



**NASHIK MUNICIPAL CORPORATION**  
**ENVIRONMENTAL STATUS REPORT**  
**YEAR 2021-2022**



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# Chapter 1

## Introduction of Environmental Status Report

The ESR is a comprehensive document that serves as an information resource base for identification of critical issues and also as an input for new city/ town development plans or even revisions in them. ESR attempts to identify current and emerging environmental concerns as well as opportunities at the town level. It does this through the identification of demographic, social and economic driving forces behind various issues that can pose risk to environment and health and safety of citizens.

ESR aids to seek new norms for environmental development. Secondly, it assists in preparation of the equal outline and evaluate the environmental development of the city as per the given norms. Nashik Municipal Corporation has taken a lead step and has been actively involved in preparation of **Annual Environment Status Report** as per the state level legislation (The MMC Act) following the 74<sup>th</sup> Constitutional Amendment Act and the 12<sup>th</sup> Schedule.

Environmental Status Report (ESR) 2021-2022 shows the current status of environment in the Nashik city. In this report, information of various surveys and detailed measures for conservation of environment have been incorporated. This report is prepared on DPSIR method of the guidelines given by Maharashtra Pollution Control Board.

### 1.0 Urbanization in India and Maharashtra

As per Census 2011 (Table 1.1), the total population of India is 1,210,193,422 or 1210.0 million population. For the first time since independence, the absolute increase in population is more in urban areas than in rural areas. As per this census record, out of total population, 31% of population is living in urban areas. Population in Maharashtra is divided equally in rural as well as in urban areas. Out of this, around 45% population live in urban areas. This percentage is more as compared to the India's total urban population.



**Table 1.1-Population Census of India**

	<b>Year 2001</b>	<b>Year 2011</b>
<b>India</b>	102.9 crores	121.0 crores
<b>Rural population</b>	74.3 crores	83.3 crores
<b>Urban population</b>	28.6 crores	37.7 crores

*Source :Census of India 2011*

- Distribution of Rural and Urban population : 68.84% (Rural)& 31.16% (Urban)
- Level of urbanization increased from 27.81% in 2001 Census to 31.16% in 2011 Census
- The proportion of rural population declined from 72.19% in 2001 to 68.84% in 2011

The state of Maharashtra is having 50.8 millions of urban population which occupies the first place in india with a share of 13.5%. This percentage is the largest as compared to other states of India.

### **1.1 Municipal Environmental Problems**

Urban environmental issues encompass inadequate water supply, treatment of wastewater and solid waste, energy, loss of green and natural spaces, urban sprawl, pollution of soil, air, traffic, noise, etc. All these problems are major concern in developing countries and countries with economic transition, where there is a conflict between the short-term economic plan and the protection of the environment. Maharashtra has been within the forefront of economic development and is commonly referred to as the economic power house of the country. However, speedy growth of urban population is exerting tremendous pressure on the natural resources and concrete services. Loss of natural resources, deteriorating air quality, impure water resources, increasing solid waste in urban areas, inequitable distribution of urban services, increasing economic condition, regional inequality, etc., area number of the environmental problems common within the State.





## 1.2. Need of Environment Status Report (ESR)

Due to the enhanced industrialization and education facilities, the people are drawn towards the Nashik city. The increased immigration from other region of the country has contributed to the population growth in the city which in turn has a deteriorating impact on the environment. Loss of green cover area, deteriorating air quality, polluted water resources, solid waste disposal in urban areas are some of the common and major concerns arising due to rapid growth of urbanization creating tremendous pressure on the natural resources and urban services. ***Day by day the problems are aggravating in the city, thus to investigate the exact reason, the Urban Local Bodies (ULBs) in Class I cities are required to publish an annual Environmental Status Report (ESR) which will indicate the status of environment management in the city and identify the areas where mitigation measures are required to be considered.***

The ESRs are submitted to Ministry of Urban Development (MoUD) and follow Maharashtra Pollution Control Board (MPCB) guidelines for preparation. It is necessary to use limited resources for sustainable development. This Environmental Status Report is prepared after comprehensive analysis of all the issues related to pollution of air, water, and soil and its impact on human life and the impact of the city, its causes and measures to prevent it.

## 1.3. Objectives of ESR Preparation

**The main objectives of preparation of ESR report is to :-**

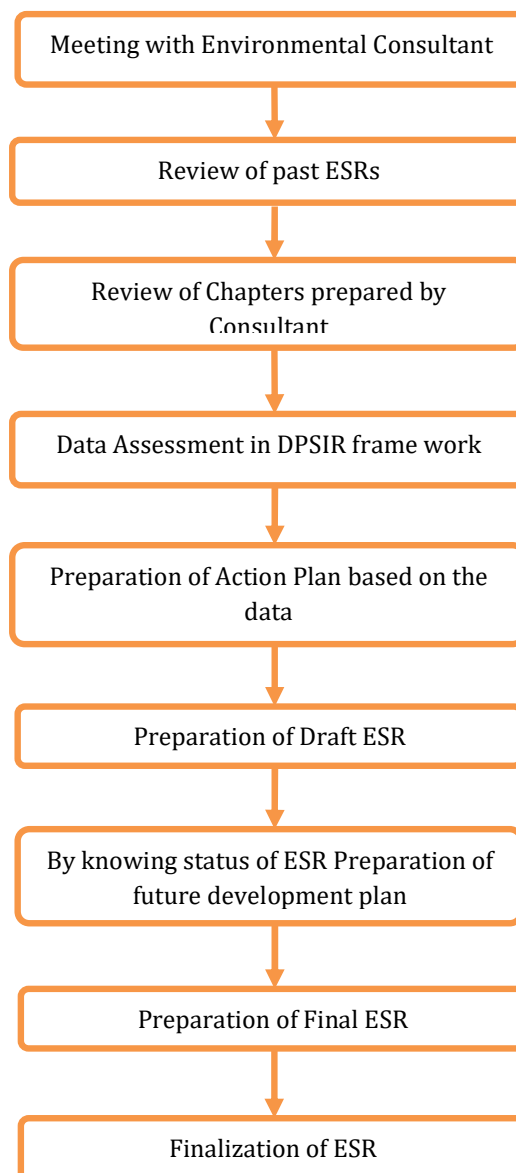
1. Evaluate the status of all the environmental parameters of a city in order to prepare short term and long term action plans to protect the environment.
2. Highlight the conditions of the biophysical environment in the city.
3. Analyze trends or changes in environment of the city.
4. Identify the causes of change in urban environment.
5. Assess and interpret the implications and impacts of the trends in urban environment
6. Check adequacy of existing available environmental facilities.
7. Set the process for public involvement.



8. Develop action plans based on partnerships.
9. Set targets, allocate responsibilities and appointing institute for monitoring and tracking mechanisms.

#### 1.4. ESR Methodology:

The preparation of the ESR 2021-2022 is based on the participatory approach involving consultant and different stakeholders (Fig 1.1).



**Fig 1.1- Schematic representation of ESR methodology**



## 1.5. Linking ESR preparation to Strategic Planning

The ESR should carry a blue print of Vision to Action. The DPSIR Framework and the Strategic Planning Process should form two convoluting circles intersecting at Pressure and Response (Fig 1.2).

### DPSIR Frame work :

**D**–Development – Urbanization

**P** – Pressure – Stress on infrastructure

**S** – Status – Present Environment status

**I** – Impact – Impact on environment

**R**–Response – Efforts taken for conservation of environment

There are different types of frameworks, which include environmental media framework, issues framework, sector framework, process framework, etc.

The DPSIR framework used in this situation analysis, assumes cause-effect relationships between interacting components of environmental, social and economic systems. This framework attempts to effectively report the complex interrelationship between the causes of environmental impacts and their effects. As a result, the DPSIR framework leads the way towards Strategic Action Planning.

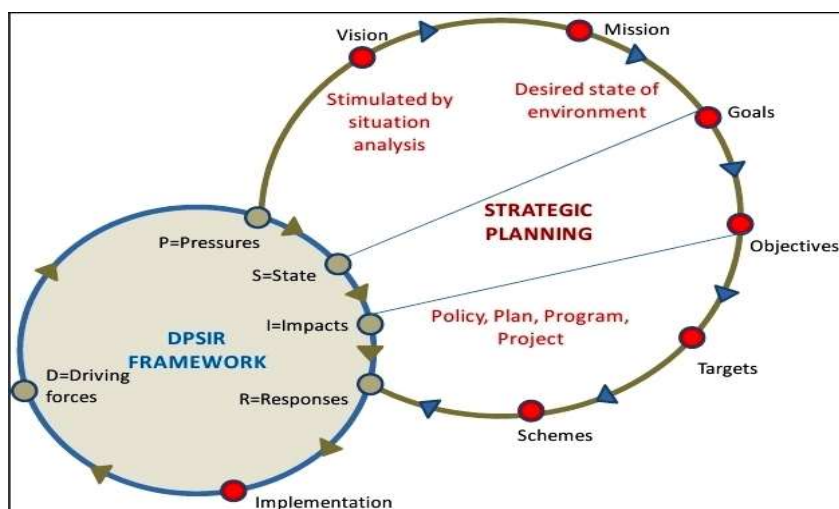


Fig 1.2- The relation between DPSIR Framework and the Strategic Planning Process



## 1.6 Environmental Performance Index (EPI)

### Purpose :

The **Environmental Performance Index (EPI)** is a method of quantifying and numerically marking the environmental performance of a state's policy (Table 1.2). This index was developed from the Pilot Environmental Performance Index. It was first published in 2002, and designed to supplement the environmental targets set forth in the United Nations Millennium Development Goals. The EPI was preceded by the Environmental Sustainability Index (ESI), published between 1999 and 2005. Both indexes were developed by Yale University & Columbia University by World Economic Forum & European Commission Joint Research Center.

**Table 1.2- Environmental Performance Index (EPI)**

Objectives 1.	Environmental Health			
Policy categories	Environmental Burden	Effects of Water on Environment	Air Pollution (Effects on Environment)	
Indicators	i. Environmental burden of disease	ii. Adequate sanitation iii. drinking water	iv. Indoor air pollution v. Urban particulates vi. Local Ozone	
Objectives 2.	Ecosystem Vitality			
Policy categories	Air Pollution (effects on ecosystems)	Water	Biodiversity and Habitat	
Indicators	vii. Regional ozone viii. Sulphar Dioxide emissions	ix. Water quality index x. Water stress	xi. Conservation risk index xii. Effective conservation xiii. Critical habitat protection xiv. Marine Protected Areas	
Objectives 3.	Productive Natural Resources			
Policy categories	Forestry	Fisheries	Agriculture	Climate change
Indicators	xv. Growing Stock	xvi. Marine Trophic Index xvii. Trawling Intensity	xviii. Irrigation Stress xix. Agricultural Subsidies xx. Intensive Cropland xxi. Burnt Land Area xxii. Pesticide Regulation	xxiii. Emission per capita xxiv. Emissions per electricity generation xxv. Industrial carbon intensity



For preparation of ESR 2021-2022, we have considered around 65 indicators related to environment. Detailed information of these indicators is given in this report. If the EPI index is high, it means, the city is good in terms of environmental conditions. From all 44 indicators, in this chapter we have considered the indicators such as, city development (Economical, industrial, population and area expansion), natural resources (Land, air, water, energy etc.) urban facility (Water, sewage management, solid waste management, transport communication) initiative taken to improve the environment (environment awareness, slum rehabilitation, transport improvement) etc.

In order to determine environmental coordinates, four thematic indicators have been considered.

1. Population growth
2. Resources current status
3. Basic facilities of the city
4. Step taken for environmental support by city .

### **1. City development**

This is the main point of Environmental performance index (EPI). For city development these four points are considered

- a. Population growth
- b. Economical growth
- c. Industrial growth
- d. Geographical growth

### **2. Current status of resources in the city**

At the time of comparing the current resources status of city, 4 main points are considered

- a. Land use
- b. Air monitoring, noise level and water monitoring
- c. Energy usage
- d. Human resources



### **3. Basic facilities of the city**

Basic facilities is considered one of the important coordinator, it includes following points;

- a. Provision of water supply in city
- b. Sewage treatment management
- c. Solid waste management
- d. Transport improvement facility provision

### **4. Initiatives taken by city for environmental conservation**

Initiatives have been taken by the city for environmental conservation which includes

- a. Environmental awareness and education
- b. Solid waste management
- c. Slum rehabilitation
- d. Transport
- e. Water supply management.

Based on the above observations, Environmental Status Report 2021-22 has been prepared.

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## Chapter 2

### Review of the past three year's

Preservation, security and amusement of regular habitat in Nashik city is the premier point of Nashik Municipal Corporation. The Municipal Corporation is taking steady endeavors for improving the living standards of the native residents. Past 3 ESRs of, 2019, 2020 & 2021 are reviewed.

The Nashik Municipality was established in the year 1969 and later it was transformed as Nashik Municipal Corporation (NMC) in 1982. NMC has been involved in preparing ESRs since 2002. The reports includes all the components of natural resources like air, water and noise pollution, land management etc., and details of environmental infrastructure and services such as solid waste management, water supply, sewage and sanitation, education and health care facilities, transportation, etc.

The ESR for 2012 has been revised as per MPCB's guidelines for ESR preparation. The ESR uses the data from ESR 2012 and is restructured as per the D-P-S-I-R Framework (Driving forces – Pressure – State – Impacts – Responses).

#### 2.0 Review of Past ESR Reports

NMC is taking steady endeavors to give basic social services to natives for a cordial life and upliftment of their way of life. ESR is set up for check of Environment status in view of various criteria and setting up needs for execution of here and now, and long haul condition agreeable measures. Past 3 ESRs of, 2019, 2020 & 2021 are reviewed.

#### 2.1 Urbanization

Population projection is not only done to foresee future population but also to gauge future demand for food, water, energy, and services. There are several population projection methods available. Growing industrialization is responsible for the increasing rate of hazardous components and non biodegradable waste, resulting in increased pollution load. Additionally, sewage, atmospheric pollution and land pollution load has also increased manyfold.



Growing population and urbanization leads to increased exploitation of natural resources which cause harm to environment. Due to growing urbanization and population growth, the number of vehicles in the Nashik City is also drastically increased. The number of buses are nearly the same in the years 2015 to 2018. The distribution is given in Table 2.1.

**Table 2.1-Number of city buses for Public Transportation**

Sr. no.	Particulars	2018-19	2019-20	2020-21
1.	No. of buses	158	143	60
2.	No. of routes	508	508	-

*Source: MSRTC Nashik bus depot*

No major changes are seen in city buses public transportation facility in last three years.

## 2.2 Health and Hospital Facility

In Nashik Municipal Corporation, the medical center facilities of NMC encompass Dispensaries, Family Planning centres and vaccination centers (Table 2.2).

**Table 2.2 - Medical center facilities from Last three years**

Distribution	2017-18	2018-19	2019-20	2020-21
Municipal hospitals	04	04	04	04
Maternity homes	08	08	08	-
Blood bank	01	01	01	-
Family Planning Centers	11	09	07	09
Leprosy Unit	01	01	01	01

*Sources - Health Department, NMC*

## 2.3 Educational Facility

From 2018 to 2021, the total number of primary and secondary schools remain same, also number of students decreased slightly whereas considerable change is seen in the number of teachers (Table 2.3).



**Table 2.3- Primary & Secondary school details**

Particulars	2018-19	2019-20	2020-21
No. of Primary & Secondary Schools	101	92	101
No. of students	29702	28505	30214
No. of teachers	941	892	873

*Source:-Education Department ,NMC*

## 2.4 Water Supply

During the last 8 years, about 1212 bore wells were dug in Nashik Municipal Corporation area, in which 918 hand pumps are installed. In Nashik city, Surface water sources primarily consist of Godavari River, Waldevi River and Darna River. Godavari river, having a length of about 19 km, flows through the central part of the city. Similarly Waldevi River having a length of about 16 km in the north and Darna (3.5 km) flowing through south east direction of the Nashik municipal corporation area(Table 2.4).

In order to treat river water and make it potable for supplying good quality water to the citizens, NMC has constructed head works for drawing water from Godavari River & distributes to the entire city after treatment. Treated water from water treatment plants is supplied to citizens through closed pipelines.

**Table 2.4 Status of water supply in past years**

	2018-19	2019-20	2020-21
Population (Approximately)	1486053	1486053	1486053
Water Supply (MLD)	481.78 MLD	471.78 MLD	516.48 MLD

Illegal connections and use of booster pumps is more at tail end which causes contamination of whole line. To achieve 24 X 7 water supply within Nashik Municipal area, automatic water meters, water auditing, avoiding water leakages, use of automatic SCADA facility and improvement in water distribution will be implemented.



## 2.5 Sewerage System

In the last ESR of year 2020-21 it is mentioned that an all-inclusive master plan for sewage system has been affirmed for the city. Five STP zones are operational, namely, Tapovan, Panchak, Agar Takli, Chehedi and Gangapur. One additional STP is in progress-namely Pimpalgaon Khamb. Gangapur STP and Pimpalgaon STP are approved under AMRUT. The STP for Pimpalgaon Khamb is in progress & is planned to be commissioned in two years.

## 2.6 Solid Waste Management

For proper management of solid waste, Solid Waste Management Handling Rules 2000 and subsequent amendments (2016) are being strictly followed. Waste generated in Municipal Corporation is disposed off by using various technologies given as below:

- i. Mechanical Compost plant
- ii. RDF composting
- iii. Diesel production using plastic
- iv. Landfilling by using scientific technology
- v. Capping by using scientific technology

**Solid waste generation for the past 4 years are shown in the Table 2.5 below.**

**Table 2.5- Solid waste generation in Nashik city during last four years**

	2018-19	2019-20	2020-21
Quantity of waste generated per day (Tonnes)	550	550	600 MTD
Waste collection efficiency	100%	100%	100%
No. of vehicles	260	262	287

**Source:-SWMDepartment ,NMC**

## 2.7 Biomedical waste Management

In Nashik, the work of Biomedical waste management has been outsourced to Watergrace Products to provide facilities of Biomedical Collection, Transportation, Segregation and disposal. Since last 15 years M/s Watergrace Products provide this facility for Nashik District.

They collect biomedical waste by visiting door to door in municipal corporation area. All the necessary setups of common biomedical waste collection, transportation, treatment and disposal facilities are available with them. They provide treatment as per MPCB and CPCB norms.



## 2.8 Gardens and Lakes

By studying past 3 ESR's it is seen that total number of gardens are 539 in Nashik city developed at different locations. Major gardens are as below:

- i) Somani garden, Nashik road
- ii) Shivaji garden, Nashik
- iii) Nehru Garden, Nashik
- iv) Krushnanagar garden, Panchavati
- v) Ramdas garden, Sharanpur
- vi) Kusumagraj garden
- vii) Kanetkar garden
- viii) Late. Promod Mahajan Garden, Gangapur Road
- ix) PhalakeSmarak, Pandavlene
- x) Indira Nagar Garden

## 2.9 Environment Status

### A) Air Pollution

The air pollution in Nashik city is mainly due to vehicular exhaust, industries and construction work. Continuous increase in vehicles is adding to the air pollution. To control the air pollution, Nashik Municipal Corporation has undertaken a number of measures. Road concretization, road widening, tar road, Compulsion on tree plantation to Residential as well as industrial projects, maintaining gardens and road side tree plantation etc. are being implemented by NMC, mandatory PUC for on road vehicles by RTO & Traffic police department.

### B) Water Pollution

Water quality from river, nallahs, under NMC area are monitored from time to time. Water samples from rivers are collected from different locations. The nallahs connected to rivers are also analysed for their water quality. Few locations are monitored by Maharashtra Pollution Control Board. Water pollution results when contaminants are introduced into the natural environment. For example, industries discharge, various anthropogenic activities like washing, bathing, agricultural runoff, etc. The ultimate goal in the control of water pollution would be zero



discharge of pollutants to water bodies; however, complete achievement of this objective is usually not cost effective. The preferred approach is to set limitations on waste disposal discharges for the reasonable protection of human health and the environment. ETP must be mandatorily utilized for treating the industrial waste water for its reuse or safe disposal to the environment. In this regard, MIDC is establishing CETP. NMC started environmental eco-friendly Ganesh festival. Plaster of Paris has been dethroned by clay, and synthetic dyes have made way for organic colours.

### **C) Noise Pollution**

During celebrations/festivals, noise making musical instruments, dances and noise making fire crackers are being used. So, during these festivals, the noise pollution level is comparatively high. During Ganesh Festival, Navratri and Diwali festival, noise levels at residential societies are observed well above the prescribed limits. High level noise pollution is observed at residential, Commercial and silence zone in previous three years.

#### **To control noise pollution, NMC has taken the following steps**

1. 19 Silence zones at different locations around schools & colleges, hospitals and courts are declared.
2. Noise barriers on construction zones at various places are being implemented.
3. Action is being taken by Police department towards complaints on noise pollution by citizens.
4. Since trees act as 'Noise Buffers', NMC has planted various species of trees in different areas and across the roads.

### **Conclusion**

From comparison of past 3 years ESR Report, it can be concluded that in 2019-20 the pollution level in terms of air, water, noise, etc. is slightly increased as compared to 2018-19 and 2020-21 but well below permissible limits. In addition to this, visible impacts are also seen on human health as well natural environment.

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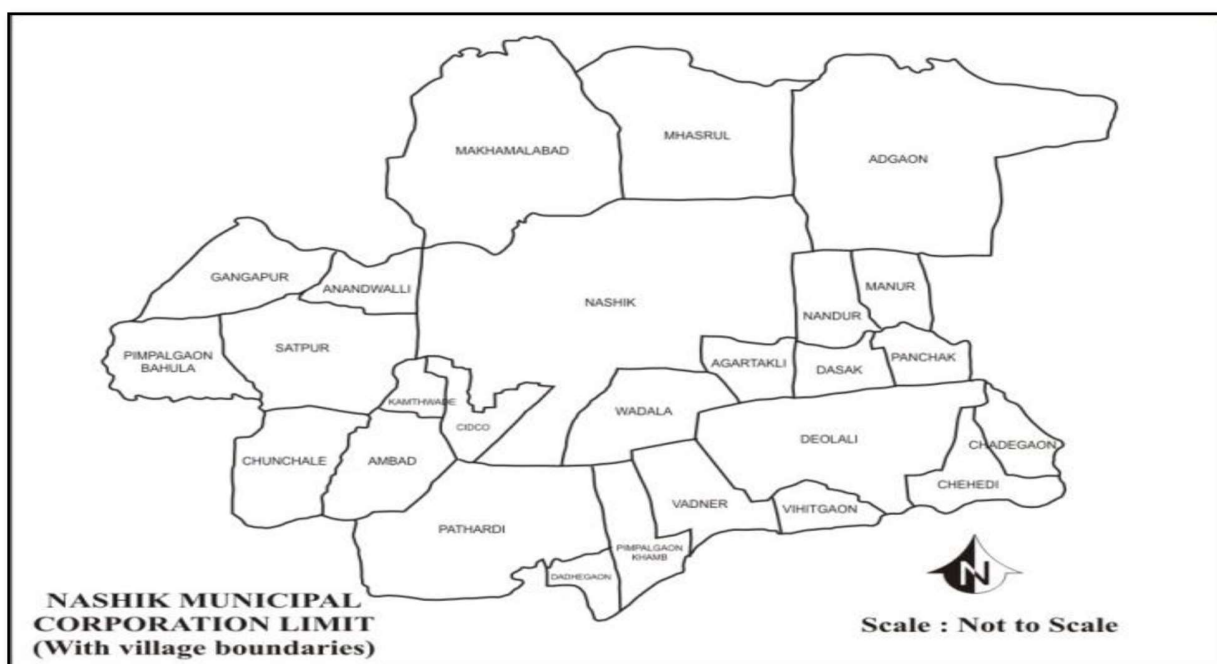
## Chapter 3

### New Development and Change

#### 3.0 Introduction to Nashik Municipal Corporation (NMC)

Nashik is the third largest city of Maharashtra after Mumbai & Pune. Nashik lies in the northern part of Maharashtra state at elevation of 560m above the mean sea level which gives it ideal temperature, particularly in winters. The river Godavari originates from the Brahmagiri Mountain, Trimbakeshwar about 32 km (20 miles) from Nashik and flows through the old residential settlement, now in the central part of the city is where from river Godavari originates. Nashik lies on the western edge of the Deccan Plateau, which is a volcanic formation. The land area of the city is about 259.13 Sq Km. Anjaneri near Nashik is the birth place of lord Hanuman. The city's tropical location and high altitude combine to give it a relatively mild version of a tropical wet and dry climate. Temperatures rise slightly in October, but this is followed by the cool season from November to February. The cool season sees warm temperatures of around 28°C during the day, but cool nights, with lows averaging 10°C and extremely dry air.

NMC was established on 7<sup>th</sup> November, 1982 under BMC Act 1949. Roughly, the NMC is spread around 260 square kilometer area. The Administrative activities are conducted with the help of six different Ward offices namely Satpur, New Nashik, Nashik (East), Nashik (West), Nashik Road and Panchavati, which provide facilities to the residents of Nashik city. Nashik Municipal Corporation includes villages like Makhamalabad, Mhasrul, Adgaon (North direction), Agartakli, Dasak, Panchak, Nandur, Manur (East), Wadala, Pathardi, Dadhegaon, Pimpalgaon Khamb, Vadner, Vihitgaon, Chehedi, Deolali, Chadegaon (South), Cidco, Kamatwada, Satpur, Anandwalli, Gangapur, Pimpalgaon Bahula, Chunchale, Ambad (West). The village map is given below (Fig 3.1).



**Fig 3.1 - Village map of NMC**

**Factors that boost the city (Driving Force) Stress on City (Pressure)**

**D- Driving Force**

1. Population Growth
2. Infrastructure & Industrialization
3. Development & Industries
4. Increasing vehicles numbers
5. Transportation Facility

**P-Pressure**

1. Number of slums is increasing
2. Increase in Solid waste Management problem
3. Exploitation of natural resources
4. Pollution increase due to industrialization & vehicles



### 3.1 Profile of the City

Nashik is one of the most important cities of Northern Maharashtra. Nashik in Maharashtra is situated on Golden Triangle (Nashik-Pune-Mumbai) about 180 km from Mumbai and 210 km from Pune. The city has become the center of attraction because of its beautiful surroundings and cool and pleasant climate. Nashik city has got historical, social, mythological importance from ancient period. The river Godavari originates at Trimbakeshwar and flows through the city. Temples and ghats on the banks of Godavari have made Nashik one of the holiest places for Hindus all over the World.

Nashik is well known for the event, every twelve years Simhastha 'Kumbhamela' a religious festival held in Trimbakeshwar and Nashik. The Nashik Kumbhamela is generally acknowledged to be the most sacred of all the festivals. This city is also having agricultural importance because of exports of grapes and onions.

Nashik city is divisional headquarter having 13 Talukas represented by Nashik Municipal Corporation situated at 565 meter above sea level. Nashik is surrounded by other districts Jalgaon towards East and North East, Dhule towards North, Thane at its South West and West, Aurangabad region at its South East and Ahmednagar towards South. Salient Features of the city are given in following table 3.1.

