Mast in Nashik City

Sr.No	Particulars	Quantity
1	12.5 m	118
2	20 m	12
3	16 m	30
4	30 m	13

Total 48263 poles covers approx. 1974 km of road length average spacing between poles is 35 m. As Nashik Municipal Corporation is growing very fast NMC has to install 3000 to 3500 poles every year in new residential area.

#### 5.1 Energy Saving in Street Lights

Taking into view of the energy crises in the state and at National level NMC has taken up the project of energy saving in street lighting in the year 2003-2004. NMC has installed energy saver for streets light in all six division. Out of 900 metering point so far NMC have installed 650 energy saver panels. The average savings achieved by this energy saver is about 30%.

**Nashik Municipal Corporation has been awarded the 2<sup>nd</sup> Prize in Municipal Corporation sector in the "State Level Award for Excellence in Energy Conservation and Management" for the year 2005 by Maharashtra Energy Development Agency.**

#### 5.2 Traffic Signals

Nashik Municipal Corporation has 25 signals in our city. NMC renovating old signals by installing LED lamp heads to reduce energy consumption. Every year NMC install 3 to 4 new signals in the city.

#### 5.3 Key Issues & Solutions

- Provision of street-lights with energy savers in new developed roads gardens parks jogging tracks etc.
- Installation of energy saver systems to street lights
- Rehabilitation of existing street light poles, cables, conductors etc.
- Providing new automatic traffic signaling system at various road junctions.



## 6 Municipal Solid Waste Management (Msw)

### 6.1. Collection System

Prior to 2001 Solid waste generated in Corporation area was collected through NMC vehicle and taken over to dumping site situated Old Adgaon Naka. Dustbins were provided all around the city and twice a day NMC vehicle are collecting solid waste. After 2001 corporation has made efforts to improve the solid waste management and the concept of an unique system of Ghanta Gadi was introduced. Under this system, garbage is collected from house to house to the private agencies. The tractors engaged by private agencies for collection of garbage are called as **GHANTA GADIS**. However due to large geometrical area in some part more number of Ghanta gadis were provided to municipal solid waste. These Ghanta Gadis while collecting garbage stops at fixed stations with fixed timings (In variation of 15 to 20 minutes) these Ghanta gadis having 1 driver and 2 garbage collectors. The garbage collector in the Ghant gadis itself carries out separation of non-biodegradable material. There are no dustbin is provided in the city. These ghanta gadis are provided in the 6 zones and 108 wards. The Municipal Solid wastes collected by ghanta gadis were taken to composed manure plant constructed by NMC.

### 6.2 Compost Plant

NMC has constructed compost plant in which solid waste is collected by Ghanta Gadi were brought on a common plat form. Daily collection of solid waste at present is about 200 M.T. per day. Before entering into this compost plant the weighing of solid waste is done on a computerised weigh bridge to ascertain the weight of solid waste.



#### **Salient features of the Solid Waste Plant**

- 1) Plant commissioned on 30-8-2001
- 2) Plant Capacity = 300 Metric Tones per day (TPD) (MSW)
- 3) Compost production = @ 30 Metric Tones per day (TPD)
- 4) Working hrs = 24 hrs. working in three shift.

#### **Compost plant comprising of three major parts:**

##### **A) Processing platform for composting of MSW**

Daily incoming @ 200 M.T. garbage in mixed condition is unloaded on this platform @ 1 kg/M ton Bio-culture & Sanitreet in powder form is sprinkled on it. (The dose includes 800 gms of Bio culture & 200 gms of sanitreet Bio culture is used as compost activate & sanitreet is used to subside the unpleasant odour) Manual segregation is being done for recyclable material like plastic, paper, Rexene, tyre tube etc. The heap is made to form windrow. Turning and shifting is being done on every seventh day and totally four times. Thus total thirty days active composting is done. Water sprinkling is done to maintain the humidity level.

##### **B) Mechanical screening of composted MSW.**

The above fermented / composted garbage is screened through 35 mm & 14 mm mechanical sieving system comprising of conveyor and Rotary trommel. Further storage of fifteen days inside the godown is done for maturation of compost. Afterwards 5-mm screening & 1 mm screening with air blowing is done to separate out sand, debris, glass, metal etc. Thus the completely processed material is enriched by adding soil enricher (@ 120 gms/M. Ton to Improve NKP values of the manure) & packed in 50 kg bags.



**C) Sanitary land filling for refuse/reject material.**

At the time of screening the oversize material is refuse or rejects and are stored scientifically on land fill sites as per MSW Rules 2000.

The incoming garbage/MSW consists of 30 % humidity, 30 % organic matter & 40 % other material. The composting process on the process platform needs daily material handling of 800 tons every day and the complete process from A to C above needs 1400 M. tons material handling every day.

**D) Expenditure at various stages:**

Sr.No	Item	Percentage
1	Processing platform	28%
2	Mechanical screening	31%
3	Sanitary land filling	41%
<b>Total</b>		<b>100%</b>

**E) Break up of expenses in detail:**

Sr.	Item	Percentage
1	Manpower	25%
2	Fuel & Oil	33%
3	Machinery repairs	7%
4	Vehicles repairs	6%
5	Electric power	4%
6	Bio-culture & Sanitreet	11%
7	LDPE empty bags for' compost filling	14%
<b>Total</b>		<b>100%</b>

Production cost of compost is @ Rs. 2162/- per M Ton (excluding interest on capital expenditure). The selling rate of compost is Rs.1750/- per M Ton packing in 50 kg bag & Rs.1500/- per M Ton in loose condition.

**Year wise production & Sale of Compost**

Year	Incoming Garbage (MT)	Compost production (MT)	Compost sale (MT)
2001-02	46629	1446	160
2002-03	74435	2239	2018
2003-04	79096	2121	2904
2004-05	75008	3752	2790
2005-06	7651.7	2608	3548

**Expenditure & Revenue**

(Rs. In Lakhs)

Year	O&M expenditure	Revenue from compost sale.
2002-03	52.26	6.77
2003-04	114.42	38.81
2004-05	229.07	47.72
2005-06	260.15	59.73



**Characteristic of Garbage at Nashik MSW Plant  
As per the Survey conducted in Jan.2006  
(30 Vehicles)**

<i>Item</i>	<i>Qty. in % Year 2005</i>	<i>Qty. in % Year 2006</i>	<i>Use ability</i>
Plastic	1	3	Recycle
Coconut shell (Green)	1	1.5	RDF
Paper, thermacol & other	1	1	RDF
Glass, metal and stone-wave	0.6	2.5	RDF
Gunny bags & cotton rags	0.6	0.6	Recycle
Leather, shoes, chappal and reczine	0.6	0.6	Recycle
Tree-cutting, garden waste and packing waste	5	3	RDF
Tyre, tube	0.2	0.2	Recycle
Sand, debris	20	20	SLF/Bricks
Water	30	30	Loss
Organic matter	40	37.6	Compost

- Manual rag picking - @ 10% Plastic, Paper, Gunny bags, Thermacol,
- Water Leather, - @ 30% Tyre, Coconut, Cotton, Reczine,
- Organic - @ 30% Tree-cutting, packing waste.
- Inorganic - @ 30%

**Total - 100%**

Manual Segregation  
(Recycle = 4.4%, RDF=8%)

Mechanical segregation  
(Bricks=20%, Compost = 37.6%)

**6.3 Key Issues:**

- System needs to upgrade to cater the population of 2011 and 2021
- Insufficient covered platform for processing MSW during monsoon
- Area of the platform needs to be increased
- Lot of costly land is required for Landfill therefore need to develop alternate technology for to process RDF and to reduce quantity going to land fill
- Leachate treatment plant is need to be developed
- Animal incineration plant is required to be developed
- Health facilities amongst the staff should be improved

**7. Bio Medical Waste (BMW) Project**

Most of the developing countries in the world are facing the grim situation arising out of environmental pollution due to unscientific disposal of bio-medical waste. This possesses a potential threat to society, unless remedial measures are taken by a safe way of disposal infectious bio-medical waste.



Mass awareness with stringent regulations is therefore necessary to maintain clean habitat and putting an end to traditional disposal of bio-medical waste from burial – burning to incineration system. Bio-Medical waste has a distinct importance in terms of the manner in which it is disposed of due to the properties of spreading infectious diseases like AIDS, Hepatitis B etc. Hence utmost care has to be taken to handle and dispose of the bio-medical waste. Keeping in view the foregoing, Nashik Municipal Corporation has started Bio-medical waste disposal plant on 'BOO' basis.