**Table 3.1 - Details of Nashik City**

Sr. No.	Description	Details
1	Municipality Establishment	1864
2	Corporation Establishment	7 November 1982
3	Total Area	259 Sq. Kilometers
4	Latitude	20° 0'2.61"N
5	Longitude	73°46'31.89"E
6	Altitude	560.61 m above Sea Level
7	Population (Census 2011)	1,486,053
8	Population Density	6200 per sq.km.
9	Average Rainfall	1233.6 mm
10	Temperature (Average)	24.7° C
11	Number of Villages within Municipal Corporation	22
12	Rivers Flowing through city	Godavari, Nandini , Darna, Waghadi, Waldevi, Kapila



13	No. of Wards	31 (As per 2017 Election)
14	Number of Corporators	Elected Members 122 Nominated Members 5 Total Members 127
15	No. of Ward Offices	06 Satpur, CIDCO, Nashik (East), Nashik (W Nashik Road, Panchwati.
16	Slum population (as per census 2011)	192959
17	Number of Slums (as per 2002)	159
18	Corporation total Secondary school	13
19	Corporations total primary school	88
20	Public library of corporation	14
21	Swimming pool	05

**Source: NMC Website**

Nashik is one of most industrialized city of Maharashtra after Mumbai and Pune, mainly due to extensive industrial development since early seventies. Nashik city started developing with establishment of two industrial areas i.e. Ambad MIDC and Satpur MIDC Areas. The engineering and manufacturing industries such as Mahindra and Mahindra, BOSCH, VIP, CEAT, ABB and several pharmaceutical hubs etc., produce huge network of auto components supplier and ancillary services. Nashik Thermal Power Station, National Treasury Printing Press (Security Press), Hindustan Aeronautics Limited (HAL), Nashik Road Railway Station, Indian Army's Artillery Center (Deolali Camp), etc. play important role in the development of Nashik City.

### **3.2 Population Projection**

Population projection is done to foresee future population. There are several population projection methods available. Since the last two decades (1991-2011) the average decadal growth rate is around 50%. Subsequent addition of new areas in NMC shows upward trend. According to the table no. 3.2 and 3.3, the population projected is 22.38 lakhs in 2021 and over 33 lakhs in 2031 (Fig 3.2).



**Table 3.2 - Nashik city Population Growth (1901 to 2011)**

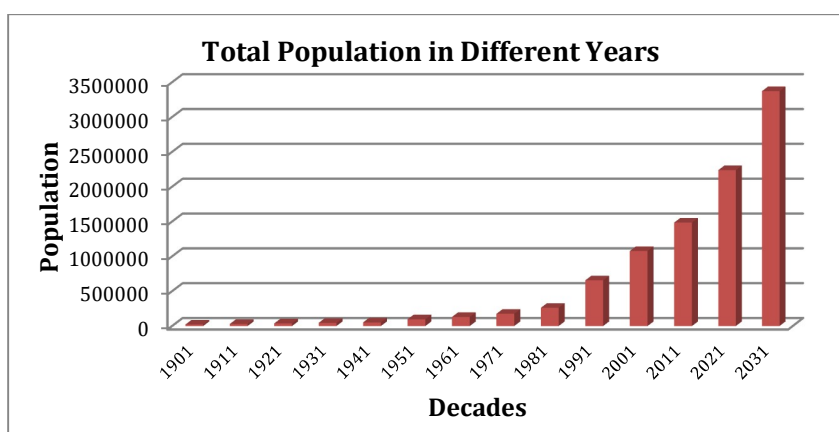
Sr. No.	Years	Total Population	Absolute Growth	Growth In Percentage
1	1901	21490	-	-
2	1911	30098	8608	40.06
3	1921	38230	8132	27.02
4	1931	45744	7514	19.65
5	1941	52386	6642	14.52
6	1951	97042	44656	85.24
7	1961	1,31,103	34061	35.10
8	1971	1,76,091	44988	34.32
9	1981	2,62,428	86337	49.03
10	1991	6,56,925	394497	50.33
11	2001	10,77,236	420311	63.98
12	2011	14,86,053	408817	37.95

*Source: 2011 Census of India, District Census Handbook Nashik District*

**Table 3.3- Population forecast in Nashik Municipal Corporation**

Census Year	Total Population	Decadal Change	Growth Rate
2021	22,38,739	7,52,686	50.65%
2031	33,72,660	11,33,921	50.65%

*Population forecasting is done by using Geometric progression method*



**Fig 3.2 - Population Growth**



As per DPSIR, 'Population Density' is an important indicator and its objective is to harmonize the annual growth of a city's population. Density of population affects human health in general by spreading diseases more quickly. Increased or decreased pressure on an urban environment illustrates population density growth overtime.

### 3.3 Highlights of Demography Structure

#### Literacy Rate:

In DPSIR literacy rate is one of the important points. (Table 3.4).

Importance of Literacy is as follows

- Awareness in people to work towards a better living and to know about the basic human rights.
- Spread knowledge and information around the world.
- Helps to break free of shackles of ignorance, avoid getting manipulated, being left out of the mainstream and build their own identity.

**Table 3.4 - Literacy Rate in Nashik Municipal Corporation area**

	Total	Percent	Literacy	Percent
<b>Population</b>	14,86,053	100.00	1,178,446	89.85
<b>Male</b>	7,82,517	52.65	6,43,543	93.40
<b>Female</b>	7,03,536	47.34	534,903	85.92

*Source: Nashik city census 2011 Literacy data*

### 3.4 Development and Industries

of Nashik is one the main exporters of white onions, grapes and pomegranates. Mumbai-Pune - Nashik is considered to be the most developed **"Golden Triangle" of Maharashtra**, and accordingly infrastructural facilities are being developed by the Government. After the establishment of the Deolali Cantonment Board (1861) and Nashik Road Railway Station (1862), there was a rapid increase in the development of Nashik. Later, Nashik Municipality came into existence in the year 1864, again Nashik was declared as District (1869), foundation of Saint Andrew Church (1884), Construction of Victoria Bridge was started in (1894), and





Establishment of Police Training School (1910), Establishment of Security Press (1927), Establishment of Artillery Center (1941) and Corporation (1982) were and are determined as milestones of Nashik City development.

Nashik city is one of the fastest growing cities in India identified as Tier 2 metrocity. With the establishment of Engineering and manufacturing industries, the economy of the city started booming. Apart from enhanced industrialization, progressive agricultural practices in surrounding of city and district also contributed to the economy. During fourth decade of 20th century, the establishment of Walchand group at Ravalgaon was initiated. During pre Independence, Nashik city initiated cottage industry activities like Bidi manufacturing. During post independence, several MIDC were established in and around Nashik such as Ambad, Satpur, Igatpuri, Dindori and Sinnar. The industries like Mahindra and Mahindra, Bosch VIP, Samsonite, Cable Corporation of India, Garware, Crompton Greaves, Siemens, Kirloskar Oil Engine, Caprihans, Gabriel India Ltd., Thyssen Krupp, IBP, PCVL Casting, CEAT, ABB, Atlas Copco, Essar Steel Hypermart Ltd, Jindal Steel, Glenmark are established in these MIDCs. Currently, more than 1300 different units are established in these industrial areas. Manufacturing, Engineering companies and Pharma Companies like GlaxoSmith Kline, Glenmark and Fem are established in the MIDC area. Nashik is also known as grapecity in India. According to the production of grapes, several wineries like Sula, York etc. are also established in the corporation area. Nashik city is deemed to be third most industrialized city of Maharashtra. Thermal power plant has been established at Eklahare to supply sufficient electricity.

### **3.5 Details of Slum areas in Nashik Municipal Corporation area**

Total no. of Hutments in Nashik city is 41,023 in which, population of 189,721 resides. This is around 12.77% of total population of Nashik city (Census, 2011) depicted in Table 3.5.



**Table 3.5 - Slum Details in NMC Area**

<b>Year</b>	<b>Population in Slum area</b>	<b>Percentage of population in slum area</b>	<b>Increase of Slums population</b>
<b>1981</b>	66,498	--	--
<b>1991</b>	75,526	11.49	9,028
<b>2001</b>	1,38,797	12.90	63,271
<b>2011</b>	189,721	12.77	50,924

*Source: 2011 Census of India, District Census Handbook Nashik District*

### **3.6 City Connectivity**

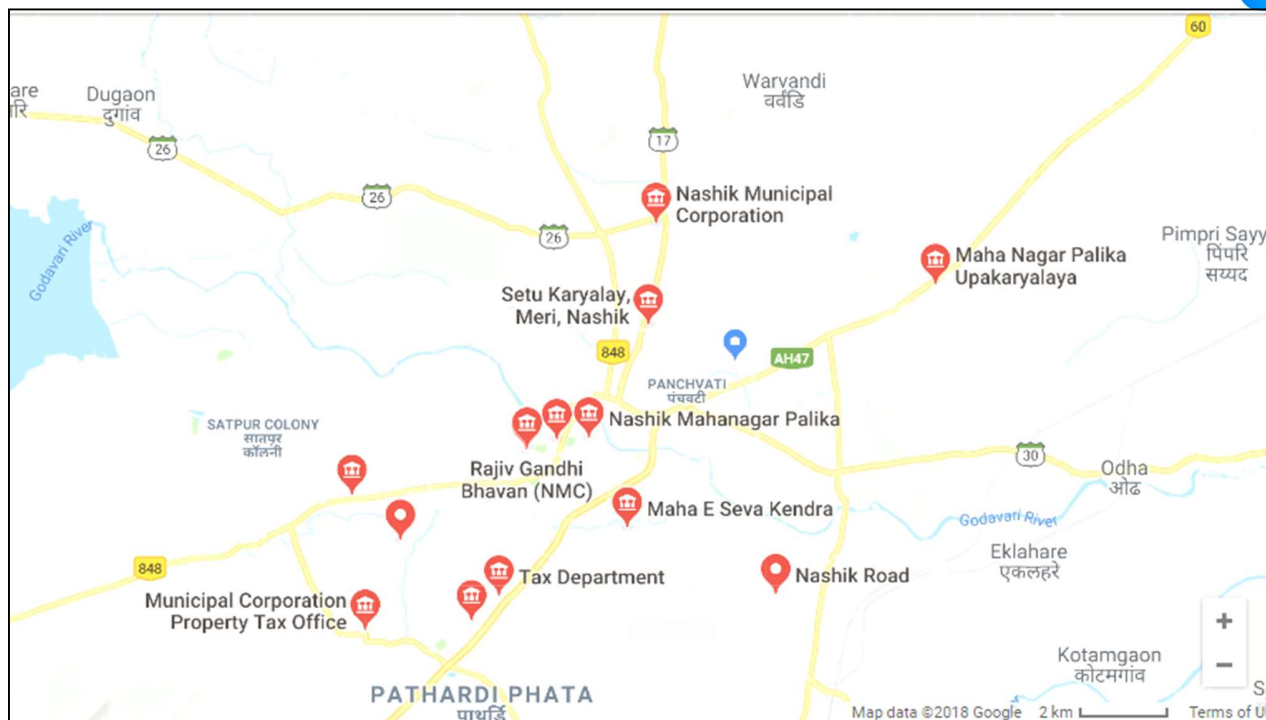
Nashik city is fourth important city in Maharashtra. It is a part of Golden Triangle of Mumbai- Pune - Nashik.

#### **3.6.1 Road Network**

A total of 1901 km of road network exists of which, 257 km are WBM roads, 221 km are Concrete roads, roads in slum areas are 115 km and 1307 km are asphalt roads. The Mumbai-Agra National Highway No. 3 passes through West-East direction from Nashik city, which connects Mumbai (180 km) and Dhule (158 km). Nashik city is connected to Pune (210 km) with National Highway No. 50. Nashik-Aurangabad (180 km) is connected through State Highway No. 30. In addition to that, Nashik city is connected to Jawahar, Kalyan, Peth etc. through state highways. Within the city, an extensive network of all weathered roads exist (Fig 3.3).

#### **3.6.2 Development of Road Network Nashik City**

Nashik city was developed because of development of several government offices, industries and historical places. The Simhastha Kumbh Mela is one of the major activities organized after every 12 years, helps to develop road network within the city. The NH 3 passes through city. Most of the development has occurred on both sides of this highway.



**Fig 3.3- Important Road Network Nashik Municipal Corporation Area**

**The following are the major roads in NMC area**

1. Nashik Road
2. Sharanpur Road
3. Gangapur Road
4. Triambakeshwar Road
5. Peth Road
6. Makhmalabad Road
7. Jail road
8. Nandur Naka to Jatra Hotel link road
9. Satpur Ambad Link Road
10. Gangapur Satpur Link Road
11. Pipeline Road
12. Untwadi Road
13. Old Canal link Road
14. Wadala Road
15. Bytco-Vihitgaon-Devlali

Mumbai-Agra NH-03, in corporation area, originates at Pathardi Phata (West end of Nashik City) and ends at Adgaon (East end of Nashik city). This highway caters most of the traffic load, because this road has 2 tiers i.e. Four lane and service road at ground and four lane fly over (about 10 kilometer) is available to carry traffic load. The NH 50 connects Nashik city to Poona through Dwarka and Nashik Road (5.00 Kilometer). This road handles the traffic load coming from Pune, Sinner MIDC, Nashik Road, etc.



### **3.6.3 Rail Network**

Central Railways Nashik Road Railway Station was established in 1866. The railway station is situated at south-east direction, approximately 10 kilometer away from Nashik city. The Nashik road railway station comes under Bhusawal- Kalyan section. The Important broad gauge lines such as Howrah-Nagpur-Mumbai line, Howrah-Allahabad-Mumbai line, and New Delhi-Bhopal-Mumbai line passes through the city.

In addition to that, a special railway track is available to supply coal to the Eklahara thermal power plant. This power plant is a coal based thermal power plant and requires large number of coal, which is supplied by means of rail transport.

The railway service provides an important means of transportation to daily commuters of Nashik to Mumbai or Nashik to Bhusawal and nearby areas.

### **3.7 Air Network**

Nashik Airport (Ozar Airport) is situated 15 km away from the Nashik city toward north-east direction. Basically, this airport is owned by Hindustan Aeronautics Limited (HAL), which uses this airport for testing of newly build aircrafts. The airlines destinations are Pune, Mumbai, Delhi, Chennai, Bangalore, Hyderabad, Goa; Kolkata, Ahmadabad. Another small runway is available at Gandhinagar area. This airport is known as Gandhinagar Airport, taken over by Indian Army. It was used by Indian Airlines to operate daily flight between Nashik to Mumbai from 1972 to 1989.

### **S-Summary**

Building development grows quickly because of urbanization and industrialization, which has impacts on soil fertility. Agricultural land is utilized for development and constructions. NMC declared a couple of lands as green space and disallowed the utilization of this space for the development purpose. Thick plantation in the zone must be done, so that CO<sub>2</sub> from air will get assimilated. Endemic species like Madhushevga, Neem, Pilmohar, Sesam ought to be planted.



## **I- Impact**

1. Growing industrialization is responsible for the increasing rate of hazardous components and non-biodegradable waste, resulting in pollution load. Also sewage, atmospheric pollution and land pollution load has increased considerably.
2. Growing population and urbanization cause exploitation of natural resources which cause harm to environment.
3. Development of Industrialization in city, IT field, and population growth in the city has put considerable burden on transportation which in turn resulted in increased accidental rate and traffic jam problems.

## **R- Response**

1. Under City cleanliness urban plan, Nashik Municipal Corporation has built 2200 Toilets on pay and use basis.
2. Equal Water supply to various parts of the city.
3. Use of Existing Sewage treatment plant for the treatment of Waste water and proper storage and transfer of sewage.
4. Special care to reduce water pollution contributed by slums and industries.

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## Chapter 4

### Land Use

#### 4.0 Land Use and Land Cover Pattern

Land is one of the prime natural resources of the each country. Land use /land cover change is a general term for the human modification of the Earth's terrestrial surface. Although humans have been modifying land to obtain food and other essentials for thousands of years, current rates, extents and intensities of land use /land cover change are far greater than ever in human history, driving unprecedented changes in ecosystems and environmental processes at local, regional and global scales. Today, land use /land cover changes encompass the greatest environmental concerns of human population including climate change, biodiversity depletion and pollution of water, soil and air. (Currently, monitoring and mediating the adverse consequences of Land use /land cover change, while sustaining the production of essential resources, has become a major priority of researchers and policy makers around the world).

Nashik Municipal Corporation lies between **18° 33'** and **20° 53'** North Latitude and between **73° 16'** and **75° 16'** East Longitude at northwest part of the Maharashtra State (Fig 4.1). The Nashik city lies at 560 meters above mean ocean level. Amid 1970, the zone was 12.80 sq. kilometers and now following multi decades, it has traversed 250 sq. kilometer mark. The NMC zone is isolated in to three zones, for example internal zone, center zone and external zone. Regulatory structures, business territory and old city contains inward zone. It has exceedingly clogged local location around Godavari River. The center zone incorporates mechanical foundation and arranged neighborhood. The suburb zones like Gangapur Gaon, Makhmalabad, Mhasrul, Adgaon, Eklahra, Deolali, Pimpalgaon Bahula, Pathardi and so forth together involves external zone of the city. The city is known for its incredible fanciful foundation. It is one of the four urban communities that have the mega event of Simhastha Kumbh Mela once in twelve years.





## D-Driving Force

1. Population Growth
2. Economic Growth
3. Population
4. Currently the existing land utilization pattern aerial & other future policy will effect on land use

## P-Pressure

- 1) Lack of space due to population growth
- 2) Due to increase in population, no of buildings and the area required to accommodate them also increased. Furniture requirement involves cutting of many trees which leads to deforestation
- 3) Thus, decline in rainfall and increase in pollution occurs



**Fig 4.1 - Latitude and Longitude boundaries of Nasik Municipal Corporations**



## S-Status

### 4.1 Land Use of Nashik Municipal Corporation

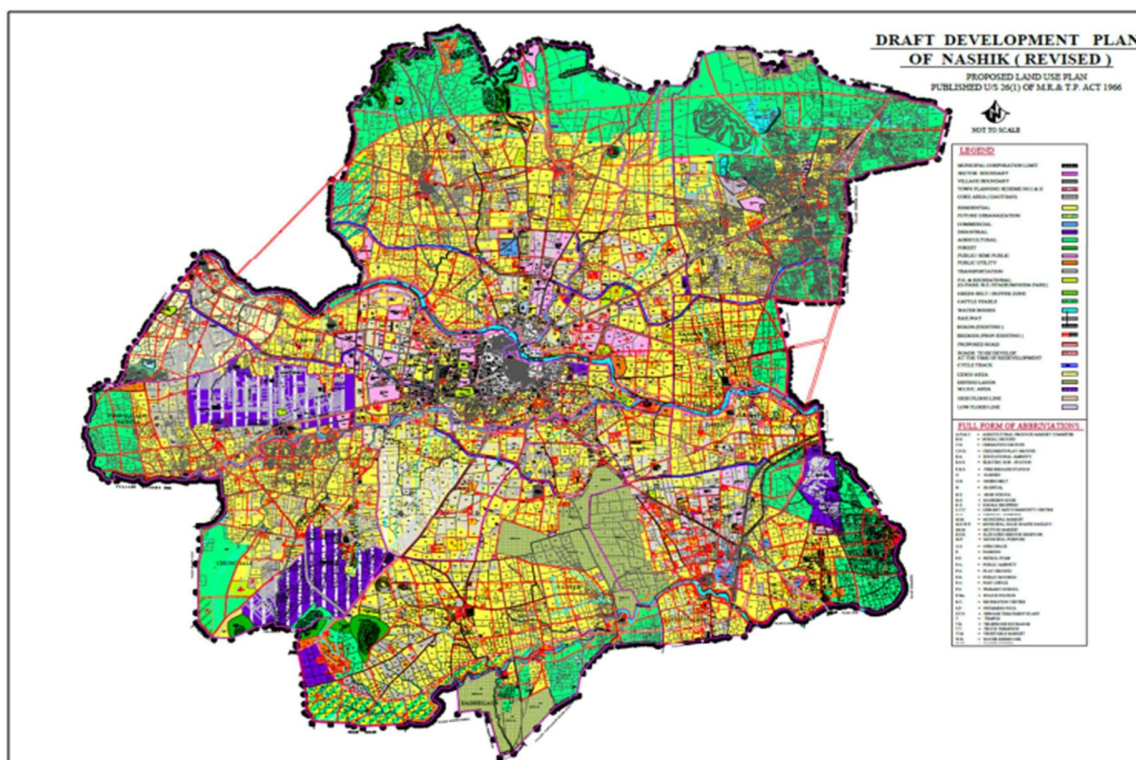
As per the table 4.1 given below, the total developed area in Nashik city accounts for about 78.69% out of total corporation area. Out of total corporation area, about 47.99% area is covered by residential area. This clearly shows that vast areas within the corporation limits are quite developed. About 16.98% areas are under cultivation, 3.39% Water Bodies, 0.94% forest land available on total available land. The total un-developed area is 21.31%.

**Table 4.1 - Current land use of Nashik Municipal Corporation Area**

Sr. No.	Land Use	Area in Hectares	% of total Developed Area	% of the Total Area
1.	Residential	12835.78	60.98	47.99
2.	Future Urbanisable Zone	442.19	2.10	1.65
3.	Commercial	118.53	0.56	0.44
4.	Industrial	1558.63	7.41	5.83
5.	Public and Semi Public	1059.64	5.03	3.96
6.	Public Utility	293	1.39	1.10
7.	Transportation	2862.9	13.60	10.70
8.	Garden, Play Ground and Receptions	535.84	2.55	2.00
9.	Military	943.75	4.48	3.53
10.	CIDCO	398	1.89	1.49
	Total Developed Area	21048.26	100	78.69
11.	Agricultural	4542.59	-	16.98
12.	Vacant Land	0.00	-	0.00
13.	Water Bodies	906.23	-	3.39
14.	Forest	250.67	-	0.94
	Total Un-Developed Area	5699.49	-	21.31
	Total Area	26747.75		100.00

**Source: Revised Development Plan 2016-2036 Report**

**(Published U/S of Maharashtra Regional and Town Planning Act, 1966)**



The residential improvement set apart on the current land use delineate, that the pattern of residential development is for the most part towards towns Nashik, Anandwadi, Gangapur, Satpur, Pathardi, Deolali, Wadala, Agartakli, Makhmalabad, Mhasrul. There is premium grade agricultural land stretch along the southern parts of Darna river within the town, farthest reaches of Pimpalgaon Khamb, Vadner, Vihitgaon and further more, inside towns Nandur, Manur, Chadegaon, Dhadegaon, Deolali, Mhasrul, Makhamalabad and eastern part of Adgaon. With increasing population, the agricultural lands are getting converted to non-agricultural lands. The commercial activities is mainly observed within the inner zone of the city and mostly concentrated on Main Road, Ravivar karanja, Bhadrakali Stand, Malegaon Stand, MG Road, Chandwadkar Lane, Lam Road of Nashik Road, Deolali area and on Trimbak Road near Satpur, College Road, Canada Corner, Mumbai Nashik Highway, Nashik Pune Highway, City center mall at Untwadi, Junction point of Saikheda Road, Jail Road etc.,

Industrial areas constituted about 7.41% of the developed area which mainly covers areas like Satpur and Ambad MIDC, small industrial settlements along Godavari River.



Further verification of Existing Land use map and gathering of information reveals that the area under water bodies, excluding the area of canal being used for jogging track, water-works, works out to be 906.23 hectares. Moreover, area of garden, play-ground and recreational spaces works out to be 163.08 hectares.

## **I-Impact**

### **1. Construction**

Currently, the city is facing problem of disposal of construction and demolition waste. Nashik Municipal Corporation has floated tender inviting agencies for management of Construction & Demolition waste.

### **2. Urban Heat Island Effect (UHI)**

Heat generated in surrounding city area is defined as UHI. Due to human interference, average temperature in populated areas is more as compared to nearby rural areas. Main reason of this is increasing housing demand & construction activity, which is increasing heat pockets. These are mainly in metropolitan cities like Mumbai, Delhi, Chennai and Kolkata. Due to UHI affect, atmospheric temperature increases & rainfall decreases. It leads to unseasonal rains, acid rains, which affects the human life and biodiversity growth in the city.

### **3. The compound effect**

The large extent of construction activities has also caused a significant impact on the natural resources.

#### **R-Response**

i. Vigilance against illegal dumping of debris

ii. Addition of Open Spaces

As open spaces in the city helps in reducing the impacts of Urban Heat Island (UHI), NMC has planned to increase the area by adding various open spaces in future. NMC is also taking various steps to avoid misuse of the open spaces.



**Plantation scheme:**

According to information provided by Garden Department, in the year 2021-22 17283 trees were planted. In every year, trees are being planted in NMC area by Garden department, private companies and social institutes. There are 539 gardens under 6 divisional offices, where plantation scheme is being implemented.

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## Chapter 5

### Social Environment

#### Preamble

This chapter covers every fundamental need like, Health, Hygiene, Education, Transportation, Industrialization, Cultural and Tourism Development, through which advancement of city takes place. Issues influencing these perspectives, their status and extent of progress are additionally canvassed in this area.

Social science is the investigation condition created by people, as stood out from the common habitat; Socio financial aspects is the sociology that reviews how monetary movement influences and is formed by social procedures. As a rule, it dissects how social orders advance, stagnate, or relapse as a result of their nearby or provincial economy, or the worldwide economy. Any town or city or organization or state or nation is socio-monetarily steady or not by contemplating and estimation of underneath components like training, work creation, formation of new administrations, industrialization, urban rejuvenation, country advancement, social mix, manageable improvement.

#### Driving forces for social transform

- Population growth and Urbanization
- Switch over to alternate business and proliferation of Industrialization
- Change in lifestyle
- Lack of knowledge in people
- Social transformation
- Alteration in economic development
- Breaching of rules and regulations
- Scarcity of sanitation facility
- Overexploitation of natural resources
- Differences in social and economic states



## **Factors responsible to generate pressure on social environment**

- Population growth is accountable for increased construction sites and to encroach forests by cutting trees causing over exploitation of resources.
- Exorbitant growth of industrialization has encouraged migration of local people from villages to city.
- Changing lifestyle creates pressure on basic necessities
- Due to lack of knowledge and awareness there is spread of contagious diseases
- Increased conduction of cultural and social programs increased the demand for various electrical instruments and lighting for decorations etc, causing air and noise pollution.
- Ever increasing growth of private vehicles is responsible for traffic jam and air & noise pollution.
- Non compliance of rules and regulation in social life creates stress on social environment.
- Lack of sanitation services is liable to create health problems.

## **S - STATUS**

### **5.1 Social Environment:**

#### **A) Population :**

Data innovation and industrial sectors require extra labors and so a sizable number of outside employees, other than selected for this reason. Therefore, there is an expanded ascent of population in Nashik city. Population is a key parameter in any sort of city arrangement.

#### **B) Population Projection:**

During the two decades (1981-2001), prior to the last one, the decadal growth rate in population has been around 50%. Subsequently, the addition of new areas showed a downward trend; however, this would still be on the higher side for the next three decades. Accordingly, the population reached to 14.86 lakh in 2011 and estimated to be 22.38 lakhs in 2021 and over 33 lakhs in 2031 (**Table 5.1 and 5.3**).