There are total 4000 hospital beds (which include 365 hospitals, 40 laboratories, 40 dental clinic and 90 consulting Doctors) This Hospital beds are generating around 2000 kg. Bio medical waste every day. This Bio-medical waste is collected by NMC through BOO operator and taken to the BMW treatment site.

### 7.1 Services Provided

The common incineration facility is available to all medical practitioner located in the city on chargeable basis.

- BMW is collected in bio-degradable and incinerable bags
- Transportation with the help of specially design vechile as per the rules of CPCB and MPCB
- Treatment of BMW by incineration autoclaving and shredding
- Storage and transportation of ash at the landfill site.

### 7.2 Treatment System

The system consist of -

- a) Incineration
- b) Autoclaving and Shredding

The incineration system is a double-chambered incineration with receiving chamber, ventury – scrubber, cyclone separator, water sprinklers, ID fan and chimney of 30 m ht. The waste of human body parts, animal waste, highly infections waste, solid waste item containing cotton, dressing, blood-contaminated material are directly going for incineration. In the primary combustion chamber (PCC), a temperature of  $850^{\circ}\text{C} \pm 50^{\circ}\text{C}$ , with negative pressure of 5mm water column is maintained, burning all the material to ash. The fuel gases and SPM produced in this chamber go to secondary combustion chamber (SCC). This SCC is operated at temperature of  $1050^{\circ}\text{C} \pm 50^{\circ}\text{C}$  with 10mm water column and the fuel gases are reburnt completely. The fuel gases then pass through the receiving chambers where the temperature of fuel gasses is reduced. The gases are then passed through venture scrubber and cyclone separator for proper treatment before exhausting with the help of ID fan to the atmosphere through a chimney.

The capacity of incineration unit is 300 kg/hr. and height of the stack (chimney) is 30 Mtr.

As per the CPCB and MPCB rules, the flue gas exhausted has to meet the following parameters.

- a) SPM – Below  $100 \mu\text{g}/\text{Nm}^3$
- b) NOX – Below  $450 \mu\text{g}/\text{Nm}^3$
- c) HCL – Below  $50 \mu\text{g}/\text{Nm}^3$
- d) Volatile organic compounds in ash should not exceed than 0.01%

Ash generated is chemically inert & sterile. The quantity of the ash is about 5% of the total BMW incinerated. Thus the system adopted by Nashik Municipal Corporation is properly designed and engineered as per the MPCB and CPCB rules.

## 8. Health Services:

The main aim of NMC is to provide safe hygiene community for the people of Nashik because it is the basic need of every human being. Keeping this in mind, NMC is extending its service by enduring



hospitals, dispensaries, maternity homes, health service centers, mobile dispensaries etc. to every one without any bias. It is striving hard to control and eradicate airborne and water borne diseases. It is also providing health education to people and health department is keeping a vigil over the spread of epidemics in these regions.

Civil hospital authorities give assurance that the Nashikites are safe from any kind of immediate threat from the spread of illness. Health services provided by NMC through medical facilities are mentioned below :

**Health facilities in NMC area**

Description	Numbers
Total number of beds available	6100
Private nursing homes & dispensaries	702
Municipal hospitals	04
Municipal nursing homes	09
Municipal dispensaries	09
Leprosy unit	01
Leprosy center	11
City primary health center	09
Mobile dispensaries	03
Sonography centers	02(Govt.) 140 (Private)
Govt. hospitals	01
ESIC hospitals	01
Dispensaries (Govt.)	10
ISP hospitals	02
Immunization center	182
AIDS center	01

**9. Education**

“Knowledge is power” and this can be acquired through good and qualitative education. Education is like a pillar to every human being. Nashik is providing hi-tech educational facilities to Nashikites. The city has got all kinds of educational institutes like Medical colleges, Engineering colleges, Diploma colleges, it is, Agricultural Institute, Science, Commerce and Arts colleges, Junior colleges, Middle and Primary schools, High Schools, Kindergarten etc. Apart from this, even private Institutes like NIIT, APTECH etc are providing Software, Hardware and other Information Technology related education to Nashikites. The quality of education has improved in Nashik and it is at the trend of achieving excellence. The improvement can be observed in this academic year i.e. 2003-2004’s performance of Nashik students in HSC and SSC exams. This time Nashik ranking position has improved as compared to previous years.

Along with curriculum education, Nashik people are even enjoying the facilities of education in different National and International level competitive examinations like GRE, TOEFL, GMAT, CAT, GATE, UPSC, MPSC etc. and other talent search exams like NTSE, OLYMPIAD etc.



**Details of Education facilities**

Institution	No. of Schools	No. of Students	No. of Teaching staff
Municipal Primary Schools	130	47059	959
Private Primary Schools	110	39000	1170
Anganwadi	413	17000	413
Junior colleges	24	-	-
Engineering colleges	4	-	-
Medical college	1	-	-

(Source: Educational department)

**10 Fire Fighting:**

As the city grows both socially and economically, the necessity of providing services in saving the properties and life of human beings goes on increasing. In order to save the properties from endangers and other mis-happenings, the city should have the best services of fire extinguishers. There are totally five fire brigades in NMC area. They are:

- Fire brigade head office at Shingada Talav.
- Nashik road fire station.
- Panchavati fire station.
- Satpur fire station.
- CIDCO fire station.

Following facilities are available in these fire stations:

**Various facilities available in fire service stations**

Sr. No.	Facilities available	Number
1	Water tender tank	9
2	Rescue van	2
3	Foam tender tank	0
4	Portable pump	3
5	Generator	4
6	Double -x- ladder	10
7	Hook ladder	8
8	Life buoys	37
9	Life jackets	55
10	Man power	180

**11. Recreations And Amusement:**

In modern hectic urban life, a man needs some kind of recreation to relax his mind. After a full week of working, the human being needs to relax during the weekends. He desires to be free and be away from all the stress and tensions of work. He needs some diversional activity in the form of good and healthy entertainment. The monotonous routine needs to be broken and the mind, body and spirit need to be rejuvenated.

Nashik has a variety of facilities for the entertainment and relaxation of its citizens. These may be in the form of uprising of hotels, restaurants, eat outs, theatres, parks and playgrounds, water parks etc.

The numbers of registered commercial establishments under NMC are:

Sr. No.	Particulars	Number
1	Shops:	2357
2	Hotels & Messes	1895
3	Theatres	21
4	Food Licenses issued	6519



Nashik is proud to own hotels and restaurants like “Taj Residency”, “Panchavati Group”, “Quality Inn” and “Sai Palace”, etc. These hotels give pleasure to people of the city who are very much tired of their work routines. The main aim of all these hotels is provide “luxury at its best”.

NMC has also helped develop ‘Water Lagoon Park’ at the ‘Dadasaheb Phalke Smarak’, where the citizens as well as the tourists can go for an outing in the pleasant atmosphere at the foothills of Pandav Leni. The area has been aesthetically landscaped with the stream running off from the hills flowing through it, and it has a two beautiful structures, one housing the statue of Lord Buddha and the other housing the museum, an auditorium, and an open-air theatre.

## 12. Slums

According to the survey conducted in January 1995, the number of slums in the Municipal Corporation area is 104, and the population of these slums is 1,35,000 (1995). Out of the 104 slums, 59 slums are ‘declared slums’ as per the policy of Maharashtra slum act 1971, and 45 slums are ‘undeclared slums’. Of these 104 slums, 90 slums are on municipal land reserved for different purpose and 41 slums are on government land. The bifurcation of the population of 1,35,000 persons in the slums is as given below:

Sr. No.	Particulars	Number
1	Slums of houses in ‘declared slums’	16995
2	No. of families	68281
3	No. of slums in ‘undeclared slums’	8038
4	No. of families	41731

### The Details of Existing Slum are enclosed in Annexure-1

NMC has provided the facility of drinking water supply through stand post or through private connection, facility of street light, facility of roads and sewerage system.

In all slums Municipal Corporation provides facility of sanitation in form of the Public toilet system.

NMC constructed community center for the use of the slum community and a chart is attached to show the existing facilities provided in the slums.

An amount of 5% of the budget is kept for the development and for providing facilities for the weaker section in slums. Infrastructure works in the slums are carried out from this amount.