**Table 5.1 Population forecast in NMC area till 2031**

Census Year	Total Population	Decadal change	Growth rate
2021	22,38,739	7,52,686	50.65%
2031	33,72,660	11,33,921	50.65%

*Population forecasting is done by using Geometric progression method*

**Table 5.2 Literacy rate in NMC area**

Details	2011	%
<b>Total Literate Population</b>	11, 78,446	100%
<b>Literate Male</b>	6, 43,543	43.31%
<b>Literate Female</b>	5,34,903	35.99%

*Source: Literacy Book 2011*

**Table 5.3 Overview of Population in City (2011)**

	2011	%
<b>Population</b>	16,60,529	100
<b>Child population</b>	1,74,476	10.50
<b>Male</b>	7,82,517	47.12
<b>Female</b>	7,03,536	42.36

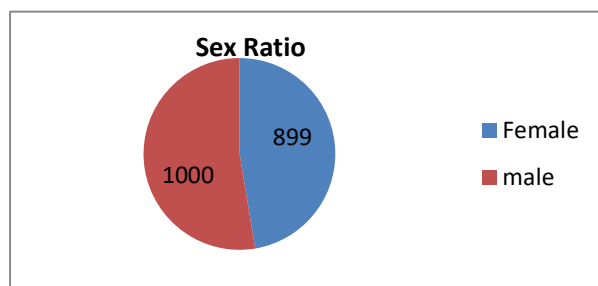
*Source: Census Book 2011*

**Female Male Ratio**

**Female Ratio of Population by Population**

<b>Population Ratio</b>	<b>899</b>
-------------------------	------------

*Source: According to the 2011 census*



**Fig 5.1 Male Female population ratio**





### C) Educational Facility

School Attendance is one of the pointers of DPSIR, with a goal to improve access to consummation of essential and optional training. For this, information required is understudies from ages 12-15 who go to government funded schools versus the complete number of students from ages 12-15 that are required to visit. Instruction is the indispensable factor for the general progression of any city that has advantageous result on it and gives openings for work to nationals. Diverse plans are in errand inside the city through Municipal Corporation under Sarva Shiksha Abhiyan. The fundamental guidance is imperative and it is a focal human right that has for quite a while been seen by the all inclusive group. The city has a wide scope of enlightening establishments like Medical colleges, Engineering colleges, Diploma colleges, Agricultural Institute, Science, Commerce and Arts schools, Junior schools, Middle and Primary schools, High Schools, Kindergarten, etc. Besides this, private Institutes are providing software, hardware and other information of technology to the native residents.

**Table 5.4 Number of Primary Schools of Nashik Municipal School**

	Year	Marathi	Hindi	English	Urdu	Total
<b>No .of School</b>	<b>2014-15</b>	110	4	4	13	131
	<b>2015-16</b>	110	4	4	13	131
	<b>2016-17</b>	110	4	4	13	131
	<b>2017-18</b>	110	4	4	13	131
	<b>2018-19</b>	110	4	4	13	131
	<b>2019-20</b>	74	4	3	11	92
	<b>2020-21</b>	73	4	0	11	88
	<b>2021-22</b>	73	4	0	11	88
<b>No .of Student</b>	<b>2014-15</b>	15408	1419	118	1834	18779
	<b>2015-16</b>	13509	1327	86	1540	16462
	<b>2016-17</b>	12749	1378	84	1494	15705
	<b>2017-18</b>	12176	1342	73	1499	15090
	<b>2018-19</b>	23811	1305	340	2744	28200
	<b>2019-20</b>	25416	1178	169	1742	28505
	<b>2020-21</b>	21915	1281	0	2309	25505
	<b>2021-22</b>	22537	1387	0	2690	26614
<b>Number of</b>	<b>2014-15</b>	401	32	5	42	480
	<b>2015-16</b>	400	32	3	35	470



<b>Teacher</b>	<b>2016-17</b>	386	33	3	42	464
	<b>2017-18</b>	387	33	3	37	460
	<b>2018-19</b>	806	41	0	94	941
	<b>2019-20</b>	785	40	0	67	892
	<b>2020-21</b>	762	27	0	84	873
	<b>2021-22</b>	714	43	0	81	838

*Source: Primary Education Department, Nashik Municipal Corporation*

**Table 5.5 Primary School Language Statistics 2021-22**

<b>Educational Facility</b>	<b>Marathi</b>	<b>Urdu</b>	<b>Hindi</b>	<b>Gujrati</b>	<b>English</b>	<b>Total</b>
<b>Granted School</b>	73	05	02	01	0	81
<b>Non- Granted School</b>	29	02	0	0	0	31
<b>Permentantly Non-Granted School</b>	0	0	0	0	128	128
<b>Total</b>	102	07	02	01	128	240

*Source - Primary Education Department Nashik Municipal Corporation*

**Table 5.6 Secondary School Annualized Statistics**

<b>Regional Office</b>	<b>No.of School</b>				<b>No.of Total Student</b>	
	<b>Marathi</b>	<b>Hindi</b>	<b>English</b>	<b>Urdu</b>	<b>Boys</b>	<b>Girls</b>
	<b>(2016-2017)</b>					
	11	0	0	2	1988	1657
	<b>(2017-2018)</b>					
	11	0	0	2	1751	1632
	<b>(2018-2019)</b>					
	11	0	0	2	1366	1502
	<b>(2019-2020)</b>					
	11	0	0	2	1504	1646
	<b>(2020-2021)</b>					
	11	0	0	2	1575	1642
	<b>(2021-2022)</b>					
	11	0	0	2	1243	1270

*Source - Department of Primary Education, Nashik Municipal Corporation*



**Table 5.7 Toilet & Urinal Facilities for Primary school**

Particular	Boys				Girls			
	2018-19	2019-202	2020-21	2021-22	2018-19	2019-2020	2020-21	2021-22
Primary	596	732	732	732	596	737	737	737

**Table 5.8 Toilet facility for Secondary school**

Sr. No.	Secondary	Girls			Boys		
		2019-20	2020-21	2021-22	2019-20	2020-21	2021-22
1.	WC	63	63	63	34	34	34
2.	Urinals	104	104	104	82	82	82
	<b>Total</b>	167	167	167	116	116	116

**Table 5.9. Sports facility for Secondary school students**

Sr. No.	Particulars
1	Location of sports academy in NMC
2	Facilities provided to sports academy students
3	Incentives for 10 <sup>th</sup> Std. students

Primary school building in NMC area is 88 nos. NMC has constructed a number of study rooms to facilitate the students from poor community, lower and middle class group of society. Such libraries are constructed at Pandit colony, Nashik Road, Cidco office, Nehru garden, Shalimar, Panchavati and Shivaji Nagar Gangapur with library facility and computer laboratory.

**Programmes undertaken by School:-**

1. Cleanliness of School Premises
2. Undertaking Save Water Camps
3. Godavari Cleanliness Drive
4. E-learning Programme
5. Eco –Friendly Projects at Science Exhibition



## 6. Tree Plantation & Conservation

### 5.3 Transport Infrastructure :

Different transport modes place pressure on the environment. Public transport saves valuable space, energy and time compared to private transport and has positive health benefits. The objective of DPSIR is to improve access to public transportation for all. The number of buses per lakh population is an important indicator for the adequacy of services in the city. The CIRT norms specify 40 buses per lakh population.

Existing transport infrastructure of Nashik city is given in last year's ESR. Nashik City is the headquarter of Nashik Administrative Division which includes four regions. Nashik is at 185 kms from Mumbai and 200 kms from Pune. It is on the Golden Triangle of Maharashtra Viz. Mumbai-Pune-Nashik. The National Highway No. 03 i.e. Mumbai Agra Highway which Criss Crosses Nashik through urban areas of Nashik, and National Highway No. 50 connects Nashik to Pune. Nashik additionally has a great railroad network as it is coated on the primary line of Central Railway on Mumbai-Bhusawal Section.



**Fig 5.2 Road Transport Systems in NMC**



**Table No 5.10 Details of Transport Infrastructure (Road Length)**

Sr. No	Division	Asphalt Road (K.M)	W.B.M Road (K.M)	Concrete Road (K.M)	Slum Road (K.M)	Total Road Length (K.M)
1	Nashik East	181.00	9.30	60.91	32.00	283.21
2	Nashik West	130.72	6.90	20.40	12.10	170.12
3	Panchavati	397.00	69.74	53.37	43.55	563.66
4	Nashik Road	232.35	16.30	17.93	16.69	283.27
5	New Nashik	391.35	63.10	79.58	5.63	539.66
6	Satpur	249.35	65.03	27.14	13.72	355.24
	<b>Total</b>	1581.77	230.37	259.33	123.69	2195.16

#### 5.4 City Bus Service In NMC Area (CITILINC)



As Nashik is one of the rapidly progressing economies in the country, the city experiences rapid population growth because of the natural advancements and high migration rates in the urban areas. This increase in population, which directly contributes to the increased motorization and pollution in the city, underscores the need for a high-quality, sustainable and affordable public transport system for the citizens. In order to meet the transportation needs of the city and discourage the personal use of vehicles, Nashik Mahanagar Parivahan Mahamandal Limited (NMPML), under its brand name of CITILINC, takes pride in being the lifeline of one of the fastest-growing cities of India by creating an efficient and sustainable public transport infrastructure that meets the short term and long-term transport needs of the city.

Citilinc is the public transport bus service provided by Nashik Mahanagar Parivahan Mahamandal Ltd (SPV of Nashik Municipal Corporation) for the city of Nashik, in Maharashtra. It operates 51 routes around Nashik and its suburban areas with the use of a fleet of nearly 250 buses. Presently, the routes cover a radius of 20km in and around the Nashik area.



CITILINC aspires to create a sustainable and efficient public transport infrastructure for the city by operating its own city bus service to meet the transportation needs of the citizens and thereby providing easy commute access to citizens for their daily transport needs. CITILINC will play a pivotal role in the sustainable development of the city. This aims to connect every nook and corner of the city in the most sustainable manner by deploying the best technology, highest safety standards, and providing affordable services for our passengers.

### **VISION AND MISSION**

CITILINC is committed to providing access through the public transport in a manner that is effective, efficient, safe secure, cost effective, and self-sustainable, that is projected to meet the short-term and long-term transport needs of the Nashik city.

- Providing easy access for jobs, markets, education, socio- cultural and economic activities.
- Providing adequate infrastructure facilities for public transport in terms of intermodal mobility hubs, bus stops etc.
- Promoting public participation, reducing individual motorized transport.

### **FUTURE PLANS**

- In order to improve the modal share of Public Transport in Nashik, more buses shall be added to the existing fleet size every year, subsequent to the deployment of the first batch of 250 buses. An addition of 50 new electrical buses every year to the existing fleet would contribute to the expansion of the public transport operations by not only enhancing the number of routes being operated citywide, but also increasing the frequency of buses along the transit corridors.
- The “Origin-Destination” statistics collected from the Electronic Ticketing Machines (ETM) would help to fine tune the route rationalization processes.





- Expansion of the horizon of the bus operations up to 20 km – Radius has also been planned in the subsequent phases of implementation. The Air-Conditioned Electric Buses for long routes shall also be made available progressively.
- CITILINC has planned to operate heritage tour, wine yard tour, jungle tour, temple tour etc.
- CITILINC has plan to operate A/C buses in Mofussil Route.

Statistical details of Nashik municipal transport system is presented in **Table 5.12**



**Fig 5.4 Citilink Bus Depo**



**Table 5.12.Details of the city buses**

Sr. no.	Particulars	2020-21
1.	No. of buses	250
2.	No. of routes	51
3.	No. of proposed routes	Nil
4.	Length of proposed routes	Nil
5.	No. of proposed buses	Nil

*Source: NMPML (CITILINK) Nashik*

**Table 5.13 Distribution of Buses from fuel type**

	Type of fuel	2020-21 No. of buses
Nashik city buses	Diesel	50
	CNG	200
		250

*Source: NMPML (CITILINK) Nashik*

#### **B-6.Private Transportation**

Urbanization, population growth and insufficient number of government vehicles lead to increased load on transportation, primarily usage of private vehicles is magnified. Vehicles which were registered in 2021 and 2022 is as follows.

**Table 5.15 Officewise & Category wise No. of vehicles as on 31/03/2022 in NMC area**

Category	Cars	Two wheelers	Total
1.	11325	50697	62036

*Source: R.T.O, Nashik*





## B-7.Road Accidents

The information from Nashik Police Commissioner towards accidents in 2021-2022 for the broad area covering NMC, Cantonment boards and suburban areas is presented in the table given below.

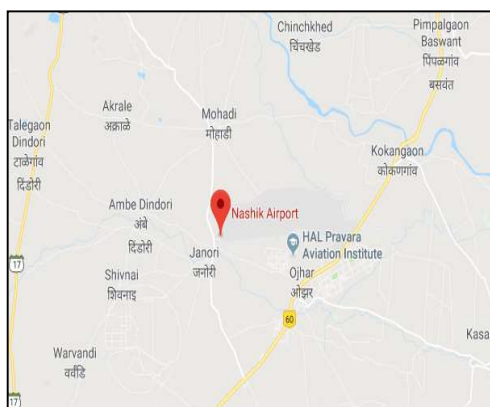
**Table 5.16 Road Accidents Registered in NMC area**

Sr. No.	Accidental cases (Year wise)	No.of registered cases
1	2014-15	243
2	2015-16	313
3	2016-17	248
4	2017-18	254
5	2018-19	260
6	2019-20	274
7	2020-21	278
8	2021-22	391

*Source: Nashik Municipal Corporation*

### B-8.1 Airport facility (Ozar) :

There is no airplane terminal for regular citizens inside Nashik Municipal Limits. The closest one is at Ozar Airplane terminal (household military) which is situated around 24km from the downtown area. It is Operated by Hindustan Aeronotics Limited. In spite of the fact that the freight terminal was propelled in year 2011, the development of traveler terminal complex is finished and it is relied upon to begin activities soon. There is military air terminal at Gandhi Nagar (Nashik city). The close-by air terminal is at Mumbai (worldwide) 190 kms., and another at Aurangabad (residential) at around 218 kms from the city. Flight administrations are in routine.





**Fig 5.5 Airport facility at Nashik**

### **B-8.1 Shirdi Airport**

Shirdi Airport is a domestic airport serving the city of Shirdi, Maharashtra, India. It is located at Kakadi, about 14 km SW of the Shirdi and 83.37 km SE from Nashik. It is the fourth busiest airport in the state after Mumbai, Pune, and Nagpur airports. The airport, spread over 400 hectares, is owned by the Maharashtra Airport Development Company (MADC) and was inaugurated by President, Ram Nath Kovind on 1 October 2017. Communication Navigation Surveillance (CNS) and Air Traffic Control (ATC) at the airport is operated by the Airports Authority of India (AAI).



**Fig 5.6 Airport facility at Shirdi**



## 5.6 Details of Property Tax

Information of Nashik Municipal Corporation Property Tax details are given in following table:-

### 5.17 Details of Total Property Tax Collection 2021-22

Year	No. of Total Residents (Property Tax)	No. of Non -Resident (Property Tax)	Total Resident (Property Tax)
2020-21	3,82,643	56,960	4,39,603
2021-22	411927	61951	473878

### Details of Property Tax

Year	Total Property Tax	Property Tax In Lacs	
		Demand	Recovery
2018-19	4,15,256	298.81	114.20
2019-20	4,25,841	358.92	141.16
2020-21	4,39,603	390.98	112.86
2021-22	473878	458.02	148.99



**Table5.17 Details of Total Property Tax Collection**

<b>Nashik Municipal Corporation, Nashik</b>											
<b>Tax Department</b>											
<b>Property Tax Target &amp; Recovery Status 2017- 18</b>											
Division	No. of Prop	Target			Recovery (Rs.)		Advance payment	Total Recovery	Recovery (%)		
		Arrears	Current	Total	Arrears	Current			Arrear s	Curren t	Total
Satpur	47634	122146966	85002081	207149047	29245630	62397515	256716	91899861	24%	73%	44%
Nasik West	38495	221787853	15931387 7	381101730	80894580	12589912 2	1293436	20808713 8	36%	79%	54%
Nasik East	78715	385233084	14722397 4	532457058	57809645	96867235	3186852	15786373 2	15%	66%	29%
Panchavati	91577	375101877	12905815 5	504160032	59109193	80819914	619419	14054852 6	16%	63%	28%
New Nasik	97517	226676877	15540129 6	382078146	66986108	11238841 4	867536	18024205 8	30%	72%	47%
Nasik Road	72366	265623492	14410004 0	409723532	50233475	97595186	1298013	14912667 4	19%	68%	36%
Grand	42630	159657014	82009942	241666954	34427863	57596738	7521972	92776798	21.56%	70.23%	38.39



Total	4	9	3	5	1	6		9			%
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Nashik Municipal Corporation, Nashik											
Tax Department											
Property Tax Target & Recovery Status 2016- 17											
Division	No. of Prop	Target			Recovery (Rs.)		Advance payment	Total Recovery	Recovery (%)		
		Arrears	Current	Total	Arrears	Current			Arrears	Current	Total
Satpur	46874	106981394	82506939	189488333	25843652	60362751	324686	86537089	24.16%	73.16%	45.67%
Nasik West	38273	210962978	157892054	368855032	45068328	112253339	1444754	158766421	21.36%	71.09%	43.04%
Nasik East	78037	343818811	146235276	490054087	54618992	95054053	3555044	153228089	15.89%	65.00%	31.27%
Panchavati	89490	344942960	125794854	470737814	59676141	78071425	342622	138090188	17.30%	62.06%	29.33%
New Nasik	96761	212131951	153944211	366076162	60467657	107918427	789582	169175666	28.50%	70.10%	46.21%
Nasik Road	71736	263672046	143448365	407120411	54408724	95699706	1733397	151841821	20.63%	66.71%	37.30%
Grand Total	421171	1482510140	809821699	2292331839	300083494	549359701	8190085	857639274	20.24%	67.84%	37.41%



**Nashik Municipal Corporation, Nashik**

**Tax Department**

**Property Tax Target & Recovery Status As on 20/03/2018**

Division	No. of Prop	Target			Recovery (Rs.)		Advance Payment	Total Recovery	Recovery (%)		
		Arrears	Current	Total	Arrears	Current			Arrears	Current	Total
Satpur	47861	147582038	117174748	264756786	32506384	84018393	265846	116790623	22%	72%	44%
Nashik West	38792	187856914	220277609	408134523	38857670	167170562	934981	206963213	21%	76%	50%
Nashik East	78943	474044191	207999337	682043528	66768884	126701388	2824512	196294784	14%	61%	28%
Panchvati	92124	457147690	184436470	641584160	52203105	104752951	263179	157219235	11%	57%	24%
New Nashik	97894	248346562	215611902	463958464	60605737	148757337	508553	209871627	24%	69%	45%
Nashik Road	72802	319305831	204215189	523521020	53606942	131445238	509390	185561570	17%	64%	35%
Grand Total	428416	1834283226	1149715255	2983998481	304548722	762845869	5306461	1072701052	16.60%	66.35%	35.95%



**Nashik Municipal Corporation, Nashik**

**Tax Department**

**Property Count 2017-2018**

Division	Resi.		Comm.		Resi + Comm		Ind		MT S	Educational	Charetable Trust	State Govt. Prop.	Central Govt. Prop.	Open Plot	Demolish.	Total
	Auth	Unauth	Auth	Unauth	Auth	Unauth	Auth	Unauth								
Satpur	35849	3336	2315	412	615	156	1685	136	349	19	6	17	2	2040	697	47634
Nashik West	25808	446	8017	581	588	11			661	128	5	155	5	461	1629	38495
Nashik East	55207	2469	13016	496	2238	42			209	47	1	59	21	1802	3108	78715
Panchvati	67505	3719	7807	534	1832	77			202	83	3	219	1	7592	2003	91577
New Nashik	76998	2588	7209	463	2715	83	1737	215	31	45		23	7	4121	1282	97517
Nashik Road	51255	4848	9132	547	543	79			163	101		64	3	1498	4133	72366



Grand	3126	17406	474	3033	853	448	342	351	161	423	15	537	39	175	12852	4263
Total	22		96		1		2		5					14		04

<b>Nashik Municipal Corporation, Nashik</b>																
<b>Tax Department</b>																
<b>Property Count 2016-2017</b>																
Division	Resi.		Comm.		Resi + Comm		Ind		MT S	Educational	Charetable Trust	State Govt. Prop.	Central Govt. Prop.	Open Plot	Demolish.	Total
	Auth	Unauth	Auth	Unauth	Auth	Unauth	Auth	Unauth								
Satpur	35685	3286	3811	544	615	145			349	19	5	17	2	1717	679	46874
Nashik West	25920	431	7965	543	589	10			661	114	5	155	5	396	1479	38273
Nashik East	55067	2279	12962	458	2235	38			209	47	1	61	21	1576	3083	78037
Panchvati	66487	3528	7777	507	1829	73			202	83	3	219	1	6826	1955	89490
New	76745	2541	8884	714	2706	85			31	45		156	7	3603	1237	96754





Nasik																
Nasik Road	51000	4846	9101	534	541	73			163	101		66	3	1315	3992	71735
Grand Total	310904	16911	50500	3300	8515	424	0	0	1615	409	14	674	39	15433	12425	421163

Nashik Municipal Corporation, Nashik																
Tax Department																
Property Count As on 20/ 03/ 2018																
Division	Rsei.		Comm.		Resi + Comm		Ind.		MT S	Educational	Charetable Trust	State Govt. Prop.	Central Govt. Prop.	Open Plot	Demolish	Total
	Auth.	Unauth.	Auth.	Unauth.	Auth.	Unauth.	Auth.	Unauth.								
Satpur	35857	3336	2316	412	616	156	1682	136	349	19	6	17	2	2246	711	47861
Nasik West	25821	457	8119	583	579	11			661	125	5	155	5	485	1786	38792
Nasik East	55202	2478	13032	502	2227	43			209	47	1	59	21	1944	3177	78942



Pancha vati	6755 1	3723	781 2	533	182 9	77			202	83	3	219	1	804 9	2042	9212 4
New Nasik	7702 0	2599	721 8	457	271 2	83	173 5	214	31	45		11	8	444 1	1319	9789 3
Nasik Road	5160 0	4835	915 5	549	538	79			163	101		64	3	153 3	4182	7280 2
Grand Total	3130 51	17428	476 52	3036	850 1	449	341 7	350	161 5	420	15	525	40	186 98	13217	4284 14



## 5.6 Building Permission Department

It is important to obtain the data about the present housing stock, its proprietorship, sort of development, state of structures, kinds of houses, and so forth. The figures of the year 2014, with the NMC demonstrate that, there are around 3,25,235 existing houses in the city. The majority of the old houses in old city have stone foundations with block or mud dividers and tiled rooftops. The present day houses being developed in the periphery of the city are for the most part of RCC developments with precast blocks. The vast majority of the houses in old gothans (Core city) of Nashik, Panchvati, Deolali, Satpur are old and are in a poor condition. The table underneath demonstrates dissemination of number of houses by age and year.

(Source : Nashik Development Plan 2016-36).

**Table 5.18 Distribution of houses by age**

Distribution of houses by age (years)							
Sr. no.	Divisions	Above 60	40-60	15-40	Below 15	Temporary	Total
1	Nashik road	466	2440	11474	21820	-	36200
2	Panchavati	6679	6650	20621	42188	-	76138
3	Nashik east	14642	12553	14073	30067	1881	73216
4	Nashik west	613	1318	4026	3767	448	10172
5	Satpur	76	4575	11642	20358	890	38229
6	CIDCO	1938	1435	41448	44821	1638	91280
	Total	25102	28971	103284	163021	4857	325235

*Source : Nashik Development Plan 2016-36*

From 2015 to 2018 total 8692 construction projects are proposed among that total 5621 projects got permission. Total 5239 projects applied for the completion certificate out of which total 2944 projects got completion certificate.



**Table 5.19 Table showing details of Building Permission**

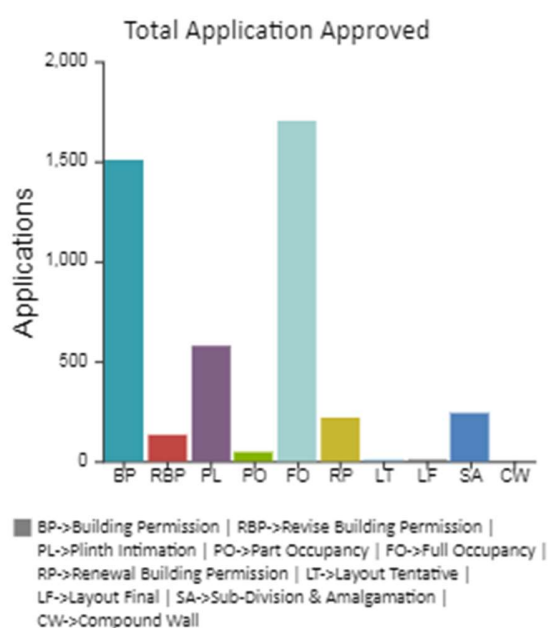
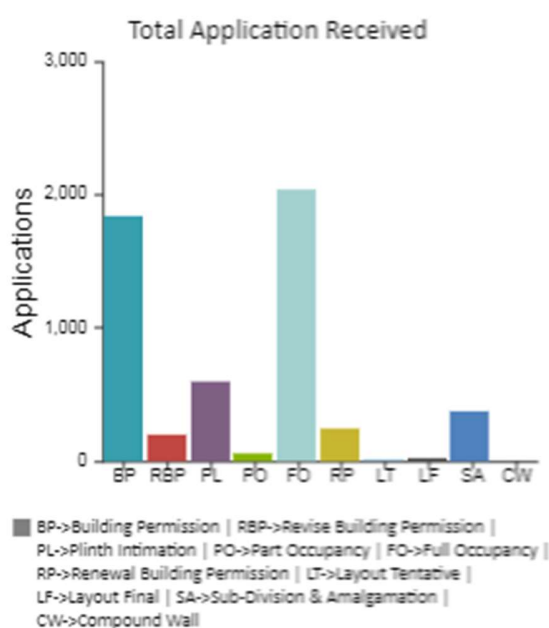
Sr. No.	Particulars	2015-16	2016-17	2017-18	Total
Details of building construction					
1.	Proposed projects	3145	3148	2399	9292
2.	Projects got permission	1527	2170	1924	5621
Details of project completion certificate					
3	Projects applied	1266	582	3391	5239
4	Projects got permission	700	225	2019	2944

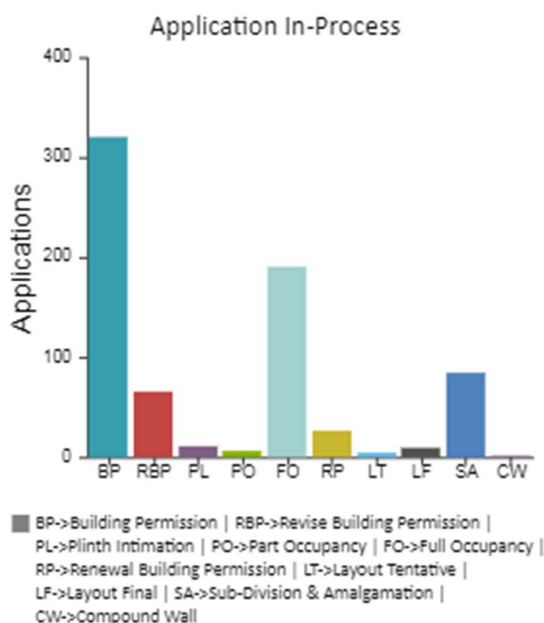
Source- Town planning Department, NMC

**Table 5.20 Showing details of Building Permission & completion certificate in 2021-22**

1.	Total Application Received	Total Application Approved	Application in process
2.	1841	1506	320

Source: <https://mahavastu.maharashtra.gov.in/index.php?para=bW9kdWxlPWdlbmVyYWwmYWN0aW9uPXN0YXRlX2xldmVsX2Rhc2hib2FyZCZkYXNoX3R5cGU9Qw==>





**Table 5.21 Online Approved Occupancy Permission (Period 1stApril to 31stMarch 2021)**

Sr. No.	Particulars	2017-18	2018-19	2020-21
<b>Details of building construction</b>				
1.	Proposed projects	888	4021	764
2.	Projects got permission	371	1406	390
<b>Details of project completion certificate</b>				
3	Projects applied	09	50	84
4	Projects got permission	04	09	56

**Source- <https://nmcobpas.in/> web Portal Town planning Department, NMC**

### 5.7 Slum Development in NMC

The general population lives in slums and there is shortage of good housing facilities, water supply, sanitation, and deficiency of basic necessities influence soundness of tenants including kids and ladies. Because of quick development of populace in NMC region, 159 nos. of slums in various areas were developed till 2021, of which 55 were declared as slums colonies, while



remaining 104 were undeclared. Add up to population in slums area is evaluated as 1,92,959. Particulars of slum in NMC region are given in Table 5.22.

**Table 5.22 Details of Slum in NMC area**

Sr. No	Detail	2018-19	2019-20	2020-21	2021-22
1	Number of slum	159	159	159	159
2	Slum Population	1,96,005	1,92,959	1,92,959	1,92,959
3	The number of declared slum colonies	47	55	55	55
4	The number of undeclared slum colonies	101	104	104	104
5	Population in the slum compared to the total population	14.73	12.98	12.98	12.98

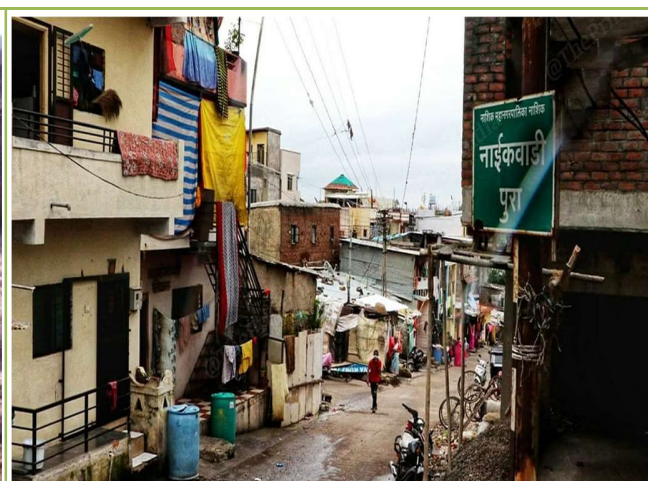
*Source: Slum Rehabilitation Department, Nashik Municipal Corporation*

### 5.8 Slum Rehabilitation Plan

The housing development is along the periphery of the town as well as along the activity nodes. As per 2011 census, there are 300000+ houses existing in Nashik. Most of the structures in Gaothan and congested area of Nashik are old. These slums are located in the core area. The housing conditions in these slums are poor.

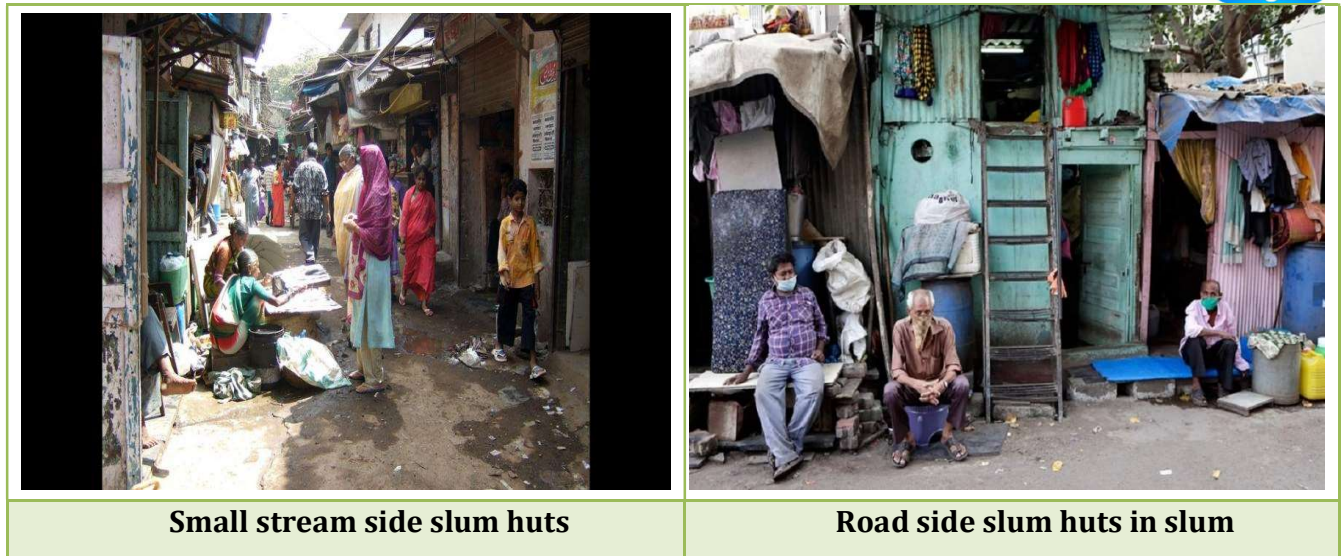


**Gutter side slum huts in Nashik**



**River side slum huts in slum**





**Fig 5.7 Different Location Of Slum Huts In Nashik Municipal Urban Area.**

### **5.9 Maharashtra Industrial Development Corporation Nashik (MIDC)**



There are various industries and industrial estates are coming up very fast in almost all parts of the Nashik. This city is considered as a fast growing one in the industrial sector. Nashik having its own wide history about industries and have developed many industrial zones in area like Satpur, Ambad, Approximately 10,000 industries are serving in Nashik including small, medium and large scale. The authorities in Nashik are very keen to provide basic infrastructure amenities for all industries at low affordable rates. Climatic and geographical characteristics of Nashik have been very helpful for the development of different industries in the city. Eight cooperative industrial estates are there to provide all the needed infrastructure amenities to the units for their establishment and functioning. The associations of industrialists in Nashik are very energetic and active. They are always there to help to solve the problems of the industrialist with positive approach. This helps for industrial growth in the district as well as to find market for the existing products. The district industries centre has been there to render all support under one platform to the energetic entrepreneurs for starting their own companies. Find below the details of various industries in Nashik.



There are two industrial area in Nashik.

- Ambad MIDC
- Satpur MIDC

Sr No	Name of the MIDC	Area In Ha	Total Project
1.	Satpur Nashik	635.73	1233
2.	Add. Ambad Nashik	515.50	1764

### 5.10 Heritage of NMC

Nashik was known as the place of learning and meditation in the days of Ramayana sacred pilgrimage groups now re-created it with new identity on the map of India. It is now known as the city developing agriculturally and industrially. The city is situated on Mumbai-Pune-Nashik golden triangle. Nashik city is fourth largest populated city of Maharashtra, and is famous for its wineries and industries.

#### A) Tourism

In order to improve the environment and biodiversity, NMC has developed 539 gardens on 1098068.44 Sq.m land and also built scenic green belt on road dividers, following norms of Tourism department.

Garden department has developed gardens in following zones:

Sr. No.	Name of Division	Total No. Garden	Area in sq. m.
1.	Nashik West	85	179336.86
2.	Nashik East	75	150250.05
3.	Nashik Road	127	242790.64
4.	New Nashik	88	177,825.55
5.	Satpur	46	187.308.00
6.	Panchwati	118	347,865.34
	Total	539	1098068.44

#### B) Tourism Development plan

Due to tremendous development in Nashik city during last few years, construction activities are observed in most of the part of the city. Special attention has been given towards protection of





natural resources in hills, forests etc. and rejuvenation of banks of rivers, nallahs etc. within the city.



**Tapovan**



**Kailas Math/ Bhaktidham**

**Fig 5.8 Major Religious Places in Nashik City**

### **Tapovan**

Tapovana or the Forest of Austerities is located hardly 1.5 km on the downstream of Panchwati on Godavari River. Once a part of the holy Dandakaranya forest, Tapovan is a pictorial spot and has a close association with the epic Ramayana. Lord Ram who is believed to have lived on fruits collected by Lakshmana from this forest. Besieged in the richness of lush greenery, Tapovan presents a tranquil ambience. At this place, Lakshmana cut the nose of Shurpanakha, the sister of Ravana. Therefore the city got its name Nashik. This sacred place has temples of Ram Laxmana. At the time of SinhasthaKumbhamela, majority of Sadhus camp at Tapovan.

### **Kailas Math/ Bhaktidham**

It is located in Panchwati area near Pethnaka. It is also called as Bhaktidham. It has temples of various deities. Kailas Math is a old religious ashram where Vedas are being taught. Established in the year 1920 by H.H.SwamiHridayanandMaharaj. The institution was headed by renowned Acharyas. Month long religious celebrations are held during month of Shravana.



**Shree Kalaram Mandir**



**Panchavati**

**Fig 5.9 Major Religious Places in Nashik City:**

### **Shree Kalaram Mandir**

Kalaram Mandir is situated within the Panchvati area of Nashik City. This temple is situated at a distance of 3 km from Central Bus stand. City buses and auto rickshaws are available from various corners of the city to reach the temple. This temple is supposed to stand on the spot where Lord Ram lived during his exile. It was built in 1782 by Sardar Rangrao Odhekar on the site of an old wooden temple. The temple has standing images of Lord Rama, Sita, Laxmana which are of black stone, and around 2 feet height. The Ramnavami festival is celebrated in Chaitra (March-April).

### **Panchvati**

Panchavati is situated on the left banks of sacred river Godavari in Nashik city. Close to Kalaram temple there are some very old and lofty banyan trees which are believed to sprang from five banyans which gave its name to Panchvati. The name 'Panchvati' is derived from the words Panch which means five and Vati which means banyan tree. This is the site where Sita Gumpah or Sita's Cave is situated. Kalaram temple, Kapaleshwar temple, Ganga Godavari temple, Sunder Narayan temple, Talkuteshwar temple, Nilkantheshwar Goraram mandir, Murlidhar Mandir, Tilbhandeshwar mandir, Balaji temple, Sandvyachidevi temple, Vitthal temple, Pataleshwar temple, Naroshankar temple, Ramkund, Karthikswami temple, Dutondyamaruti, Katya marcuti temple, Panchmukhi Hanuman temple, Bhadrakali temple, Katpurthala monuments are located in and around Panchavati area. Nashik has earned name of the Banaras of western India due to large number of temples.



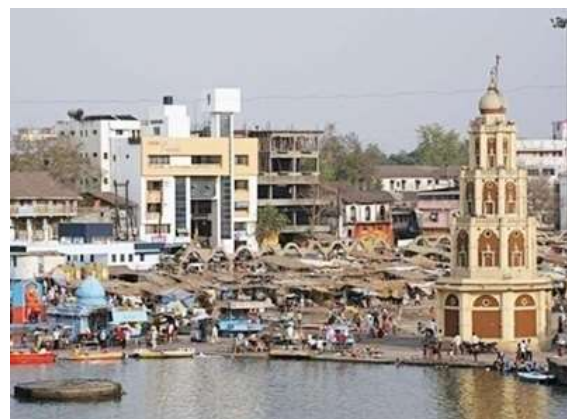
**Fig 5.10. Seeta Gumpha**

### **Seeta Gumpha**

Sitagumpha is situated in Panchawati area about 3 km away from the Nashik Central bus stand. It is said that Seeta stayed in this caves for some days during exile (Vanvas). The deities of Ram, Seeta and Laxman are placed inside the first main gumpha. In the second small gupha there is a Shivling. The main reason attributed for the Shivling is that Seeta used to worship God Shiva and she never took her meals before worshipping him. So for her convenience Shivling was placed in that gupha. It was in this cave that Lord Rama used to hide Sita when he had to leave her, and it was from herethat Sita was carried by Ravana disguised as a begger.



**Fig 5.11.(a)Ganga Godavri Temple**



**(b)Ramkund**



### **Ganga Godavari Temple**

This temple is adjacent to Ramkund. It was built in 1775 by Gopikabai Peshwe. Statue of Godavari and Bhagirath are placed inside the temple. The temple remains closed for 11 years, but opens on the day of Kartik Poornima (full moonlight) once in 12 years and kept open for a year in Simhastha period.

### **Ramkund Nashik**

Ramkund is located along the bank of Godavari River. This place is situated at a distance of 2 km from Central Bus stand. This is the holiest spot in Nashik as it is believed to be the place where Lord Rama used to bathe. It contains the bone dissolving AsthivilayaTirth. It was built by ChitraraoKhatav, a landholder of Khatav in Satara in 1696 and was repaired by Gopikabai, the mother of Madhavrao the fourth Peshva. People bring ashes of their deceased relatives and immerse it in Asthivilaykund. Ashes of big personalities like Pandit Nehru, Indira Gandhi, Y B Chavan and others had been immersed at Ramkund.

### **Kapaleshwar Temple Nashik**

Kapaleshwar is among the very oldest temple in Nashik city located near Ramkunda, Panchavati. It is about 2 KM from CBS towards North-East. This Temple was renovated by "Peshwas". The story behind it is that lord Shiva by mistake killed a cow ("GOHATYA"). To clean his sin, the Nandi told him to go to NASHIK and take a bath in Ramkund. As per Nandi's instruction, Lord Shiva came at NASHIK and cleaned his sin by taking a bath in RAMKUND. And after that he did some JAP, the place where now the Temple is located. You can also observe that this particular Shiva temple don't have any NANDI because NANDI suggested to Lord Shiva about the taking bath in RAMKUND for cleaning his sin, and because of this Lord Shiva adopted Nandiji as his Guru. At every Monday and at PRADOSH 6.30 PM, there is a Pooja at RAMKUNDA GANGA GHAT of Shree Kapaleshwar Mandir. Many people come for Darshan in this Mandir daily. Many people arrange Shree Satyanarayan Pooja in the month of Shravana here. Some people make 101 pradakshina to this mandir to complete their wishes. 57 There are also Shree Ganesh Mandir, Maruti Mandir, Gayatri Devi Mandir near Kapaleshwar Mandir.





**Kapaleshwar Temple**

**Fig 5.12 Kapaleshwar Temple**

## **Summary**

### **Review of Environmental & Socio-economic status -**

To prepare environmental status report collected by primary and secondary information from economic, industrial development corporation and government offices of Nashik municipal corporation.

The aim to create a report that ensure sustainable environmental conditions, sound economic and social life. Social changes create stress on environmental elements and population growth. Educational facilities, electrical vehicles, highways, bridges, private vehicles, slum eradication and rehabilitation, tourism temple, all those factors are directly or indirectly affect our environment. The quality of life is influenced by following indicators as follows:

employment generation, work state, home, food, clothing, drinking water, sanitation, health, quality, energy, communication, transportation, education, environmental pollution, entertainment, increase in social security and human rights, industrial growth, vehicular use. Nashik is a big industrial township. Due to growing industrialization and vehicular usage results in increased air, noise and water pollution.



## **R - Response**

- 1) To conduct the activities for awareness and cleanliness of the city.
- 2) Various activities organized for environmental conservation and protection.
- 3) Organization of various educational environmental programs in schools.
- 4) Green cities initiatives for NGO's with the help of CSR extermination of carry bags and plantation of trees.

## **Proposed measures**

- 1) Arrangement of periodic programs on environmental development.
- 2) Building of the private toilets by government as an initiative to keep the city clean.
- 3) Latest community toilets/public toilets are being repaired and improvement programs also started.
- 4) In slum area, provision for sewer network.

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## Chapter 6

### Electricity Generation and Energy Saving

#### 6.0 Introduction

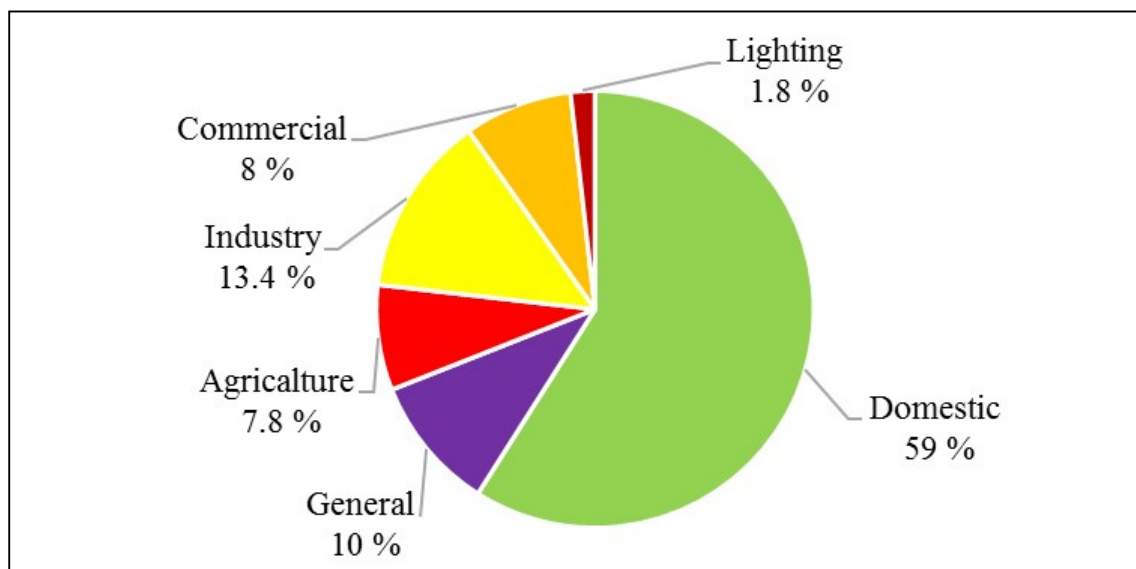


Presently Maharashtra State Electricity Distribution Co. Ltd. (MSEDCL) supplies electricity for regular use in NMC area (**Table 6.1**). Comparatively, use of wind and solar energy is negligible. Similarly use of CNG in vehicles is less as compared to petrol and diesel. Eklahare Thermal Power Plant located in village Eklahare, near Nashik Road, caters to the power demand in the western division grid which is subsequently distributed to substations and finally to households.

**Table 6.1 - Power consumption (MW) in previous years**

Years	2009-10	2010-11	2011-12	2012-13	2013-14
No. of consumers	158900	163980	209120	258980	310443
Power in Residential (MW)	140	157	179	209	228
Power in heavy industries (MW)	220	245	271	298	327
Power in light Industries (MW)	26	29	33	39	47
Power in Commercial (MW)	35	39	44	51	60
Power in Other (MW)	18	20	24	31	41
Total load	439	490	551	622	703
Load Growth (KW)	10.6	11.6	12.44	12.88	13.02

**Source: - Electrical Department of NMC**



**Fig 6.1- Consumption of power in different sectors**

From above **fig 6.1**, it is seen that power consumption in heavy industries has increased considerably.

#### **D-Driving Force**

1. Increase in population
2. Increase in no of high energy consuming equipments & machineries due to high standard of living
3. Modern lifestyle

#### **P-Pressure**

Use of model equipments (**E.g.-AC, Dish Washer, Heater**), increases use of energy which results in loss of natural resources.

#### **S-Status**





## 6.1 Energy

It is observed that, every year there is increasing demand of electricity. Maximum usage of electricity is in Residential area. Consumption of electricity in Nashik area is presented in **Tables 6.2.**

**Table 6.2 - Sector –wise Electricity Consumption Source- MSEDCL, Nashik-2021-22**

Month	Nashik East	Nashik West	Satpur	New Nashik	Nashik Road	Panchavati	Total Rupees.
Apr-21	263510	384928	347968	562122	372497	969532	<b>2900557</b>
May -21	273118	235217	358695	459464	350977	533646	<b>2211117</b>
Jun-21	271263	314920	778073	524956	366822	496289	<b>2752323</b>
Jul-21	277160	203906	457563	453485	308036	769725	<b>2469925</b>
Aug-21	270166	213374	266422	475995	265650	521688	<b>2013295</b>
Sep -21	257847	204096	280089	487107	318909	514710	<b>2062758</b>
Oct -21	280452	214620	256207	490834	330116	525477	<b>2097706</b>
Nov -21	233282	245803	355497	524079	455384	528151	<b>2362196</b>
Dec -21	258451	247341	272089	539347	290076	542956	<b>2150260</b>
Jan -22	248844	234683	293070	476533	365465	538995	<b>2157590</b>
Feb-22	267010	193394	275520	438948	334519	482678	<b>1992069</b>
Mar-22	167396	125491	287446	421563	337889	503670	<b>1843455</b>
Total Rupees	<b>3118499</b>	<b>2817773</b>	<b>4228639</b>	<b>5854433</b>	<b>4060390</b>	<b>6927517</b>	<b>27013251</b>

**Source: - Electrical Department of NMC**

**Table 6.3 Use Of electricity Area-wise**

Sr. No.	Area	Total no. of Units
1	Residential	-
2	Commercial	-
3	Industrial	-
4	LED	<b>27013251</b>
5	Water Supply	-
6	etc	-
7	Agriculture	-
8	Daily use of electricity	-
Total		<b>27013251</b>



**Table 6.4 - Electricity use of Nashik Municipal Corporation building.**

**(Year-April- 2021 to March-2022)**

Sr. No.	Years	Total Unit (KVAH)
1	April 2021- March-2022	238282

**Source- Electrical Department of NMC**

**Table No 6.5 Current Status of electrical Crematorium**

Area/Office	Electric	Gas	Diesel	APC System
Satpur	-	-	-	-
Panchvati	-	-	-	-
East	-	-	-	-
Cidco	-	-	-	-
West	01	-	-	-
Nashik Road	-	-	-	-
<b>Proposed electrical Crematorium</b>				
Satpur	-	-	-	-
Panchvati	01	-	-	-
East	-	-	-	-
Cidco	01	-	-	-
West	-	-	-	-
Nashik Road	02	-	-	-

**Source- Electrical Department of NMC**

## 6.2 Street lighting

Major functions of electrical Department are providing street light facility on Municipal Roads, Gardens, Public Places, and Jogging track. Street light department is decentralized in 6 divisions for maintenance purpose (Table 6.6). There are 95800 no. of LED in Nashik NMC has installed a number of high mast in various Chowks of city to facilitate cross over traffic during night hours.

**Table 6.6 - Details of LED Street light-2021-22**

Sr. No.	Division	Saving	Total no. of LED
1	<b>Satpur</b>	-	13812
2	<b>Panchavati</b>	-	22066
3	<b>Nashik East</b>	-	12446
4	<b>New Nashik</b>	-	19402



5	<b>Nashik West</b>	-	8942
6	<b>Nashik Road</b>	-	15526 + Add. Qty (3606)
Total		-	95800

**Source- Electrical Department of NMC**

Taking into view regarding energy crisis in the state and at National level, NMC has taken up the project of energy saving in streets lights from the year 2003-2004. NMC has installed energy saving technique for street lights in all six divisions. Out of 1610 metering point, so far NMC have installed 650 energy saver panels. The average savings achieved by this energy saving technology 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.

**Table 6.7 - Nashik Municipal Corporation Renewable Energy Projects-2021-22**

Solar water heater	-
Photovoltaic system	<b>476.18 KWP</b>
Solar Traffic signals	<b>41 Signals</b>
Solar Blinkers	-
Solar air-conditional system	-
Bio-mechanization Plant	-

As per **DPSIR** 'Total Energy Consumption' indicator aims to reduce overall energy consumption. By reducing the amount of electricity that we consume, we can reduce emissions of greenhouse gases and help stop global warming. Electricity consumption impacts air quality and greenhouse gas emissions.

### Summary



By considering growth of the city in future, there may be stress on present power generation & energy resources. The device measures the area of electricity and energy saving solution as well as the need to raise awareness. The use of renewable energy sources is necessary for it to reduce stress.

### I-Impact

1. Growing population leads to increased use of energy, resulting in declined trend in natural resources.
2. Due to increase in vehicles, there is an enormous demand for fuel that ultimately enhances air and noise pollution load.
3. Rising demand of energy and less availability of natural sources enhances the cost of energy.
4. Problems are often created towards protection, conservation, regulation, distribution, determining uniform rates and transportation etc. of natural sources (oil, diesel, petrol, coal) throughout the country.

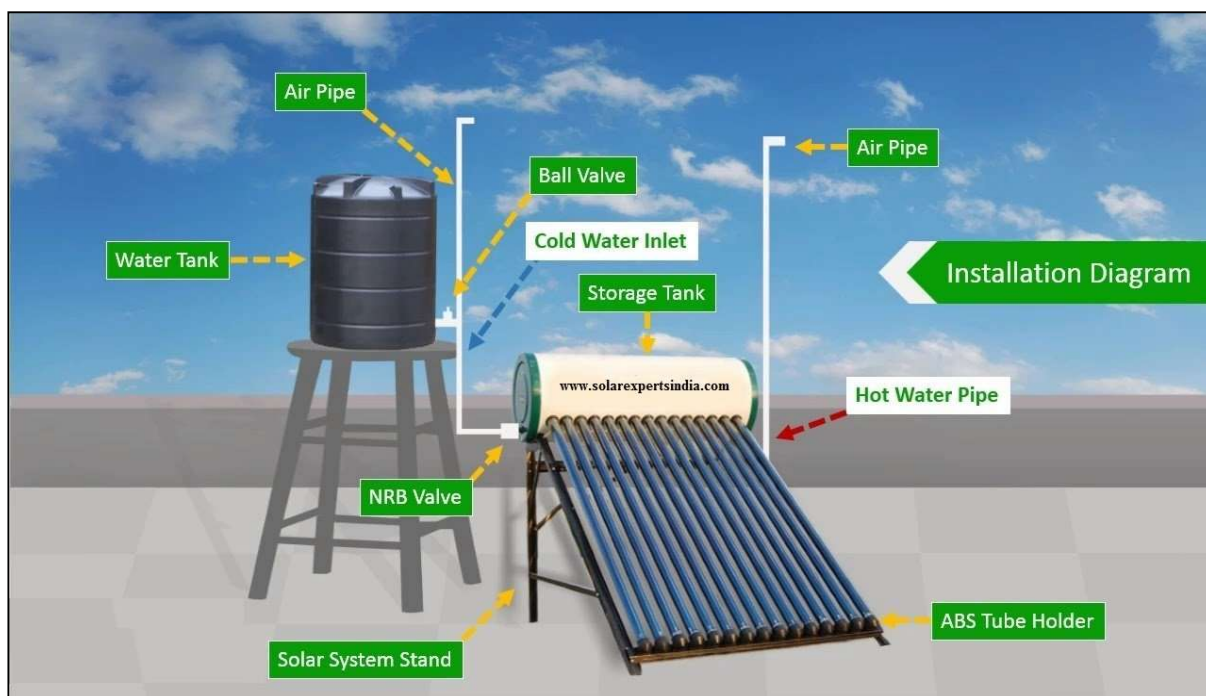


Fig 6.2 - Solar Water Heater



## R-Response

- Inductor fittings are being used for energy saving method at different places in NMC area. And LED fitting is being implemented on roads and at slum areas on experimental basis.
- Energy efficient lamps are used for street lighting.
- Energy efficient T-S tube lights and Bureau of Energy Efficiency approved Fans are used in NMC buildings.
- There is a need to develop awareness towards saving of energy.
- In an over whelming response, energy is being saved in developing new projects.
- Use of solar energy has been made mandatory for giving permission to construct building of over 4000 sq. m area. Accordingly, solar heaters are in use in large residential buildings (Fig 6.2).
- Water supply and drainage pumping station energy audit done in Nashik city.
- LED fittings arranged for all street lights.

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## Chapter 7

# Health and Environment

### 7.0 Introduction

The interaction between the earth and human well-being are very unpredictable and hard to survey. The best-known well-being impacts are identified with encompassing air contamination, poor water quality and deficient sanitation.