### 12.1 The Community

The growth of slums consisting of the industrial, domestic and casual workers is the outcome of industrialization and rapid urbanization, and economic structural adjustments. The privatization & globalization has brought many migrants from the nearby villages as well as from under developed parts of country to the Nashik City. The financial position of agricultural community in the village is deteriorating, particularly in respect of low landholders & marginal workers. There is a trend of people migrating to Nashik City from the nearby drought prone villages of the districts & even from the outside districts.



The slums are the only affordable place of choice for them in the city area. The living condition in the slum areas is not only unhygienic and degrading, and it is a blot on the society. Migrants struggle under great odds by taking the help of job opportunities in the industrial sector and the construction





sector. Those who possess or develop some skill are able to survive by adopting some means of household industrial activity. However, years together they remain as marginal workers, and have no social status. Growing industry is a hope for slum-dwellers to improve their economical status

The social status of this group is as usual, that, they are mainly from the backward-tribal classes and economically weaker section of the society and communities.

The men folk start working as daily wage laborers in the constructions industries or even as vendors. Spread of MIDC in Nashik has helped the middle class to find jobs. They also get employment as domestic help in the homes of the upper class & middle class.

The education awareness has come up to certain level, but various factors affecting higher education do not allow the completion of the education. Before a girl has completed her 7th class, she is already a helper of her mother. Child marriages are highly prevalent. The reason behind it is lack of security of the girl child in the slum area.

### 12.2 Profile Of The Domestic Workers:-

Running from one house to another, the domestic worker- Working woman is not a human but a machine, from early morning to late evening completing her house hold coarse to that of other 10 - 15 houses, she just has no time to look after her own health or well being.

Social evils like alcoholism, wife beating, taking to other vices & child marriage is highly prevalent.

Slowly and steadily awareness is coming about their rights among the women. There is greater acceptance of the group & more sense of the belonging in the existing groups.

### 12.3 Valmiki Ambedkar Awas Yojna (VAMBY Scheme)

As per the policy of Govt. of India since 2002 to improve the housing condition of the slums located in corporation area VAMBY Scheme is implemented and from this scheme 17 slums are developed and total no. of houses developed in through VAMBY scheme 2317 and develop the further slums under NURM Scheme.

### 12.4 Health Service in slums.

For beneficiaries of slum develop the health of the public residing in slums. NMC is implementing pulse polio scheme and other vaccination scheme and other health scheme in these slums. The scheme is implemented through the qualified staff of this corporation.

**Implemented Schemes in Slums**

<b>Sr. No.</b>	<b>Name of slum area</b>	<b>Administratively</b>	<b>Total Number of people getting benefits</b>
1	Shivajinagar	300	263
2	Suyognagar	60	37
3	Gautamnagar	38	38
4	Kasturbanagar	200	209
5	Sahavasnagar	110	87
6	Shahid Bhagatsingh Nagar	370	67
7	Wadala Part-80	100	51
8	Beldarwadi	60	0



9	Hirawadi	205	186
10	Gurdwadi	110	63
11	Vaiduwadi	75	71
12	Nilgiribag	225	154
13	Erandwadi	225	144
14	Savitribai Phule Nagar	71	0
15	Krantinagar	100	0
<b>Total</b>		<b>2249</b>	<b>1370</b>

### 12.5 Housing for Urban Poor (H.U.P.)

Owing to rapid industrialization in an around city and due to changing industrial land and growth ability economy activity a land influx of migration has been observed. The city has not only attracted a substantial amount of capital amount also a large proportion of population from within the state and also adjoining state and due to this migration of population formation of slums are increasing the city presents a wide range of activity in various industrial & commercial sector growth in such activities, possibility of exertion in industry and allied service sector, scope in employment in trade and business. Employment in trade and business is hawking, retailing, carting and other such possibilities have attracted urban poor to the city.

In year 1995 there were totally 104 slums in the city with population of 1,35,000 souls. This figure is 15.5% of the total population in 1995 of the city. There are increasing number of industries and business establishment in an around the city. Due this number of slums are also increasing. These slums are located in government land & some are in private land also.

### 12.6 Key Issues:

- Due to lack of information on the services available and due to many incomplete information in survey of the slums, the municipal corporation is unable to implement the of slum development/ rehabilitation program.
- Several slums, which are located along water bodies, need to be relocated since infrastructure cannot be provided in such areas. But the area of land available with the corporation is not adequate to relocate these slums.
- Increase in number of slums is due to rapid development of the city and industrialization in and around the city, which attracts migrants.