According to an examination by WHO, ecological variables are in charge of spreading over 80% of the ailments. Ailments with the biggest mortality rate include respiratory contaminations, Dengue and Malaria.

The status of health of residents is one of the most crucial indicators of the environmental status of a city. But in addition to good environmental conditions, a city also needs to have good healthcare facilities. The following section presents the status of various diseases recorded in NMC in the year 2021-22 and the actions taken in the sensitive wards in NMC area.

#### **D - Driving Forces**

1. Pollutants in surrounding Environment
2. Total Birth rate
3. Growth rate of population
4. City development rate
5. Health awareness
6. Health and cleanliness related awareness
7. Employment rate
8. Population under poverty
9. Social



## P - Pressure

Frequency of Solid waste collection in residential area.

### 7.1 Health Care Facilities in NMC Area



Nashik Municipal Corporation has diverse health care services and facilities including Clinics, Hospitals, Super Specialty Hospitals, Private and Government dispensaries and so on. In Nashik, there are 4 municipal hospitals, 5 municipal nursing homes, 30 municipal dispensaries & primary health centers, along with 1 leprosy unit and 11 leprosy centers. All medical facility centers are equipped with necessary aid for emergency cases. It has recently introduced the service of super specialty wards at hospitals with the help of private operator. There are plenty of private hospitals and government hospitals in the city which are equipped with the latest instruments and specialist doctors. Given below is the list of current health care facilities of Nashik Municipal Corporation as in **Table 7.1**.

**Table 7.1 -Public Health Department Services in Hospitals of Nashik City**

Sr. No.	Name of Hospital	Total no. of Beds	Solar powered fans, lamps, etc.	Sewage treatment system present Yes/ No	Water Reuse/ Recycling	Quantity and Disposal of Biomedical waste
1	J.D.C Bytco Hospital, Nashik Road	200	Solar Water Heater Installed	No	No	M/s Water Grace Product is collecting biomedical waste from all hospitals and disposing it through incineration near Kannamwar Bridge, Dwarka, Nashik
2	Dr. Zakhir Hussain Hospital, Kathda, Nashik	100	Solar Water Heater Installed	No	No	
3	Indira Gandhi Hospital, Panchvati, Nashik	60	Solar Water Heater Installed	No	No	
4	Shri Swami Samarth Hospital, Morwadi, CIDCO, Nashik	40	Solar Water Heater Installed	No	No	

*Source: Health Department, Nashik Municipal Corporation*





Also, Nashik Corporation provides preventive and treatment services to the citizens. Preventive services include following:

1. Vaccination
2. Pulse Polio Program

*According to the indicators given by DPSIR, health care is an important indicator and its objective is to improve health conditions. Health care indicator costs are linked to social, economic and environmental conditions in a city. Improving the health of people as well as of the environment is necessary for sustainable economic growth, and is a precondition for reducing poverty.*

**Table 7.2 - Health care facilities available in NMC area (2020-2021)**

Sr. No	Type of Medical Establishment	Nos.
1	Total no. of beds available	12715
2	Private nursing homes, Maternity & Hospitals	588
3	NMC Hospitals	04
4	Municipal nursing homes	08
5	Dispensaries & City primary health center	21
6	Mobile dispensaries	00
7	Sonography centers	329
8	Govt. hospitals	02
9	ESIC hospitals	01
10	ISP hospitals	00
11	Immunization center	34
12	Aids center	01
13	Gov. Recognized MTP center	182
14	Family planning centers	55 Pvt. + 9 Gov. = 64
15	Leprosy unit	09
16	Leprosy center	01
17	Medical centre	00
18	Vaccination centre	34

**Source- Health Department, NMC.**



## 7.2 Patient information in the Nashik city

Sources of different diseases along with the no. of patient and death record are given in Table 7.3.

**Table 7.3 - Details of Patients in Nashik city**

Sr. No.	Source	Condition/Disease	No. of Patients		No. of Deaths	
			2020-21	2021-22	2020-21	2021-22
1	Mosquito	Malaria	01	3	0	0
		Dengue	420	1177	0	0
2	Water	Gastro	08	09	0	0
		Jaundice	30	15	0	0
		Inflammation of the stomach and intestines	0	0	0	0
		Typhoid/Typhoid fever	318	175	0	0
3	Physical relations	AIDS	41	11	0	0
		S.T.D.	0	0	0	0
4	Air	Respiratory Disease	8446	105	1	0
		Swine Flu	6	143	0	10
		Chicken Guinea	347	0	0	0
5	Other	Heart Attack	4402	47	4	1
		Brain Disease (Meningitis)	0	0	0	0
		Cancer	3	4	0	0
		Total Natural Death	-	0	12765	24479
		Total infant mortality	-	0	93	0
		Corona virus	112468	160310	1143	2962

**Sources - Health Department, NMC**

### Nashik Municipal Corporation contains

- Registered Private nursing homes, Maternity & Hospitals -588 number.

## 7.3 Communicable Diseases

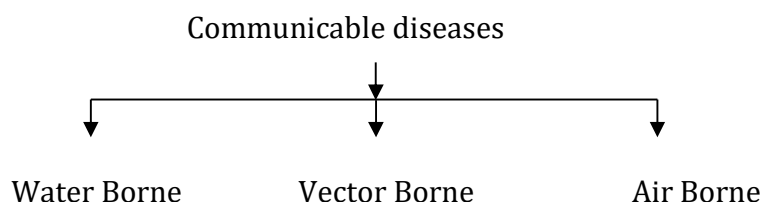
Communicable diseases are the state of unhealthiness caused by microorganisms and are transmitted from an infected person to others. These diseases are largely transmitted by direct or indirect contact with an infected person. They can spread due to air-borne bacteria or viruses i.e. they get expelled from the nose and mouth of the infected person and inhaled or ingested by anyone in close proximity, or physical contact with an infected person's bodily fluids.



Some well-known examples of such diseases can be the common flu or influenza, chicken pox, measles, mumps and the endemics like HIV/AIDS and Ebola.

Communicable diseases can be classified based on various causative agents, the clinical syndrome, or the mode of transmission. Usually all 3 characteristics are used (e.g. food borne, enteric bacteria gastroenteritis). Responsible agents include helminthes, protozoa, bacteria, fungi and viruses. Examples of diseases caused by bacteria are Pneumonia and gonorrhea. Measles and Ebola are caused by viruses as pathogens. Protozoan infections can cause parasitic diseases. Certain fungal infections (e.g. histoplasmosis) are also transmittable.

Depending on the mode of transmission, communicable diseases are categorized into:



### 7.3.1 Water Borne diseases

Water borne diseases are the diseases caused by contaminated drinking water at its source or in the distribution system, or by direct contact with recreational waters. Waterborne diseases result from ingestion of water which contains pathogenic microorganisms or chemicals. Gastroenteritis, diarrhea, hepatitis and typhoid are some of the commonly occurring water borne diseases/ conditions in Nashik city. The status of the patients whose death occurred due to water borne disease is presented above in **Table No. 7.3**

As seen in the table there is a continual and remarkable decrease in all the water borne diseases however, in the year 2021-22 the number of cases for gastroenteritis registered an decrease by 09 patients. Norovirus is known to cause gastroenteritis and commonly occurs due to consumption of contaminated food and water. Norovirus is contagious and may be caused upon being in contact with an infected person.



### **7.3.2 Vector borne diseases**

Vectors are life forms that transmit pathogens and parasites from one infected individual (or creature) to another, causing illnesses in human population. These maladies are usually found in the locales where there is no access to safe drinking-water and sanitation framework. As indicated by WHO, Vector-borne diseases ailments represent 17% of the assessed worldwide weight of every single irresistible illness, with dengue and intestinal sickness at the highest priority on the rundown.

#### **Malaria**

Malaria, a parasitic infectious disease, is transmitted by mosquitoes which breed in fresh or occasionally brackish water. The species of Plasmodium, a casual parasite of malaria resides in the body of Anopheles mosquito, which acts as a vector in transmission of the malarial infection is showing the no of the patients in 2021-22, while no deaths occurred due to malaria.

#### **Dengue**

Dengue fever, also known as break bone fever, is a tropical disease caused by the dengue virus. The *Aedes sp.* of mosquito acts as the vector for transmission of dengue infection. Symptoms of Dengue include fever, headache, muscle and joint pains, and characteristics of skin rash that is similar to measles. Dengue and dengue hemorrhagic fevers could be prevented by following good practices like managing water containers and avoiding accumulation and stagnation of freshwater in and around houses. Significant number of dengue patients was found in 2020-21 which gradually increased in 2021-22. As per table 7.3 zero deaths occurred in 2020-21 and zero death occurred in 2021-22.

#### **Preventive measures**

1. Proper management of the water resources would ultimately lead to clean and healthier environment.
2. Disinfecting of the city's water supply.
3. Chemical spraying and fumigation of the breeding sites.
4. Direct surveys by visiting the patient's home, collecting blood samples and providing medication.



5. Indirect surveys by examining the blood samples of the patients suffering from fever and visiting the primary health care centers, women and child hospitals and other government hospitals.
6. Awareness to the public about disinfection of the water using house method like boiling and filtration.

### 7.3.3 Air Borne Diseases

Airborne diseases are caused by pathogens that are transmitted through the medium of air. As per Directorate General of Health Services, Ministry of Health & Family Welfare, Government of India, TB (Tuberculosis), respiratory diseases and swine flu are considered as the prototypic disease of airborne transmission. TB causing bacteria spread from person to person through tiny microscopic droplets when a TB patient coughs, sneezes, speaks, sings, or laughs. TB is caused by Mycobacterium tuberculosis that affects the lungs and the condition is known as pulmonary tuberculosis whereas when the infection is outside the lungs and affects other internal body parts it is known as extra pulmonary tuberculosis.

**Swine flu** is a respiratory disease caused by influenza viruses that infect the respiratory tract of pigs and result in a barking cough, decreased appetite, nasal secretions, and listless behavior; the virus can be transmitted to humans. Swine flu viruses may mutate (change) so that they are easily transmissible among humans. Symptoms of swine flu in humans are similar to most influenza infections: fever (100 F or greater), cough, nasal secretions, fatigue , and headache. Swine flu is contagious from about one day before symptoms develop to about five to seven days after the onset; some patients may be contagious for a longer time span. After getting infected, the person will come down with the flu symptoms in 4-6 days.

In the year 2021-22 death recorded due to respiratory diseases and swine flu were 10 and 0 respectively. It is shown in table 7.3.

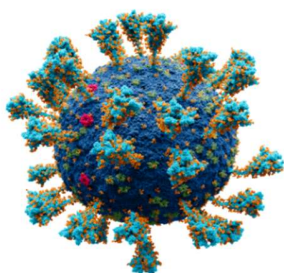


### **Health services and facilities provided by NMC:**

Nashik Municipal Corporation regularly carries out the following measures for the well-being of citizens:

- 24 hour ambulance
- TB eradication programme
- Management & control of communicable diseases
- AIDS detection and guidance centre
- Registration of private practitioners, sonography center and hospitals
- Action against unauthorized practitioners
- Sterilization of stray dogs
- Malaria/Dengue detection, prevention and control Program

### **7.4 COVID 19 (Corona virus disease)**



Coronavirus disease also known as COVID-19, which originated in the Wuhan, Hubei Province, People's Republic of China (PRC), has spread to all parts of the world. COVID-19 is caused by severe acute respiratory syndrome corona virus 2 (SARS-CoV-2). The first known case was identified in Wuhan, China, in December 2019. The disease has since spread worldwide, leading to an ongoing pandemic.

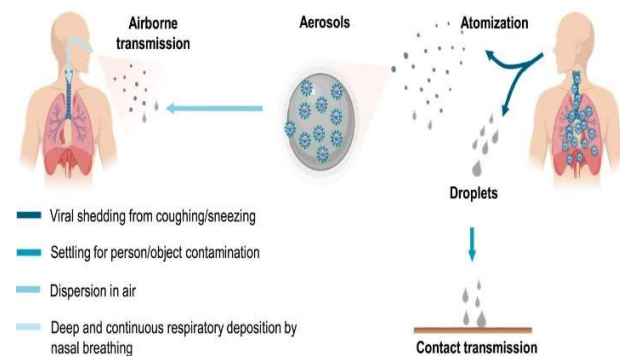
Symptoms of COVID-19 are variable, but often include fever, cough, headache, fatigue, breathing difficulties, and loss of smell and taste. Symptoms may begin between one to fourteen days after exposure to the virus. At least a third of people who are infected do not develop noticeable symptoms than the people who develop symptoms noticeable enough to be classed as patients, most (81%) develop mild to moderate symptoms (up to mild pneumonia), while 14% develop severe symptoms (dyspnea, hypoxia, or more than 50% lung involvement on imaging), and 5% suffer critical symptoms (respiratory failure, shock, or multiorgan dysfunction). Older people are at a higher risk of developing severe symptoms. Some people continue to experience a range of



effects (long COVID) for months after recovery, and damage to organs has been observed. Multi-year studies are underway to further investigate the long-term effects of the disease.

## Transmission

The virus can spread from an infected person's mouth or nose in small liquid particles when they cough, sneeze, speak, sing or breathe. These particles range from larger respiratory droplets to smaller aerosols.



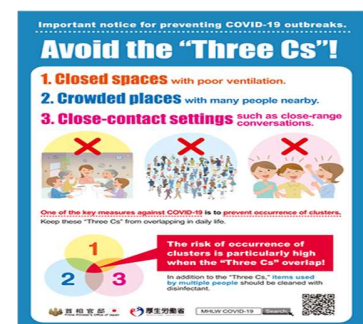
Current evidence suggests that the virus spreads mainly between people who are in close contact with each other, typically within 1 meter (short-range). A person can be infected when aerosols or droplets containing the virus are inhaled or come directly into contact with the eyes, nose, or mouth.

The virus can also spread in poorly ventilated and/or crowded indoor settings, where people tend to spend longer periods of time. This is because aerosols remain suspended in the air or travel farther than 1 meter (long-range).

People may also become infected by touching surfaces that have been contaminated by the virus when touching their eyes, nose or mouth without cleaning their hands.

The “**Three C’s**” help us to further more understand the setting in which transmission of the COVID-19 virus happens more easily:

- ❖ **Crowded places.**
- ❖ **Close-contact settings (especially where people have conversations very near each other)**
- ❖ **Confined and enclosed spaces with poor ventilation.**



## Signs & Symptoms

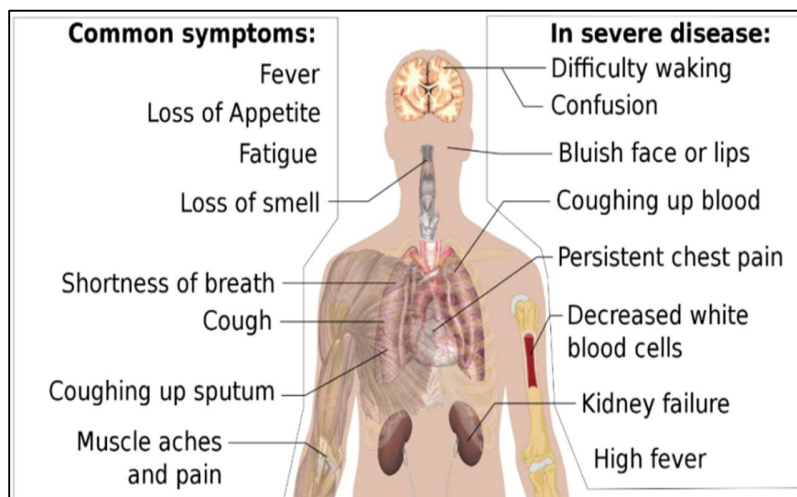




Symptoms of COVID-19 affect different people in different ways. Most infected people will develop mild to moderate illness and recover without hospitalization.

### Common symptoms include:-

- ❖ Headache
- ❖ Loss of smell
- ❖ Taste
- ❖ Nasal congestion
- ❖ Runny nose
- ❖ Cough
- ❖ Muscle pain
- ❖ Sore throat
- ❖ Fever
- ❖ Diarrhea
- ❖ Breathing difficulties



### Impact of COVID-19 in India.

India, with a population of more than 1.3 billion will have difficulty in controlling the transmission of severe acute respiratory syndrome corona virus among its population.

The Ministry of Health and Family Welfare of India has raised awareness about the recent outbreak and has taken necessary actions to control the spread of COVID-19. The central and state governments are taking several measures and formulating several wartime protocols to achieve this goal. Moreover, the Indian government implemented a 55 days lockdown throughout the country that started on March 25<sup>th</sup>, 2020, to reduce the transmission of the virus. This outbreak is inextricably linked to the economy of the nation, as it has dramatically impeded industrial sectors because people worldwide are currently cautious about engaging in business in the affected regions. Owing to this Nashik was also affected.



## Scenario of COVID-19 in Nashik Municipal Region

From March 20, 2020 Chief Minister of Maharashtra announced a 2 day lockdown further to this Central Government announced a nationwide lockdown.

In Nashik, the first case of COVID-19 was reported on 29<sup>th</sup> March, 2020. As of that further the number of cases gradually started increasing. Over the month of April, State Government declared emergency, directed closure of schools, colleges, malls, gyms, cinema halls and other public places. The State government issued necessary advisories and guidelines. State helpline numbers were established. The Nashik Municipal Corporation followed the trace-test-treat principle to contain the spread of corona virus. Designated COVID-19 care Centers, hospitals, laboratory facilities were established by the Nashik Municipal Corporation. Schools, hotels and public halls were turned into quarantine Centers.

### Prevention & Control (Personal Level)

#### To prevent the spread of COVID-19:

- ❖ Maintain a safe distance from others, even if they don't appear to be sick.
- ❖ Wear a mask in public, especially indoors or when physical distancing is not possible.





- ❖ Choose open, well-ventilated spaces over closed ones. Open a window if indoors.
- ❖ Clean your hands often. Use soap and water, or an alcohol-based hand rub.
- ❖ Get vaccinated when it's your turn. Follow local guidance about vaccination.
- ❖ Cover your nose and mouth with your bent elbow or a tissue when you cough or sneeze.
- ❖ Stay home if you feel unwell.

If you have a fever, cough and difficulty breathing, seek medical attention. Call in advance so your healthcare provider can direct you to the right health facility. This protects you, and prevents the spread of viruses and other infections.

### Masks

- ❖ Properly fitted masks can help prevent the spread of the virus from the person wearing the mask to others.
- ❖ Masks alone do not protect against COVID-19, and should be combined with physical distancing and hand hygiene.
- ❖ Follow the advice provided by your local health authority.



### Covid-19 Cases

**Table No: - Details of Covid-19 Cases in Nashik city  
(1st April-2021 to 30th March-2022)**

Sr. No.	Source	Condition/Disease	No. of Patients	No. of Deaths
			2021-22	2021-22
1	Covid-19	Corona virus 2 (SARS-CoV-2)	160310	2962

*Source: Health Department, Nashik Municipal Corporation*



## Vaccination

India began administration of COVID-19 vaccines on 16 January 2021. As of 25 September 2021, India has administered over 849 million doses overall, including first and second doses of the currently-approved vaccines.



India initially approved the Oxford–AstraZeneca vaccine (manufactured under license by Serum Institute of India under the trade name Covishield) and Covaxin (a vaccine developed locally by Bharat Biotech). They have since been joined by the Sputnik V (manufactured under license by Dr. Reddy's Laboratories, with additional production from Serum Institute of India being started in September), Moderna vaccines, Johnson & Johnson vaccine and ZyCoV-D (a vaccine locally developed by Zydus Cadila) and other vaccine candidates undergoing local clinical trials.

**Table No: - Details of Covid-19 Vaccinations in Nashik city  
(1<sup>st</sup> April-2021 to 30<sup>th</sup> March-2022)**

Sr. No	Name of the Vaccines	1 <sup>st</sup> Dose	2 <sup>nd</sup> Dose	Booster Dose	Total Doses
1	Covishield	1156602	898662	26079	2081343
2	Covaxin	164573	157712	9182	331467
<b>Total</b>		<b>1321175</b>	<b>1056374</b>	<b>35261</b>	<b>2412810</b>

**Source: Health Department, Nashik Municipal Corporation**

## Recommendations

- State should design and fund major public works programs and the corporation should help implement them.
- These should be in rural areas, namely road building, digging up ponds, tree planting, engaging workers in the PM's nation-wide affordable housing program, seriously think about easy to set-up agro-based small scale industries, solar paneling where needed; and so on;



- Lots of jobs in the cities, in all likelihood may not come back, hence creating employment opportunities in the village is key. Agro-based industrialization will have major backward and forward linkage and will be very beneficial to the rural areas.

### **Future Perspective**

Infections caused by these viruses are an enormous global health threat. They are a major cause of death and have adverse socio-economic effects that are continually exacerbated. Therefore, potential treatment initiatives and approaches need to be developed. First, Nashik, is taking necessary preventive measures to reduce viral transmission. Second, ICMR and the Ministry of AYUSH provided guidelines to use conventional preventive and treatment strategies to increase immunity against COVID-19. These guidelines could help reduce the severity of viral infections in elderly patients and increase life expectancy.

Nashik Municipal Corporation has attempted to broaden its research facilities and shift toward testing the mass population, as recommended by medical experts in India and worldwide.

### **Conclusion**

Further to conclude, the emergence of new, infectious, global threats in the past 4 decades (e.g. AIDS, avian influenza A/H5N1 and SARS) has reshaped thinking at both national and international levels on the nature and level of public health responses needed for these threats. The International Health Regulations (2005) have emphasized that all countries are at risk from new infections and therefore need to collaborate on information sharing and data exchange when they occur. In the current age of immediate and ongoing access to world-wide digital information, there are high expectations globally that everything is being done to detect and control an emerging disease threat. Uncertainties as to how a newly discovered disease is going to evolve means that preparations have to be determined at both the national and the global level.

### **7.5 Non –Communicable Disease**

Diseases which by definition are non-infectious and non-transmissible to other people are called non- communicable diseases. NCDs may be chronic diseases of long duration and slow



progression or they may result in more rapid death, such as some types of sudden stroke.

It includes diseases like heart disease, stroke, cancer, asthma, diabetes, chronic kidney disease, osteoporosis, Alzheimer's disease, cataract, etc.

*According to the indicators given by **DPSIR**, health service is an important indicator and its objective is to improve health conditions. Health service indicator costs are linked to social, economic and environmental conditions in a city. Improving the health of people as well as of the environment is necessary for sustainable economic growth, and is a precondition for reducing poverty.*

### 7.5 Veterinary Department

For animal health care in NMC, veterinary doctors are available (Table 7.5). The NMC takes care of the health of stray dogs by vaccinating them against various diseases.

#### Steps taken to control on-street and rover dogs-

To control stray dogs in city, Nashik Municipal Corporations Veterinary Department catches these dogs after the complaints received from citizen. These dogs are freed again on the same place, after spaying and neutering them.

**Table 7.5 Activities for Veterinary Section**

Mentioned activities of Veterinary Dept.		
Sr. No.	Current	Proposed
1	Animal birth control (A,B,C Program) in stray dogs	More number of A,B, C Centers in city town to reduce unwanted dog population
2	Pet cemetery working	Starting of pet incinerator machinery
3	Disposal of large animal carcasses	Disposal of chicken waste, market and fish waste in scientific manner

**Source- Animal Husbandry Department, Nashik Municipal Corporation.**

### Summary

- Good Health is essential for sustainable economic growth and reduces poverty and improves people's health environment.
- Transformed ecosystem research component of the World Health Organization, 80 percent of this is because of the spread of diseases.





- Health service facilities
  1. Vaccination
  2. Pulse Polio programme
  3. Eye Examination
  4. Infectious Disease
  5. Water Sickness
  6. Preventive Measures
  7. Ambulance
  8. Tuberculosis Eradication
  9. Management And Control Of Infectious Diseases
  10. Aids Detection And Guidance
  11. Non Infectious Disease
  12. Veterinary Department
  13. Dog Vaccination And Sterilization

## R - Response

Different activities are conducted in Nashik by Nashik Municipal Corporation by medical department.

नाशिक महानगरपालिकेच्या वतीने कोरोना संदर्भात सर्व प्रकारची माहिती नागरिकांना मिळावी यासाठी खालील हेल्पलाईन नंबर सुरू करण्यात आले आहेत

राजीव गांधी भवन मुख्यालय कोरोना हेल्पलाईन नंबर :

- General helpline: 9607432233
- Central Hospital Bed Reservation System: 9607623366
- Landline: 0253-2317292

विभागीय कार्यालय कोरोना हेल्पलाईन नंबर :

विभागीय कार्यालय	वॉररूम संपर्क क्रमांक
नाशिक पूर्व	०२५३ - २९४५२९५
नाशिक पश्चिम	०२५३ - २५७०४९३
पंचवटी	०२५३ - २५९३४९०
नाशिक रोड	०२५३ - २४६०२३४
नवीन नाशिक	०२५३ - २९४७२९५
सातपुर	०२५३ - २३५०३६७

NASHIK MUNICIPAL CORPORATION नाशिक महानगरपालिका, नाशिक @my.nashikms @my.nimc | www.nimc.gov.in

नाशिक महानगरपालिका, नाशिक

काही महत्वाचे दूरध्वनी क्रमांक आपल्याकडे असणे गरजेचे आहे.

- १) हॉस्पिटल बेड बुक करण्यासाठी:  
+९१-९६०७६२३३६६
- २) नाशिक महानगरपालिके संदर्भातील माहितीसाठी:  
+९१-७०३०३०३००
- ३) हॉस्पिटल बिलासंदर्भातील तक्रारीसाठी:  
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- ४) कोरोना संदर्भातील इतर माहितीसाठी:  
+९१-९६०७४३२३३
- ५) नाशिक महानगरपालिका कोरोना माहिती कक्ष:  
०२५३-२३१७२९२
- ६) होम आयसोलेशन संदर्भात माहिती:  
०२५३-२३१७११७
- ७) शववाहिके संदर्भातील माहितीसाठी:  
०२५३-२५२२९०२

NASHIK MUNICIPAL CORPORATION





## नाशिक महानगरपालिका लसीकरण केंद्र



केंद्र शासनाचे आरोग्य विभागाने कोविशिल्ड या लसीचा पहिला डोस दिल्यानंतर दुसरा लस डोस देण्याचा कालावधी हा ६ ते ८ आठवड्यांवरून १२ ते १६ आठवडे (८४ ते ११२ दिवस) असा केलेला आहे . त्यामुळे ज्यांना पहिल्या कोविशिल्ड डोस ला ८४ दिवस पूर्ण झालेले आहेत, त्यांनाच दुसरा डोस दिला जाईल . इतरांना डोस दिला जाणार नाही याची नोंद घ्यावी .

**एक वचन.  
तीन नियम.**



**माझे कुटुंब  
माझी जबाबदारी**

१ मास्क वापरा २ हात धुवा ३ अंतर ठेवा





## Chapter 8

### Air Quality

#### 8.0 Introduction

Contamination implies the addition of impurity or poisonous substance in air, or increment in any factor which influences life adversely. The wellsprings of air contamination in urban territories significantly are autos (vehicles), businesses and so forth. The real Air discharges include PM<sub>10</sub>, PM<sub>2.5</sub>, Carbon Monoxide (CO), sulphur oxides (SO<sub>x</sub>), Nitrogen oxides (NO<sub>x</sub>), Hydrogen sulphide(H<sub>2</sub>S) and so on.

Air is an essential factor of environment. Air is the blend of different gases which keeps up the atmosphere of the Earth.

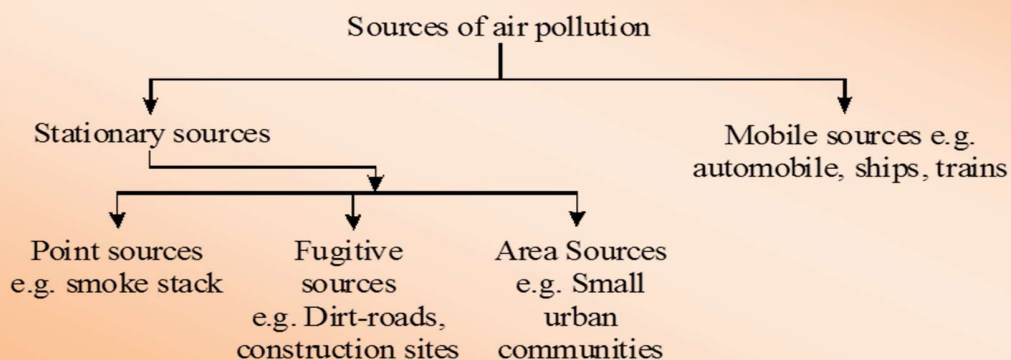
Factors responsible for air pollution and their percentage are as follow: -

- A) Suspended particulate matter (SPM), PM<sub>2.5</sub> - 2.5 $\mu$  sized particulate matter
- B) Suspended particulate matter (SPM), PM<sub>10</sub> - 10 $\mu$  Sized particulate matter
- C) Sulphur dioxide - 80 $\mu$ g/m<sup>3</sup>
- D) Nitrogen Oxide - 80 $\mu$ g/m<sup>3</sup>

#### Sources of Air Pollution (D - Driving Force )

[A] Type-I sources of Air Pollution: Natural and Anthropogenic

[B] Type II sources of Air Pollution: Stationery & Mobile sources





## S-Status

### CPCB- NAAQ Standards for Air quality:

According to standards stipulated by CPCB, desired levels of various components of air are given in the following **table 8.1**.

**Table 8.1 - CPCB-NAAQ Standards of Ambient Air Quality**

Sr.No	Pollutants	Time Period	National Ambient Air Quality Standards (NAAQS)	
			Industrial, Residential, Rural & Other areas	Ecologically Sensitive Areas
1	Sulphur Dioxide (SO <sub>2</sub> ) -µg/m <sup>3</sup>	Annual	80	80
2	Nitrogen Dioxide (NO <sub>2</sub> ) -µg/m <sup>3</sup>	Annual	80	80
3	Particulate Matter (PM <sub>10</sub> ) -µg/m <sup>3</sup>	Annual	100	100
4	Particulate Matter (PM <sub>2.5</sub> ) -µg/m <sup>3</sup>	Annual	60	60
5	Ozone (O <sub>3</sub> ) -µg/m <sup>3</sup>	8 hrs.	100	100

**Note:** All parameters are in (µg /m<sup>3</sup>)

**Source:** CPCB

### 8.1 Air Quality Monitoring Status

#### Objectives of Air quality Monitoring

1. To check the quality of air in the atmosphere.
2. To check whether the air quality is as per the prescribed standards.

For this reason, air quality observing stations have been selected for different 07 locations namely, Trimbak road ITI Signal, Satpur MIDC, Ambad MIDC, Panchvati Karanja, Old CBS, Mumbai Naka, Main Road, Dwarka, etc within NMC area (Fig 8.6).

#### 8.1.1 Overview of PM levels in Nashik city for Residential & Industrial area (PM<sub>10</sub> and PM<sub>2.5</sub>)

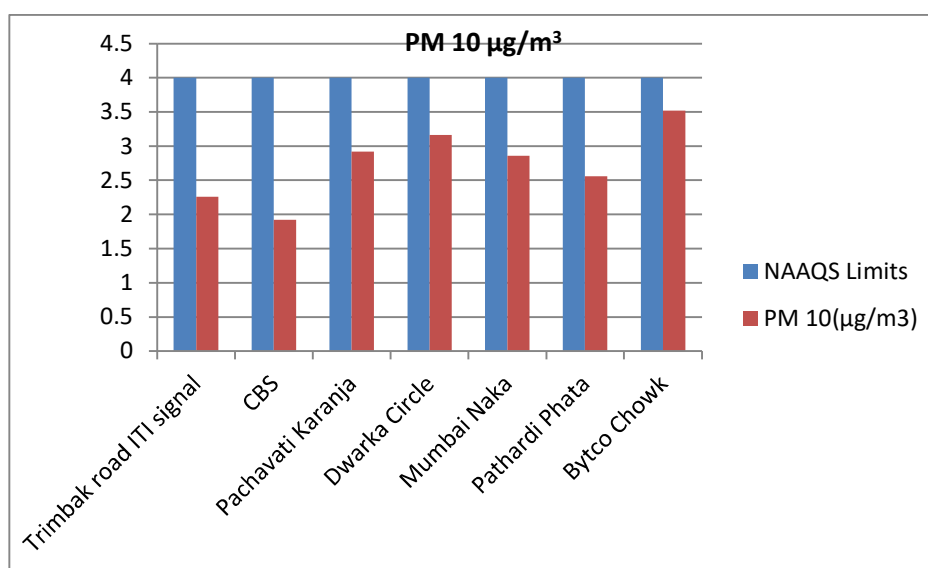
The air quality monitoring is assessed quarterly for different locations and average results are given in below table 8.2. Comparative study of the various air pollutants with the NAAQS standards are depicted in the fig 8.1-8.5.



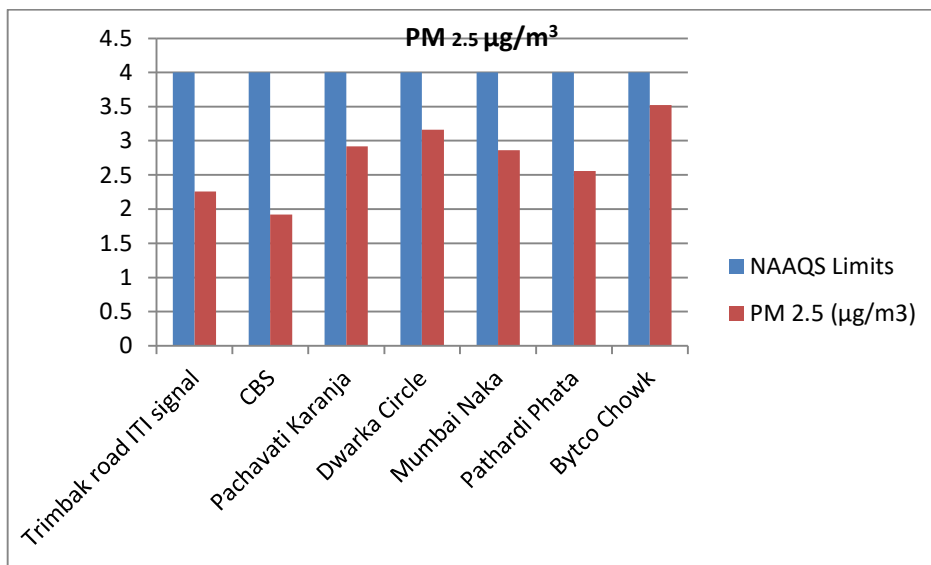
**Table 8.2 - AAQ in Nashik City for Before Diwali- Nov 21**

S.No	Name of the Parameter	Results				
		PM <sub>10</sub> (µg/m <sup>3</sup> )	PM <sub>2.5</sub> (µg/m <sup>3</sup> )	SO <sub>2</sub> in µg/m <sup>3</sup>	NO <sub>x</sub> in µg/m <sup>3</sup>	CO in µg/m <sup>3</sup>
	<b>NAAQS Limits</b>	100	60	80	80	4
1	Trimbak road ITI signal	62	40	38	41	2.26
2	CBS	72	44	42	48	1.92
3	Pachavati Karanja	68	42	32	38	2.92
4	Dwarka Circle	82	54	46	52	3.16
5	Mumbai Naka	66	52	44	48	2.86
6	Pathardi Phata	62	40	35	39	2.56
7	Bytco Chowk	78	42	58	62	3.52

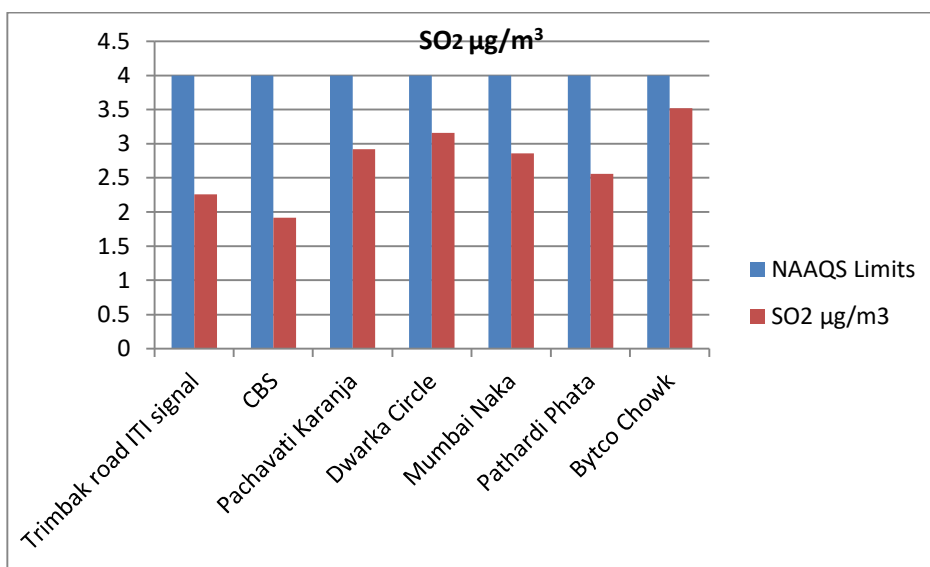
**Source: Mantras Green Resources Ltd., Nashik**



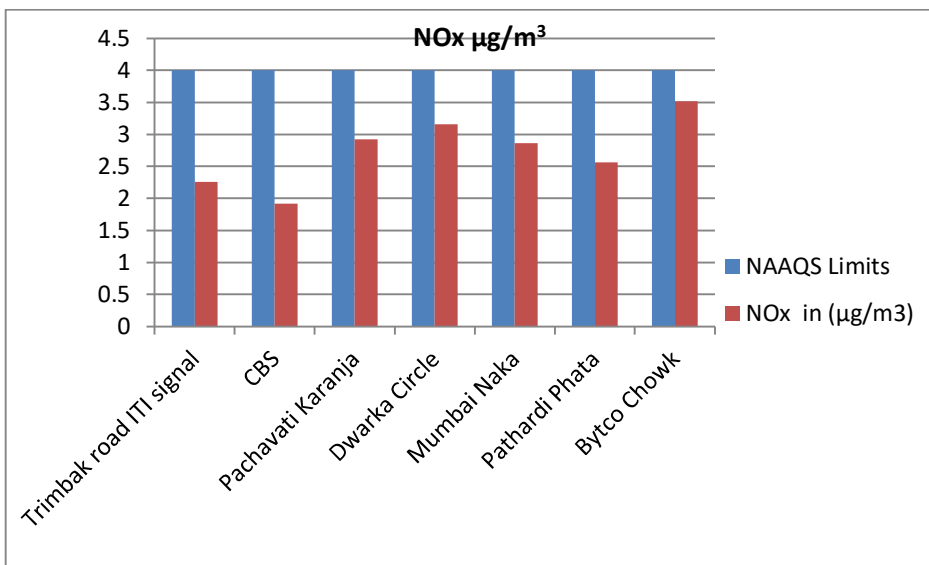
**Fig 8.1 - Results for PM<sub>10</sub> at 7 different locations**



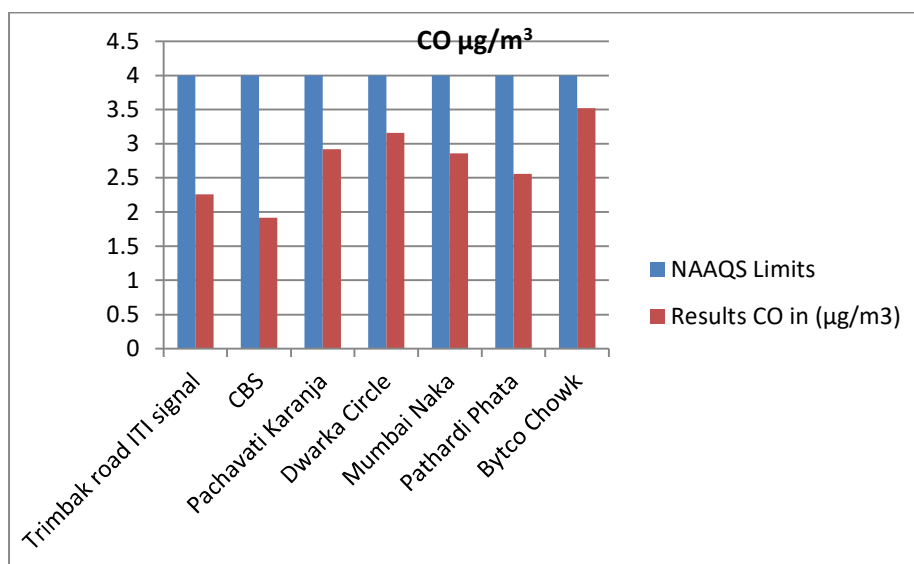
**Fig 8.2 - Results for PM<sub>2.5</sub> at 7 different locations**



**Fig 8.3 - Results for SO<sub>2</sub> at 7 different locations**

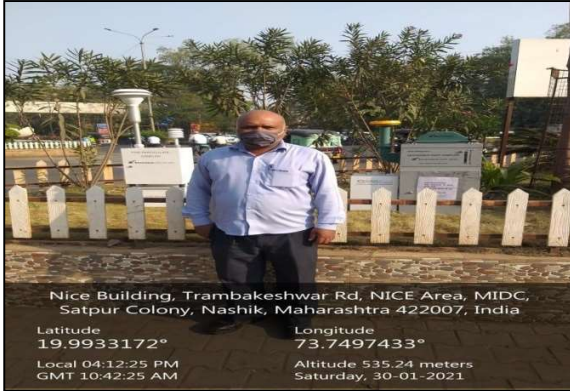


**Fig 8.4 - Results for NOx at 7 different locations**



**Fig 8.5 - Results for CO at 7 different locations**





**Trimbak Road ITI Signal**



**Bytco Chowk**



**Panchavati Karanja**



**Pathardi Phata**



**Mumbai Naka**



**CBS**



**Dwarka Circle**

**Fig 8.6 – Air Monotoring Photos**



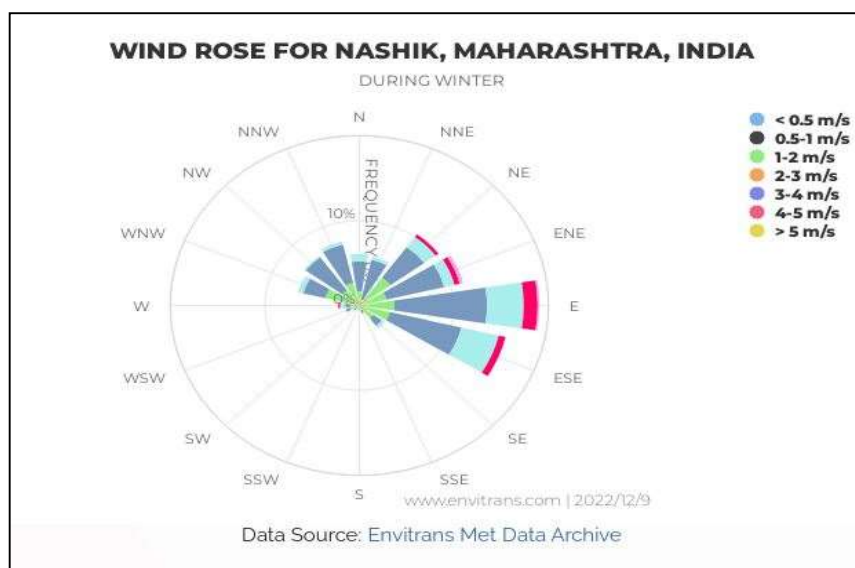


## Conclusion

1. From above result and graph, it is concluded that the average level of PM<sub>10</sub> & PM<sub>2.5</sub> NAAQS at 7 locations is within the prescribed NAAQS limit. As compared to all locations PM<sub>10</sub> is high at Mumbai Naka and low at CBS.
2. The all values of SO<sub>2</sub> within the prescribed NAAQS limit.
3. From the graphical representations it can be stated that Nitrogen Oxides results are within the NAAQS limits but the lowest values are seen at CBS.
4. The all values of CO within the prescribed NAAQS limit

### 8.1.2 Wind Rose Information

Wind rose diagram is used to demonstrate air direction and speed at particular area in a year. All four directions are shown by 0-360 in a spherical diagram. Length of line originating from the centre of spheres indicates frequency, velocity, as well as air direction. Study of Wind rose is normally used for examination of atmosphere, oceanic winds, air pollution, construction of runways etc. It is also useful for architects and experts for the planning of building in city.



**Fig 8.7 - Wind Rose diagram of Nashik area**

The corresponding results were used to draw wind-rose for 00-24 hours during study period (**Fig. 8.7**). The wind-rose diagram indicates that the predominant winds are from E and ESE sectors with the dominant wind speed class of 10-15 Km/h and calm condition of 0.00%. Local prevailing wind pattern during the study period was in the conformity with the climatologically normal wind pattern of the region.



Climatologically data station of IMD Nasik presented in Table 8.3.

**Table 8.3 - Climatologically Data Station IMD Nasik (Maharashtra)**

Months	Temperature (°C) (Mean)		Relative Humidity (%)	Rainfall (mm)
<b>2021</b>	<b>Range</b>		<b>Mean</b>	<b>Monthly Total No. of days</b>
<b>October</b>	30	34	62.00	70
<b>November</b>	24	28	52.00	15
<b>December</b>	20	28	53.00	4
<b>Annual (Avg.)</b>	<b>27.33</b>		<b>55.66</b>	<b>29.66</b>

Automotive exhaust is the major source of the total emission. Automobile exhaust consists of wide range of pollutants from simple to carcinogenic substances such as (1) Hydrocarbons (Unburnt), (2) Carbon monoxide, (3) Oxides of nitrogen (NO<sub>x</sub>), (4) Lead oxides, (5) Particulate matters e.g. lead, carbon, alkaline earth compounds, iron oxide, tar, oil, mist (6) Traces of aldehydes, esters, ethers, sulphur dioxide, peroxides, ketones benzene (C<sub>6</sub>H<sub>6</sub>), 1, 3 butadiene, Poly Aromatic Hydrocarbons (PAH).

### **Summary**

The MPCB is monitoring air pollution in six selected sampling areas. PM<sub>2.5</sub> component is considered the most dangerous as it can penetrate deep into the lungs. In winter season, PM<sub>2.5</sub> component is exceeding the permissible limits in residential and industrial sectors. Air pollution of city has increased since 2010. If the air pollution continues to increase at this rate, it will lead to poor air quality as compared to other metropolitan cities. It is the need of the hour to use public transport at large rather than using individual vehicles, to reduce air pollution.



**Table 8.4 - Health effects on human P – Pressure & I - Impacts**

No.	Pollutant	Major Sources	Effects
1	<b>Sulphur Dioxide (SO<sub>2</sub>)</b>	Volcanoes, acid rains, industrial processes	Heart disease, respiratory diseases, cancer, irritation to eyes, headache
2	<b>Nitrogen Oxides (NO<sub>x</sub>)</b>	Automobile Exhaust	High concentration cause respiratory irritation, Eye Irritation
3	<b>Carbon Monoxide (CO)</b>	Natural air, coal, wood, vehicular emissions	High reaction affinity with blood haemoglobin. Reduces oxygen transport capacity of blood and Fatigue
4	<b>Suspended Particulate Matter (SPM) PM<sub>10</sub>, PM<sub>2.5</sub></b>	Cyclones, volcanic eruption, vehicular exhausts, industrial stack emissions etc.	Small size particles poses health hazards due to their infiltration capacity into respiratory system, allergy
5	<b>Photochemical Oxidants Ex. Ozone</b>	Secondary pollutants from primary pollutants.	lowered lung functionality, eye irritation, cough
6	<b>Lead</b>	Unburnt HCs from vehicles	Problems in hemoglobin synthesis. Anemia, affects nervous system and kidneys.
7	<b>Greenhouse Gases</b>	Carbon Dioxide, methane, Evaporation, chlorofluoro carbons.	Global warming, weather changes, ice melting, growth of sea level.

Checking of these infections is an imperative parameter to know the status of the wellbeing of the city. NMC is stepping up with measures in regards to maintaining and updating information of patients experiencing the above mentioned diseases through a joint exercise between private and Government healing centers.

### **R – Response**

Measures to reduce Air Pollution:

- Use of public transportation:  
By using the public transport facility, air pollution can be reduced substantially. Also, it is more economical and safe.



- Improvement in transport infrastructure, roads, vehicle designs and better traffic management.
- Access to clean fuel and electricity to reduce outdoor and indoor air pollution by promoting renewable energy such as solar energy.
- Regular air quality monitoring to ensure uniformity as per standards all over city area.
- Road side tree plantation.

### **Plan Air Pollution**

1. In order to reduce traffic congestion, roads have been widened. WBM roads are planned to be black topped. Necessary measures are to be taken during demolition work of buildings.
2. Cycle track to encourage the use of cycles have been proposed.
3. To check Air Quality in the city, AAQMS has been placed in five selected areas by MPCB.
4. Tree Plantation Programmes are being implemented on a large scale to reduce air pollution.

### **Proposed Initiatives**

#### **NMC is taking following initiative :-**

1. Debris generated from demolition of old building leads to increase in air pollution, necessary measures to be taken during demolition work.
2. To increase the green cover in and around the city.
3. Intensively cover WBM Road with bituminous surface.
4. Not allowing people to burn garbage & imposing heavy penalty if they are found doing so.
5. Farmers in nearby localities to compost the agricultural residues .
6. Encourage people to use ready mix concrete instead of cast in-situ concrete.
7. Encouraging people to use public transport & cycles.

\*\*\*\*\*



## Chapter 9

### Water Supply

#### 9.0 Water Pollution

Water is an important factor for sustaining ideal environment, comprising of all kinds of living beings, including human and biotic factors, together with ground & surface water. Godavari River acts as a life line of the Nashik city. The Gangapur Dam (Earthen Dam) was constructed on Godavari River to fulfill the water requirement of growing population of Nashik city. The dam not only fulfills the drinking water requirement, but also provides the water for irrigation and industries. In Nashik city, about 3.57% of the area is covered by surface water.