### 13 Existing Administrative Setup

In Nashik Municipal Corporation the Administrative Setup is as follows –

- 1) **Commissioner** – The function is the administrative head of the Corporation. The Commissioner is the Chief Executive who controls and monitors the day to day working of the Corporation. Commissioner is the implementing authority of the policy decision taken by General Body of Municipal Corporation. He is empowered to attend the General Body but do not have any voting rights. However he can take part in discussion with the approval of the Chairman. State Government under section 36 of BMC Act 1949 and normally from Indian Administrative Services (IAS) appoints the Commissioner.
- 2) **Deputy Commissioner** – To assist the Municipal Commissioner in discharging various administrative functions, the Deputy Commissioners are appointed under sec.45 of Bombay Provincial Municipal Corporation Act 1949. In Nashik Municipal Corporation there are three Deputy Commissioner at present.
  - a) **Deputy Commissioner (Adm.)** – He is entrusted with General Administration, Establishment, Secondary Education and other Departments like Fire, Store, PRO, Security Office etc.



- b) **Deputy Commissioner (Tax)** – He is entrusted Octroi, Property Tax and Water Tax.
- c) **Deputy Commissioner (Ench.)** – He is entrusted with the work of encroachment removal, misc. taxes and slum department.

The Asst. Municipal Commissioner and six Divisional Officers assist the Deputy Commissioners. The Divisional Officers are the to Administrative Head of the respective Division and entrusted with daily routine functions for their respective divisions.

- 3) **City Engineer** – This post is the head of the technical wing of the Corporation. The City Engineer is appointed under the section 45 of BPMC Act 1949. At present City Engineer is entrusted with Water Supply, Underground Sewerage, Storm Water Drainage, Street Lighting, Garden, Godavari Action Plan, and JNNURM.

The City Engineer is assisted by 5 Executive Engineers, 22 Deputy Engineer and 45 Junior Engineers.

- 4) **Superintending Engineer** – This post is equivalent to City Engineer post but not appointed under section 45 of BPMC Act 1949. At present he is entrusted with Public Works Department & Town Planning.

The Superintending Engineer is assisted by Asst. Director Town Planning, 4 Executive Engineers, 12 Deputy Engineer and 52 Junior Engineers.

- 5) **Medical Officer of Health (MOH)** – MOH is entrusted with the work of cleaning and scavenging of the city, Solid Waste Management, Bio-Medical Waste Management. He is appointed under section 45 of BPMC Act 1949.

Divisional Sanitary Inspectors, Sanitary Inspectors and Mukadams assist MOH.

- 6) **Medical Superintendent:** He is entrusted with the work of Hospitals, maternity homes, primary health center and vaccination.

Medical Superintendent is assisted by Medical Officer (Doctors), RMO and other paramedical staff.

- 7) **Chief Account Officer:** He is entrusted with keeping the accounts of the Corporation. The Dy. Chief Accountant assists him.

- 8) **Chief Auditor** – He is entrusted with internal audit of all transaction carried out by using Municipal Funds. He is working under Standing Committee and reporting and answerable to Standing Committee and General Body. He is appointed under section 45 of BPMC Act 1949.

Dy. Chief Auditor assists him.

- 9) **Municipal Secretary** – He is entrusted with the work of providing secretarial services to the General Body, Standing Committee, Ward Committee, other adopt committees appointed by General Body.

**strength of Officer / employees on establishment of Nashik Municipal Corporation as on 31<sup>st</sup> March-2006**

Grade	Total Number of post sanctioned	Employees on regular pay scale	Employees on fixed pay	Vacant Post
Class-I	75	62	0	13
Class-II	70	47	0	23
Class-III	1840	1494	26	320
Class-IV	4532	3986	314	232
<b>Total</b>	<b>6517</b>	<b>5589</b>	<b>340</b>	<b>588</b>

**The total expenditure on establishment pay and others -**

Sr.No	Particulars	Percentage
1	Pay & allowances	25.31%
2	Pensions for retired employees	2.46%
3	Others	7.54%
4	Total Expenditures on establishment	35.31%