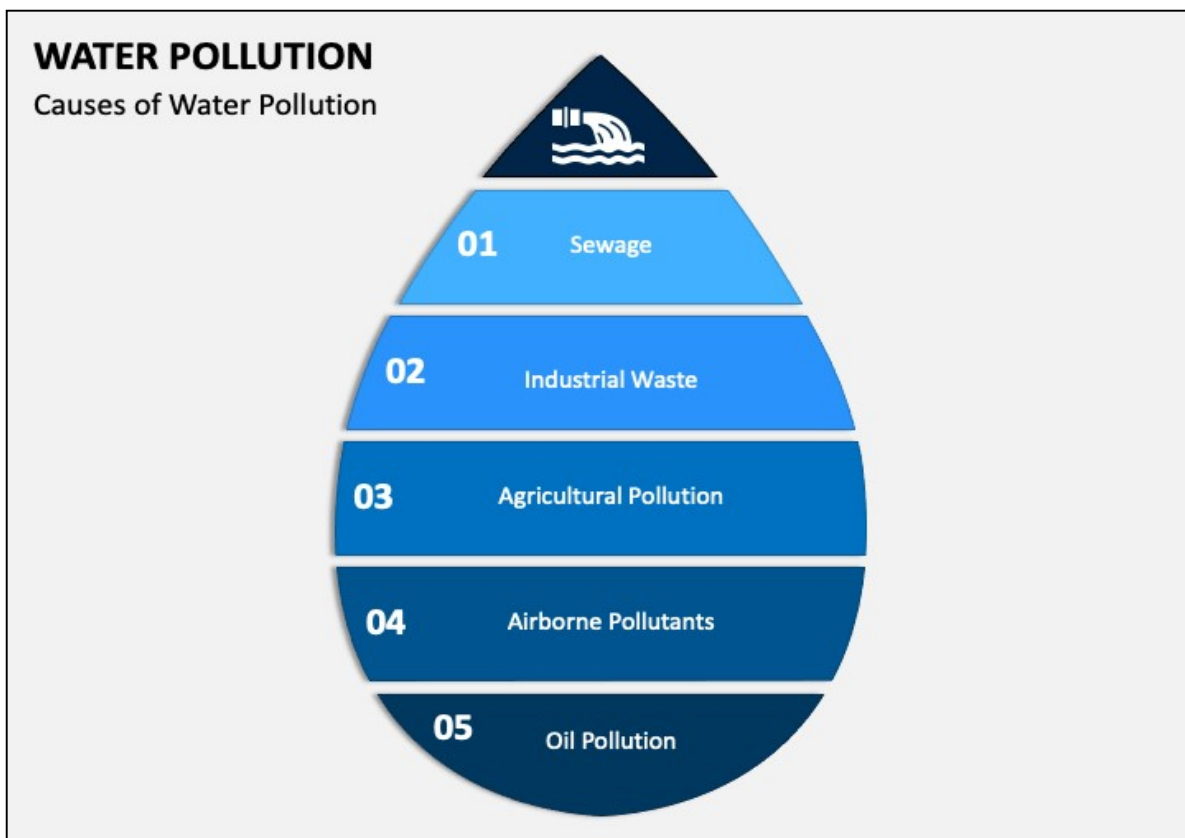


Fig 9.1- Causes of Water Pollution



### Sources of water in Nashik Corporation area:

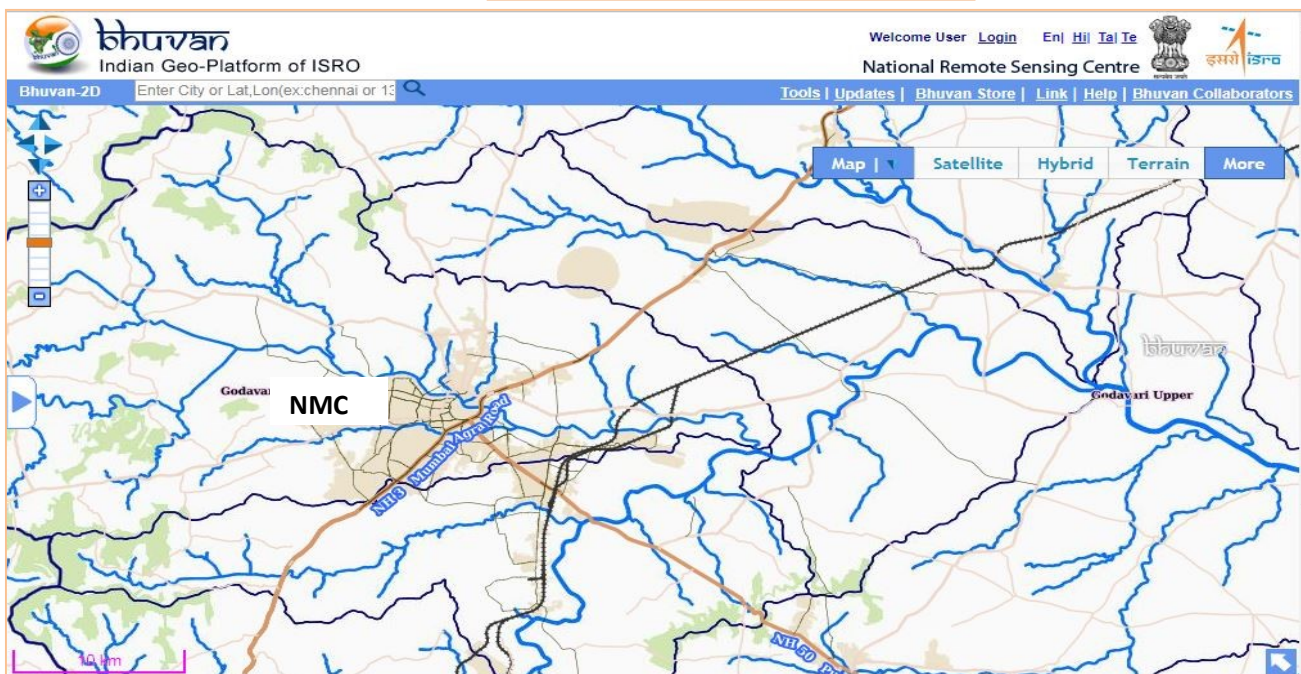
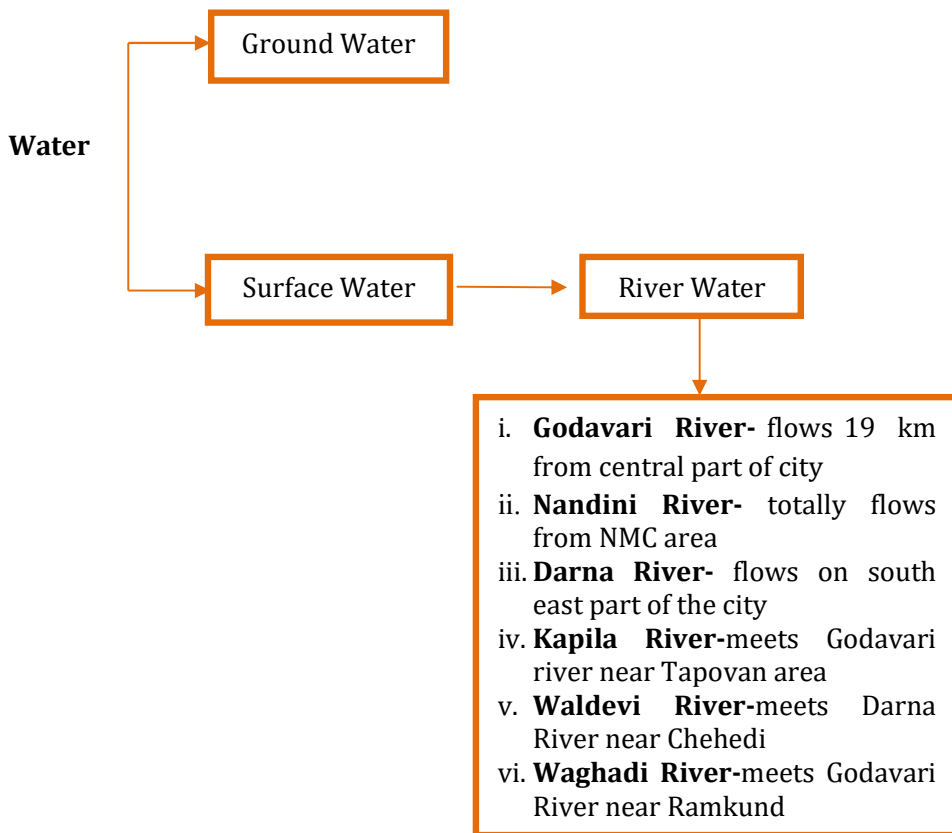
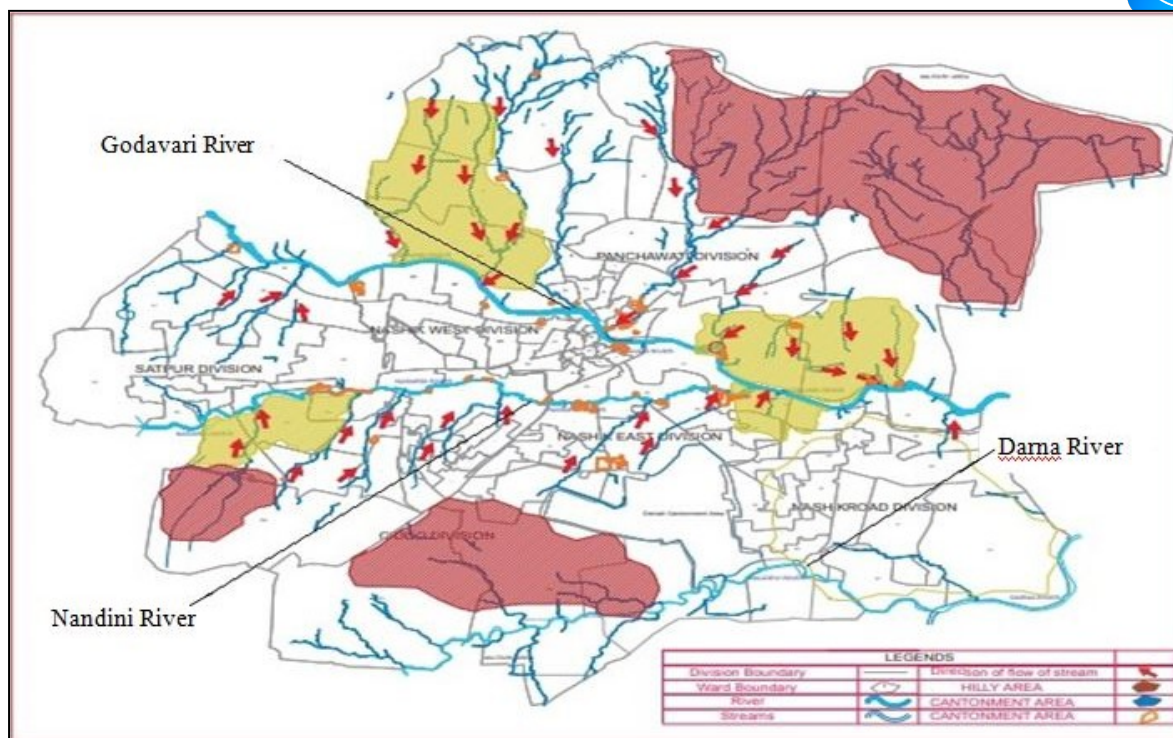


Fig 9.2- Latest Satellite imagery of hydrology network map of NMC area Source: NRSC, Hyderabad

#### 9.1 Ground water





**Fig 9.3- River Network Nashik Municipal Corporation Area**

(Source: City Sanitation Plan, Nashik City)

According to Environment Protection Agency, ground water is the source of drinking water for millions of people. According to the reports, groundwater use accounts for nearly 80% of the rural domestic needs and 50% of the urban water needs in India. Groundwater is an important source of irrigation water in agricultural sector with low capital cost. Ground water is used as an alternative source by considering the increasing demand of water for the citizens. Levels of ground water that depends on geologic structure are likely to be different in various localities of the city. Ground water is used for the domestic, agriculture, construction purpose etc., are drawn through bore well, well, etc. It is difficult to measure the total groundwater being extracted by the citizens. Department of Groundwater Surveys & Development Agency (GSDA) is working on the scientific study of 'Groundwater' in the city. The main objective of this department is to monitor the impact of natural & man-made components on groundwater quality, level and rate of extraction.



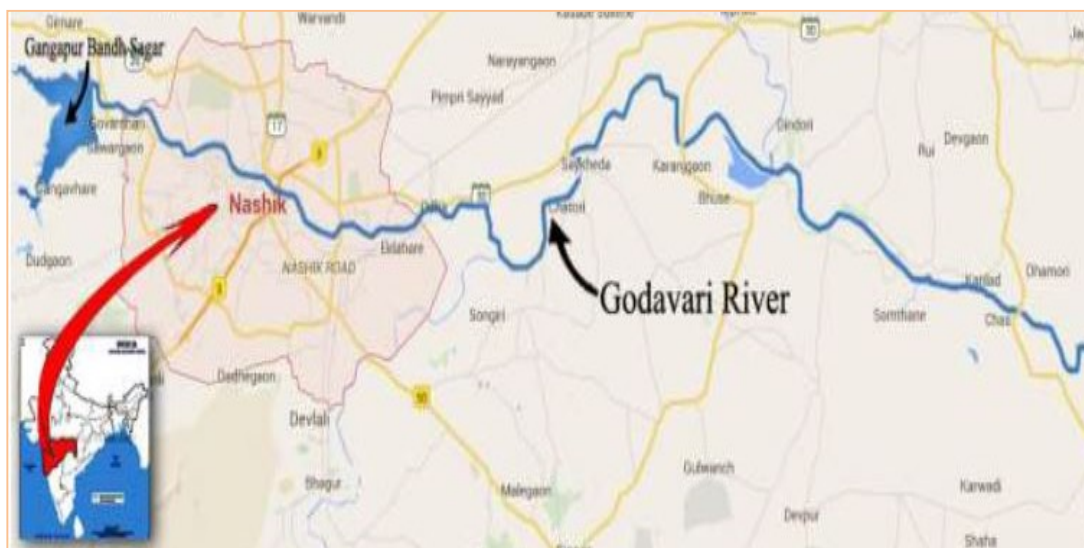


### 9.1.1 Surface water (Rivers) in NMC

In Nashik city, Surface water sources primarily consist of Godavari River, Nandini River and Darna River. Godavari River, having a length of 19 km, flows through the central part of the city. Similarly Nandini has a length of 16 km in the north and Darna (3.5 km) flowing through south east direction of the Nashik municipal corporation area.



**Gangapur Dam**



**Godavari River Map**



## **D-Driving Force**

### **Water Pollution**

Water pollution is contamination of water bodies (e.g. Lakes, River, Ocean, Aquifers or Ground Water) usually as a result of human activities. Water pollution is one of many types of pollution which results from contaminants being introduced into the natural environment. Water pollution occurs when pollutants (particles, chemicals or substances that make water contaminated) are discharged directly or indirectly into water bodies without enough treatment to get rid of harmful compounds. Pollutants get into water mainly by human causes or human factors. Water pollution can be a **Point-source, Non-Point-source or Trans-boundary** in nature.

#### **9.1.2 Types of Water Pollution**

Water pollution can occur from a number of different sources. A point source is a single, identifiable source of pollution, such as a pipe or drain. Industrial waste is commonly discharged to the rivers and the sea in this way. High risk point source waste discharges are regulated through different control bodies. Non point source pollution results when contaminants are introduced into the environment over large, widespread areas.

Nutrient discharge from agricultural runoff, surface water pollution due to incoming hazardous waste, oxygen depletion due to over microbial degradation, ground water pollution, chemical pollution, oil spillage, etc., are the major sources of the water pollution.

#### **A) Chemical pollution**

Water pollution occurs when undesirable foreign substances are introduced into natural water. The substances may be chemical or biological in nature. The common pollutants includes human or animal waste, pathogens, radioactive materials, toxic metals such as lead or mercury, agricultural chemicals such as pesticides, herbicides or fertilizers, acid rain, high temperature water discharged from power plants, often called thermal pollution, etc. There are many sources of chemical pollutants, as our technological advances have made us a species largely reliant on chemicals and these chemicals are toxic to life and our environment.



Metals and solvents from industrial work can pollute rivers and lakes. These are poisonous to many forms of aquatic life and may slow their development, make them infertile or even result in death. Pesticides are used in farming to control weeds, insects and fungi. Run-offs of these pesticides can cause water pollution and poison aquatic life. Subsequently, birds, humans and other animals may be poisoned if they eat infected fish. Petroleum is another form of chemical pollutant that usually contaminates water through oil spills when a ship ruptures. Oil spills usually have only a localized effect on wildlife but can spread for miles. The oil can cause the death of many fish and stick to the feathers of seabirds causing them to lose the ability to fly.

### **B) Oxygen Depletion**

Hypoxia or depletion of dissolved oxygen in water bodies normally occurs due to heavy pollution load and increased microbial degradation. Oxygen depletion may be classified as either generalized affecting the whole body or local affecting region or the water body. Microorganism present in water feed on the biodegradable substances. These biodegradable organic substances may be added through point sources or non point sources. Microorganism require large amount of oxygen for the degradation of these substances. Increased number of microorganism demands more dissolved oxygen leading to oxygen depletion.

At the depth, the aerobic organisms dies because of low level of dissolved oxygen. This type of condition encourages anaerobic microorganisms. Dissolved oxygen level in the water is inversely proportional to the temperature. In warmer condition oxygen level goes down. Algal blooms and decaying organic mater are the primary causes of oxygen depletion and can occur in large number in still warm water bodies.

### **C) Eutrophication**

It is taken from the Greek word *eutrophos* meaning well nourished. Such kind of condition develops when water bodies are overly enriched with minerals and nutrients that induce excessive growth of plants and algae. This process also deplete dissolve oxygen level. Excessive growth of phytoplankton s in the water body is known as blooms which is the best example of eutrophication. Continuous discharge of wastewater containing nitrate and phosphate



(detergents), agricultural runoff (fertilizer), municipal waste water (sewage) etc, into water bodies helps in the process of eutrophication. Farmers apply excess nutrients to the soil for better agricultural production. These nutrients leach into the soil where they remain for years. With rain they may drain into the water bodies. Some may drain into the ground water. When they enter into the water bodies, they enrich the water bodies with high amount of nutrients. This may lead to the fast growth of algal colonies which results in algal bloom. Algal bloom blocks the sunlight by creating a layer on the surface of the water body. The plants beneath the algal bloom die because they cannot get sunlight for photosynthesis. Eventually the algal bloom dies and settle at the bottom. Bacteria begins to decompose the algal bloom. This decomposition deplete oxygen from the water bodies. Larger life forms suffocate to death and water body can no longer support life. According to the scientists, the primary limiting factor for eutrophication is phosphate. Available phosphorus generally promotes excessive plant growth and decay, favoring simple algae and plankton over other more complicated plants and causes a severe reduction in water quality.

#### **D) Suspended matter**

Some pollutants do not dissolve in water as their molecules are too big to mix with the water molecules. These materials are called suspended particulate matter and can often be a cause of water pollution.

The suspended particles eventually settle and cause a thick silt at the bottom. This is harmful to marine life that lives on the floor of rivers or lakes. Biodegradable substances are often suspended in water and can cause problems by increasing the amount of anaerobic microorganisms present. Toxic chemicals suspended in water can be harmful to the development and survival of aquatic life.

### **P-Pressure**

- 1 The water level is depleted due to the continuous use of ground water.
- 2 Due to Growing urbanization, number of bore wells increase.
- 3 Ground water pollution increases.
- 4 Fishing, washing clothes, bathing, rearing of cattle calves, etc. causes pollution of water.



- 5 Uncontrolled growth of weeds in water arises due to pollutants such as nitrogen, phosphate, etc. which leads to degradation of the water environment.
- 6 Water demand is increasing day by day in NMC area due to growing urban population.

## S-Status

In order to provide sufficient drinking water for the citizens, Water Treatment Plants are in operation at six various zones of Nashik city for treating surface waters that is pumped from Gangapur Dam. The sewage that is being generated from domestic sources is treated within limits provided by pollution control board and then is discharged into river. Total 10 STPs in NMC area are present in which Domestic wastewater, being generated by regular activities of citizens is treated in different treatment plants of Municipal Corporation and treated sewage is released in rivers following sewage quality standards. A total of 10 Sewage Treatment Plants, are in operation at different locations of the city. Water pollution is measured in terms of following major parameters.

### 1. Dissolved Oxygen (DO)

Amount of oxygen dissolved (and hence available to sustain marine life) in water bodies such as a lake or stream, DO is the most important indicator of the health of a water body and its capacity to support a balanced aquatic ecosystem of plants and animals. Wastewater containing organic (oxygen consuming) pollutants depletes the dissolved oxygen and may lead to the death of marine organisms.

### 2. Biochemical Oxygen Demand (BOD)

**Biochemical oxygen demand** (BOD, also called **Biological oxygen demand**) is the amount of dissolved **oxygen** needed (i.e., demanded) by aerobic **biological** organisms to break down Organic material present in a given water sample at certain temperature over a specific time period.

### 3. Chemical Oxygen Demand (COD)

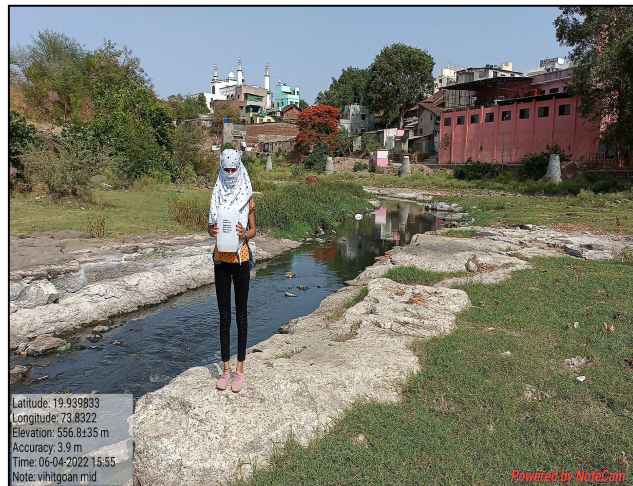
**Chemical oxygen demand** (COD) is a measure of the capacity of water to consume oxygen during the decomposition of organic matter and the oxidation of inorganic **chemicals** such as ammonia and nitrite.





### 9.1.3 Results of Surface water Analysis

River water samples were collected from selected stations during post monsoon seasons, analyzed for certain physical & chemical parameters results of analysis are given in **Table 9.1**.



**River Waghadi**



**River Waldevi**



**River Nandini**



**River Godavari**

**Fig 9.4 - Monitoring of Different Rivers from NMC area**



**Table 9.1 - Physico-chemical parameters of Godavari River water samples on 10.12.2021**

Sr. No	Name of sample	pH	DO	BOD	COD	TSS
			(mg/lit)	(mg/lit)	(mg/lit)	(mg/lit)
	MPCB limits	6.5 to 8.5	>2	<10	<150	<100
1	Upstream (Gangapur Gaon)	7.8	6.7	7	29	24
2	Midstream (Goda park)	8.7	4.6	6	29	29
3	Downstream (Tapovan)	8.5	6.5	23	39	36

**Source- Mantras Green Resources Ltd., Nashik**

**Table 9.2 - Physico-Chemical parameters of Nandini river water samples on 10.12.2021**

Sr. No.	Name of sample	pH	DO	BOD	COD	TSS
			(mg/lit)	(mg/lit)	(mg/lit)	(mg/lit)
	MPCB limits	6.5 to 8.5	>2	<10	<150	<100
1	Upstream (ITI Bridge)	7.9	1.2	32	79	1.2
2	Midstream (City Centre Mall)	7.2	1	41	125	1
3	Downstream (Samaj Kalyan Vibhag)	7.9	4	22	95	4

**Source-Mantras Green Resources . Ltd., Nashik**

**Table 9.3 - Physico-chemical parameters of Waghadi River water samples on 10.12.2021**

Sr. No.	Name of sample	pH	DO	BOD	COD	TSS
			(mg/lit)	(mg/lit)	(mg/lit)	(mg/lit)
	MPCB limits	6.5 to 8.5	>2	<10	<150	<100
1	Upstream (Mhasrul Amardham)	7.6	3	49	139	91
2	Midstream (Juna Hatti Pool)	7.5	6	21	86	35
3	Downstream (Ganeshwadi)	7.6	5.1	12	37	23

**Source- Mantras Green Resources Ltd., Nashik**

**Table 9.4 - Physico-chemical parameters of Waldevi River water samples on 10.12.2021**

Sr. No.	Name of sample	pH	DO	BOD	COD	TSS
			(mg/lit)	(mg/lit)	(mg/lit)	(mg/lit)
	MPCB limits	6.5 to 8.5	>2	<10	<150	<100
1	Upstream (Wadner Gate)	7.7	5.6	8	17	31





2	Midstream (Vihitgaon)	7.3	4.6	19	49	26
3	Downstream (Chehdi Pumping Station)	8.2	6.8	10	26	9

**Source- Mantras Green Resources Ltd., Nashik**

**1. except pH, all other parameters are expressed in mg/l.**

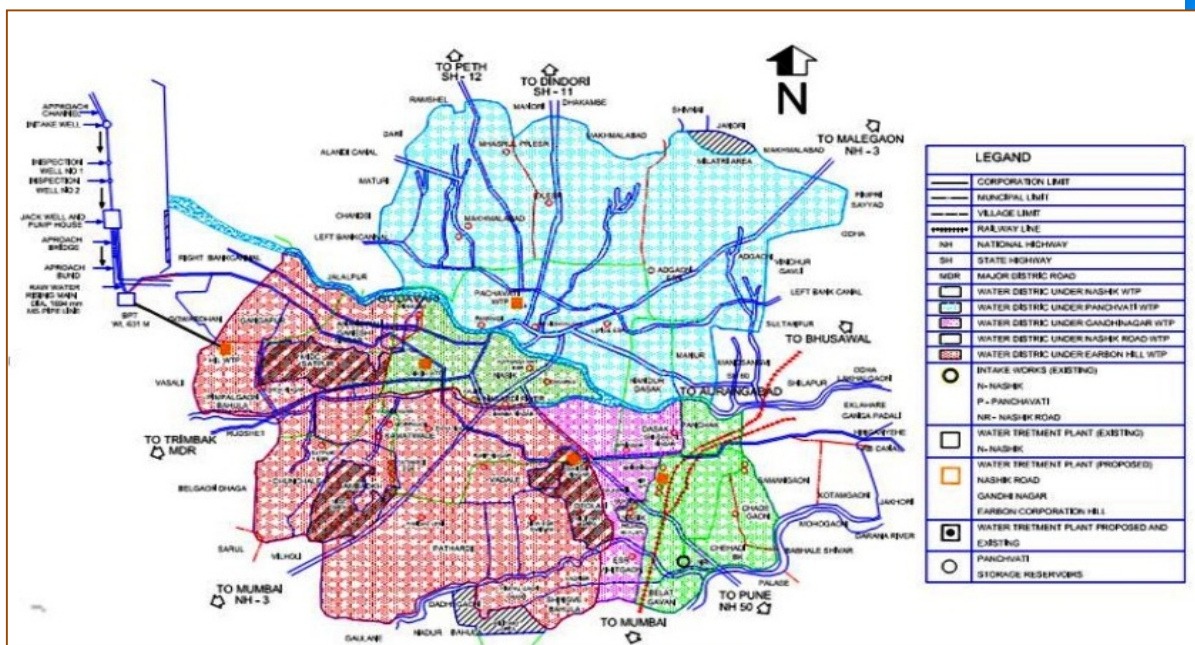
**2. Note: DO- Dissolved Oxygen, BOD- Biochemical Oxygen Demand, COD- Chemical Oxygen Demand, TSS - Total Suspended Solids**

### **9.3 Water Treatment Plant (WTP) System in NMC**

For continuous supply of water, three projects were established in the Nashik region namely Gangapur Dam, Kasyapi Dam and Gautami Dam. Gangapur dam is about 10 km from the Nashik city. This dam was constructed from 1954 to 1963. It has gross storage capacity of 48,910 cu mi. Kashyapi Dam is an earth fill dam on Kashyapi river a tributary of Godavari river. This dam is situated on upstream of Gangapur Dam. This dam has gross capacity of 12,641 cum. Gautami Godavari Dam is constructed on Gautami river at Trimbakeshwar. As Godavari River flows through Nashik city, traditionally city depends on Godavari River for water supply. One other source is from Darna Dam constructed on river Darna. This dam is about 28 km from Nashik city. This dam was constructed in 1934 with storage capacity of 7149 mcft.



**Fig 9.5 - Arial view of Water Treatment Plant**



**Fig 9.6 - Location of WTP and Water Supply Scheme of NMC area**

Well set laboratory has been established for analyzing the quality of water, supplied to the citizens. Physical, chemical & biological analysis is carried out in the laboratory and analytical reports are consolidated. Information about water supply, current status of water supply and information towards water treatment plants are given in **Section 9.3, 9.4** respectively.



**Aeration Fountain**



**Clarifier Tank**



**Filter Bed**



**Water distribution tank**

Use of Water is an index. The main objective of DPSIR is to indicate the coordination between water use and its availability. Due to this per capita water use, availability of water, quality, water rate, climate, water used by citizens (domestic use, drinking, bathing, cloth washing, or gardening) annual water consumption and percentage of water use is decided.

**Table 9.6 - Information about potable water supply in NMC**

Sr. No.	Particulars	Statistical details
1	Total Population (2011 census)	1486053
2	Total water supply per day	531.88 MLD
3	Total water supply in industrial area	648.2 MLD
4	Average water supply- hours per day	3 hours /day

**Source - Water Supply Department NMC**

### **Conclusion**

Water supplied to the citizens by Municipal Corporation is potable and of good quality as per the standards.

### **9.4 Water Supply Management**

About 374.94 MLD from Gangapur Dam and 45 MLD from Darna River (Chehedi Barrage) are being lifted for daily water supply to the Nashik City. This water is purified at six water treatment plants. These water treatment plants are spread over 70 hectares of area and water is distributed to the Nashik city through 2441 kms pipeline network. Following are the details of water treatment plants available in Nashik City.





**Table 9.7 - Water Treatment Plant and Their Capacities**

Sr. No.	Name of Treatment Plant	Capacity
1.	Bara Bangla Water Treatment Plant	81 MLD
2.	Panchwati Water Treatment Plant	71 MLD
3.	Gandhinagar Water Treatment Plant	52 MLD
4.	Nashik Road Water Treatment Plant	73 MLD
5.	Shivaji Nagar (Satpur) Water Treatment Plant	145.50 MLD
6.	Nilgiri baug	50.00
7.	Old Pathardi Jakat Naka	137.00 MLD
	Total	609.50 MLD

**Source:-Public Health Engg Dept NMC**

The water supply currently being done in the city is being done on average 150 liters per person / day. Nashik city was selected with 63 cities in the country under the Jawaharlal Nehru National Urban Renewal Mission, to cater to the growing population of the Nashik city and the basic amenities required accordingly. Under this program, considering the future water demand of Nashik city, many detailed project reports were submitted to the Central Government. The Government of Maharashtra and the Central Government have sanctioned the City Development Plan of Nashik city and approved the plans for the city's future water supply. As per this plan, the city's future population and water demand are as follows.

**Table 9.7 Water Supply Service Level Bench mark**

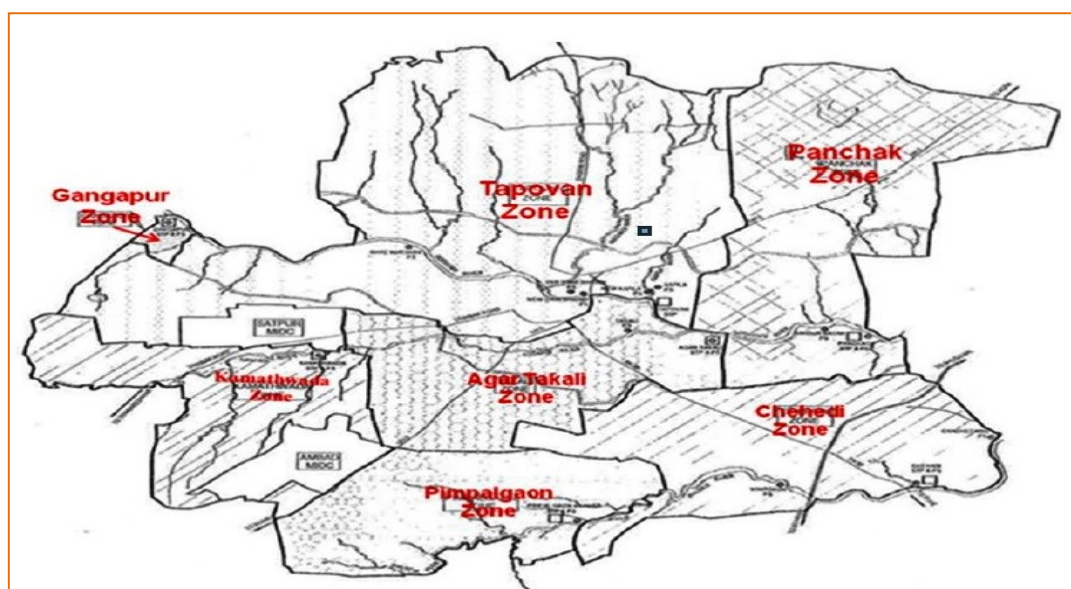
Sr. No.	Services	Expected functionality (%)	Status (%)
1.	Grievance Redressal	100%	100%
2.	Quality of water supply	100%	99.10%
3.	Average water supply- hours per day	3	3
4.	Amount of non- revenue water	40	45.3
5.	Water supply per capita	150	190
6.	Percentage for availability of water supply	100	100
7.	Expansion of water supply services	NA	NA



8.	Total Plumbing connections	100	80.80
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**Table 9.8 - Future Water Demand of Nashik City**

Year	Population (Lakh)	Required Water Quantity (MLD)
2011	14.86	337
2021	26.00	500
2031	37.50	721
2041	52.50	1096



As mentioned above, Nashik Municipal Corporation started the planning for constructing required facilities to supply sufficient water to growing population. Under the Jawaharlal Nehru National Urban Renewal Mission, a project report worth Rs 50.52 crore (package-1) was approved for the water supply department and various works have been completed accordingly. Eg constructing new nine tanks, treatment plant capacity (48.5 + 26 MLD), rising main pipe line, putting ultra sonic flow meter at different locations, and distributing distribution channels of different diameters. Gangapur Dam (5630), Kashyapi (1861) and Gautami (1883), as per the Gangapur dam, total 9,400 mcm (million cubic meters) water is available. Similarly, Darna dam on Darna River and other dams on the tributaries have total capacity 15,663 mcm. If the population of 2041 is considered to be 52.50 lakhs for preparation of water supply report of Nashik city, the yearly



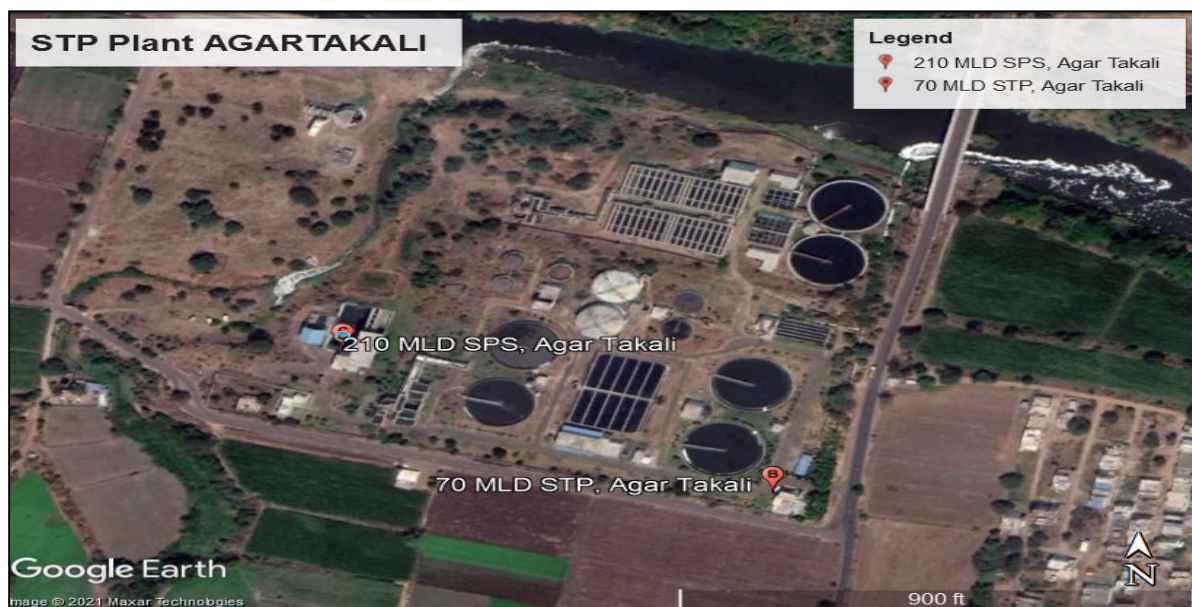
water requirement is about 14113 mcm. For the purpose of the reservation of water for agricultural purpose, about 60% water (8467.80 mcm) is available after treating sewage in sewage treatment plant.

Thus, for the year 2041, considering the population of Nashik city Gangapur, Kashyapi and Gautami, will be reserved as per annual Water Demand.

### 9.5 Sewage Treatment Plant

The population of Nashik is 1486053 (2011 Census). As per Master Plan, based on topography of Nashik, the area is divided into eight sewerage zones (Fig: 9.5). Currently, there are 6 divisions (31 Wards as per 2011 Census). Total sewage generated in the city is properly treated in the STP and then released in the rivers. Godavari Action Plan and current works provided with 100% grant under National River Action Plan from Central Government. Nashik Corporation executed sewage pumping station and sewage treatment plant works in Nashik under Godavari Action Plan and JNNURM. The aggregate area of Nashik city is around 259 sq.km.

**Fig. 9.7 - Service Zones of Sewerage System for Nashik City**



### Sewerage Network

Total sewage generated in Nashik city, is around 323.31 MLD, and is collected by sewer lines having a total length of 1585 km with variable diameters. Work for laying additional 210 km sewerage network is in progress. There are two waste water management system in Nashik i.e. off



site sanitation (through sewage system) and onsite sanitation (through septic tanks and soak pits). NMC's sewerage system covers nearly 84% of its residential area. The town planning department has made septic tanks mandatory for getting building permissions in the city. About 80 to 85% of septic tanks and other individual toilets are connected to this network. These septic tanks are cleaned by the NMC on demand from the citizens.

In addition to the septic tanks, several households, located mainly in the New Nashik zone, have soak pits – which are lined pits without a floor and that allow human waste to filter through alluvial sand before reaching the underground aquifer. The outlets of septic tanks are connected to the sewer networks, and the sewage disposal in this system is done at the sewage treatment plant of the existing facility. Sludge collected from the septic tanks by the vacuum suction trucks is disposed in the sewage Treatment Plant.

Nashik has five operational Sewage Treatment Plant (STP) zones located at Tapovan, Chehedi, Agartakli, and Panchak & Gangapur. The CPCB's nation-wide assessment graded Tapovan and Chehedi as satisfactory facilities and Panchak as a good facility. The operation & maintenance of the same is being executed through private contractors.

**Table 9.10 - Various STP Capacities in Nashik City Area**

Sr. No	STP	Capacity (MLD)	Method	Avg. Sewage Treated per Day in MLD
1	Tapovan Phase 1	78	UASB	77.82
2	Tapovan Phase 2 (New)	52	UASB	46.90
3	Panchak Phase	7.5	ASP	6.64
4	Panchak Phase 1	21	ASP	15.60
5	Panchak Phase 2 (New)	32	UASB+MBBR	23.08
6	Chehadi Phase 1	22	UASB	20.98
7	Chehadi Phase 2	20	ASP	20.29
8	Agar Takli Phase 1	70	UASB + MBR	63.08
9	Agar Takli Phase 2 (New)	40	ASP	32.32
10	Gangapur gaon	18	SBR	16.59
<b>Total</b>		<b>360.5</b>		<b>323.31</b>

**Source:-Water Supply Department NMC**





Self-laboratory facility is available in plant and daily testing of treated sewage is carried out in all treatment plants.

**Table 9.11 - STP Analysis Reports in 2021-2022**

Sr. No	STP	Capacity (MLD)	pH		TSS		BOD		COD	
			Max	Min	Max	Min	Max	Min	Max	Min
1	Tapovan Phase 1	78	7.56	7.20	28	18	20	14	56	40
2	Tapovan Phase 2 (New)	52	7.62	7.14	23	15	18	15	55	42
3	Panchak Phase	7.5	7.40	7.22	24	14	17	13	54	36
4	Panchak Phase 1	21	7.43	7.24	25	12	19	12	52	38
5	Panchak Phase 2 (New)	32	7.36	7.19	26	15	16	14	48	36
6	Chehadi Phase 1	20	7.60	7.30	20	12	18	12	50	31
7	Chehadi Phase 2	22	7.72	7.50	19	10	17	11	49	38
8	Agar Takli Phase 1	70	7.50	7.28	24	17	16	14	52	39
9	Agar Takli Phase 2 (New)	40	7.55	7.23	25	16	20	13	49	37
10	Gangapur Gaon	18	7.63	7.44	9.01	8.12	5.29	4.47	44.6	35.55

Source:-Water Supply Department NMC

**Table 9.12 - Details of Power Generation through 100% Bio Gas at 130 MLD Tapovan STP in 2021-2022**

Sr. No	Month	Avg. Sewage Treated per Month (MLD)	Biogas Unit Per Month (KWH)	MSEDCL Per Month (Units)
1	Apr-21	124.36	17656	55655
2	May-21	124.04	11220	53970
3	Jun-21	123.22	4780	54635
4	Jul-21	124.51	4460	51845
5	Aug-21	129.67	6460	47725
6	Sep-21	128.77	4500	47930
7	Oct-21	137.22	4750	46420
8	Nov-21	131.31	7150	37335
9	Dec-21	133.42	8500	38865



10	Jan-22	133.16	9050	40395
11	Feb-22	133.17	12800	36830
12	Mar-22	132.70	13250	54930
	<b>Total</b>	<b>1555.55</b>	<b>104576</b>	<b>566535</b>
	<b>Average</b>	<b>129.63</b>	<b>8714.67</b>	<b>47211.25</b>

Source:-Water Supply Department NMC

*'Waste Water Treatment' is an index in DPSIR index method. The main objective behind, it is to minimize the water pollution in the city. The scope of carrying sewage water channels and the rate of treated sewage water are shown. Quality of Treated, waste water plays important role to determine treated sewage quality. A Good quality of sewage treatment facility is an index of good & developing society.*

**Table No 8.14 Sewage Water Treatment Service Level Benchmark**

Sr. No.	Services	Expected functionality (%)	Status (%)
1	Adequacy of Sewage Treatment Capacity	100%	89.68%
2	Sewage Reuse & Recycling percentage	100%	100%

Source: Water Supply Department, Nashik Municipal Corporation



**Tapovan STP**



**Agar Takli STP**



**Chehadi STP**



**Panchak STP**

**Fig 9.8 - Photographs of various STPs in NMC area**

### **S-Status**

Nashik city has a good infrastructure of Sewerage Network & Sewage Treatment Plants. The treatment quality of sewage is as per MPCB norms. In future, due to increased population & industrialization, water scarcity is certain. Therefore, use of different types of water conservation, recycling and rainwater harvesting methods are followed to increase the level of ground water.

### **I-Impact**

#### **Impacts of Water Pollution: -**

- i. Hazardous impacts of water pollution on human health**
  - A. Typhoid, diarrhea, gastro, hepatitis, jaundice, headaches and bowel disorder take place due to bacteria & viruses in stored water.
  - B. Prevalence of diseases like cholera, hepatitis etc. due to infected water.
- ii. Plants & animals**
  - A. Decrease of dissolved oxygen in polluted water affects aquatic fauna & flora.
  - B. Photosynthesis process decreases due to floating oily substances on water.



## R-Response

A master plan for sewerage system has been approved for the city. As per the expected population projection in 2041, eight sewerage zones are planned. Regular analysis on STP effluent water & Nallah water quality is done by the lab team. The river and their tributaries need special attention so as to identify and make the river boundary as tourist place by laying aside walkway, cycle way, green gym facility, etc., develop toilets, crematory & laundry (washing clothes) facilities separately along river boundary. Available (open) space on river side planted trees & garden developed. Different cultural and entertainment programs shall be conducted along the outer space on river.

### **Water Supply -**

All over city 24 x 7 plans for implementation is being designed.

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## Chapter 10

### Noise

#### 10.0 Introduction

Noise Pollution or Noise disturbance is the excessive noise that may harm the activity or balance of human or animal life. Noise is indistinguishable from sound, as both are vibrations through a medium, such as air or water. Sound is measured based on the amplitude and frequency of a sound wave. Amplitude measures how forceful the wave is. The energy in a sound wave is measured in decibels (dB), the measure of loudness, or intensity of a sound; this measurement describes the amplitude of a sound wave. The main instrument to measure sounds in the air is the Sound Level Meter. The source of most outdoor noise worldwide is mainly machines and transportation systems, motor, vehicles, aircraft and trains. Outdoor noise is summarized by the word environmental noise.

#### D-Driving Force

1. Industrialization
2. Population growth
3. Change in lifestyle
4. Increased construction & townships
5. Modern lifestyle including excess use of Television, Telephone, Mobile, etc.

#### P-Pressure

1. Growth in number of vehicles resulting in congestion
2. Use of loudspeakers in functions, festival & speeches, etc.
3. Use of fire crackers in functions & other events
4. Population growth and change in standard of living leads to increase in number of vehicles causing increase in noise pollution. E.g. Honking
5. Rapid growth of construction activities increases noise levels



Noise Pollution mainly occurs due to use of equipments like mobiles, music system, and television etc. due to change in life style. It also occurs during Diwali, Dahihandi, Ganesh Visarjan and Navratri festivals.

During celebrations, musical instruments and noise making crackers are being used. So, during these festivals the noise pollution level is high. During Ganesh festival, Navratri and Diwali festival, noise levels at residential societies are observed well above the permissible limits.



**Fig 10.1 - Noise Pollution during Ganesh Festival**

## S-Status

### 10.1 Noise Status in Nashik city

Nashik City is divided into 4 zones viz., Residential, Commercial, Industrial and Silence zone. CPCB has specified the standards of noise levels during day and night times. Following **Table10.1** shows standards for different zones, as per Noise pollution (Regulation and Control), Rules2016.

**Table 10.1 -Ambient Noise Quality Standards**

Sr. No.	Category/ Area Zone	Limits in dB(A) Leq	
		Day (6 am to 10pm)	Night (10pm to 6 am)
1	Residential	55	45
2	Commercial	65	55





3	Industrial	75	70
4	Silence	50	40

**Source: Central Pollution Control Board (CPCB)**

If noise level is not meeting the norms, action is taken against concerned person by Police Department. As per rule 3 (1) and 4 (1) of Noise Pollution (Control and Regulation) Rules, 2000, Area within periphery of 100 meters of Courts, hospitals and educational institutions is declared as Silence Zone. Boards declaring Silence Zone have been installed and implementation of keeping silence zone is monitored by Police Department. Noise is measured by noise meter and expressed in units of decibel dB (A) Leq. Internationally accepted method is used for noise measurement.

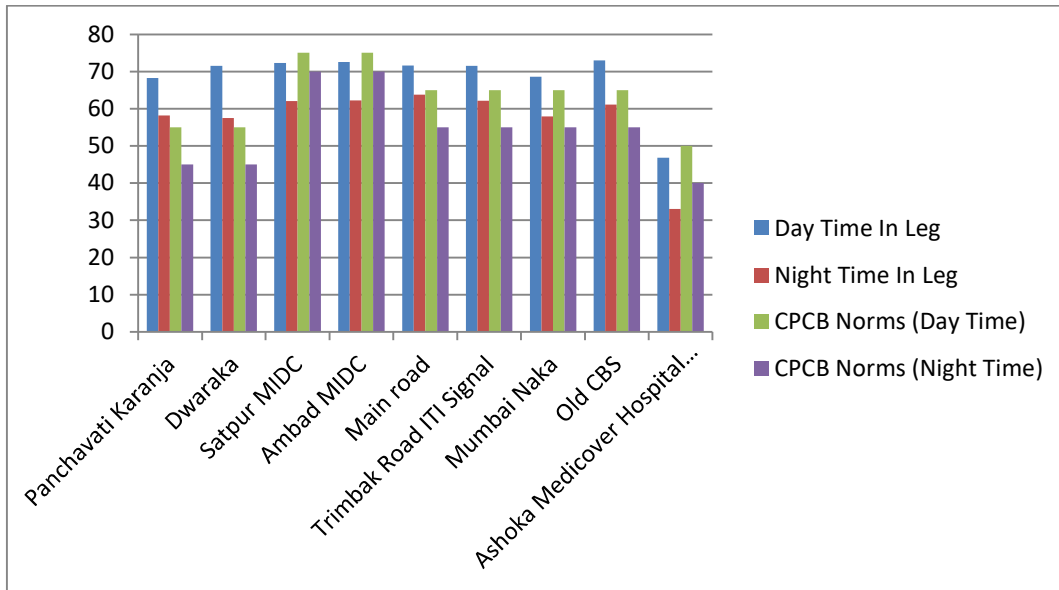
## 10.2 Noise Monitoring in Nashik city

**Table 10.2 - Average Noise Monitoring Results 2021 -22**

Sr. No.	Name of the place	Day Time In Leq	Night Time In Leq	CPCB NORMS (Day time)	CPCB NORMS (Night time)
A	<b>Residential</b>				
1	Panchavati Karanja	68.2	58.2	55	45
2	Dwaraka	71.5	57.5		
B	<b>Industrial</b>				
3	Satpur MIDC	72.3	62	75	70
4	Ambad MIDC	72.6	62.2		
C	<b>Commercial</b>				
5	Main road	71.6	63.8	65	55
6	Trimbak Road ITI Signal	71.5	62.1		
7	Mumbai Naka	68.6	57.9		
8	Old CBS	73	61.1		
D	<b>Silence</b>				
9	Ashoka Medicover Hospital Indiranagar	46.9	33	50	40

**Source: Mantras Green Resources Ltd Nashik**





**Fig 10.2 - Average Noise Monitoring 2021-22**

**Conclusion:** All values of Residential, Commercial and silence zone exceeds the standard limit except industrial zone having values of noise within the standard limits.



**Panchavati Karanja**



**Dwaraka**



**Satpur MIDC**



**Ambad MIDC**



**Main Road Trimbak Road**



**ITI signal**



**Mumbai Naka**



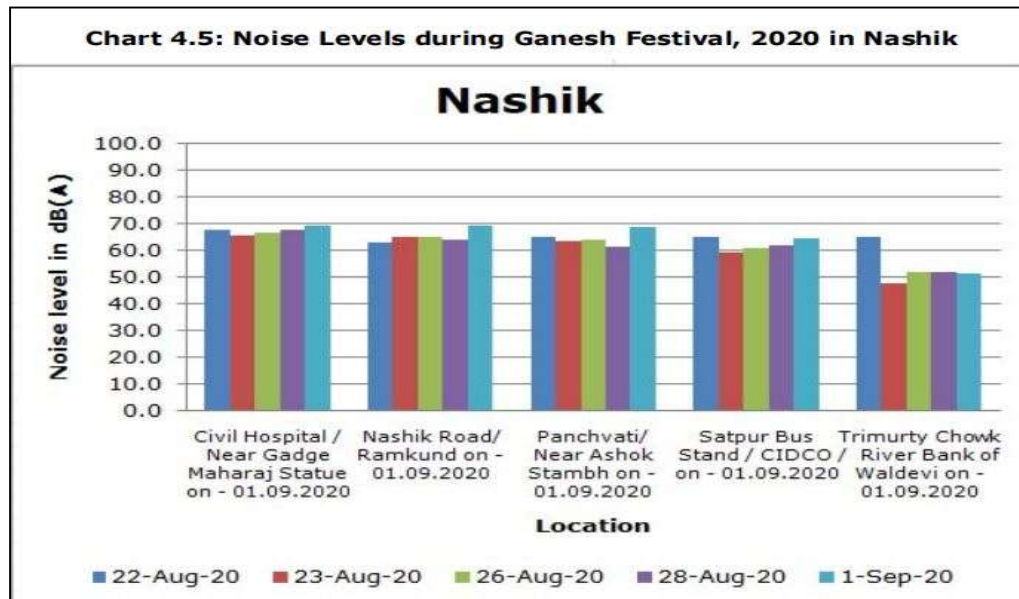
**Old CBS**

**Fig 10.3- Noise Monitoring Photographs at different locations**

**Table 10.3 –Noise Monitoring during Ganesh festival 2020.**

Location of Noise Monitoring	Leq Night time (22-Aug - 20)	Leq Night time (23- Aug - 20)	Leq Night time (26- Aug - 20)	Leq Night time (28- Aug - 20)	Leq Night time (1-Sept- 20)
Nashik Road/ Ramkund on-1.09.2020	80.3	74.6	74.1	69.9	73.6
Panchvati/ Near Ashok Stambh- 1.09.2020	80.1	77.0	77.1	70.9	73.4
Civil Hospital/ Near Gadge Maharaj Statue-1.09.2020	75.1	75.5	75.3	71.3	74.6
Trimurty Chowk/River bank of Waldevi-1.09.2020	81.1	78.8	77.1	70.2	72.9
Satpur Bus Stand/ CIDCO (Behind PF Off.)- 1.09.2020	77.7	76.8	74.9	70.4	72.8

*Source – MPCB website*



**Fig 10.4- Noise Level during Ganesh Festival 2020**

**Table 10.4- Noise Monitoring during Diwali festival 2020**

Location	Date	Day time (6AM-10PM) values in dB (A)					
CBS	11.11.2020	67.8	60.1	72.4	71.7	65.7	61.7
Panchavati	11.11.2020	68.0	59.1	72.1	71.6	66.2	60.7
Dahipool	11.11.2020	67.6	58.1	72.5	71.3	65.5	60.8
CIDCO Residential	11.11.2020	67.3	55.2	72.6	70.9	64.8	57.7
Bytco Point	11.11.2020	66.6	55.3	71.6	71.4	62.9	57.0
Location	Date	Night time (10PM-6AM) values in dB (A)					
CBS	11.11.2020	61.3	54.6	68.1	63.3	57.2	55.0
Panchavati	11.11.2020	61.1	54.6	67.2	64.4	57.0	55.3
Dahipool	11.11.2020	61.1	54.6	68.2	63.3	55.7	54.8
CIDCO Residential	11.11.2020	61.9	54.3	69.1	64.5	55.5	54.7
Bytco Point	11.11.2020	61.2	54.2	68.2	63.5	56.7	55.0

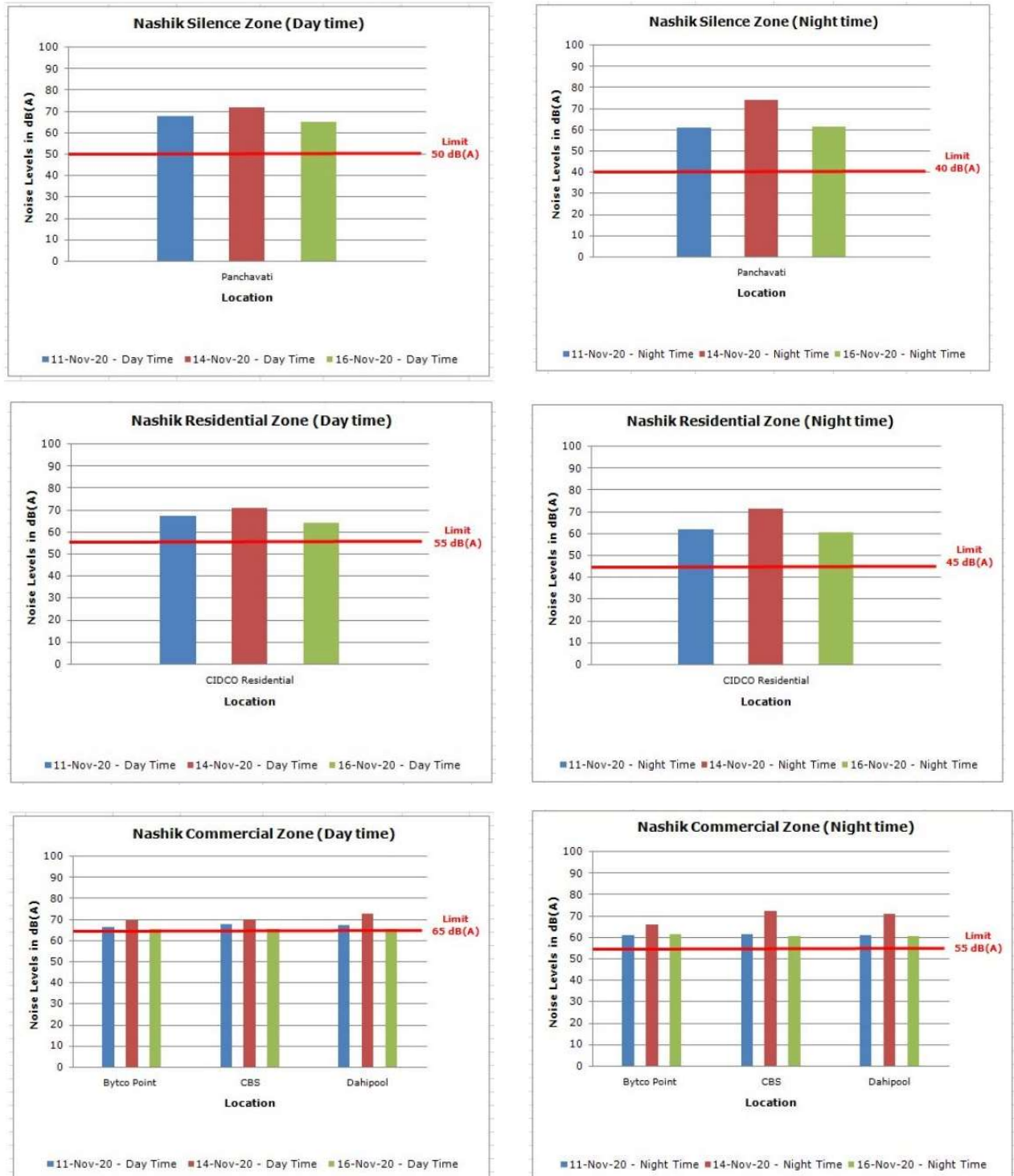


Location	Date	Day time (6AM-10PM) values in dB (A)					
CBS	14.11.2020	70.0	61.5	76.1	74.5	66.8	62.5
Panchavati	14.11.2020	71.7	59.2	76.2	74.9	70.8	63.2
Dahipool	14.11.2020	73.0	59.2	77.1	76.5	72.0	60.9
CIDCO Residential	14.11.2020	71.2	56.4	77.5	75.4	68.9	58.8
Bytco Point	14.11.2020	69.7	60.1	75.6	73.6	67.5	61.6
Location	Date	Night time (10PM-6AM) values in dB (A)					
CBS	14.11.2020	72.4	58.2	79.5	75.8	66.2	58.5
Panchavati	14.11.2020	74.4	56.2	80.2	78.8	67.9	59.0
Dahipool	14.11.2020	70.8	55.1	77.3	74.0	66.7	57.4
CIDCO Residential	14.11.2020	71.5	55.4	78.2	74.3	68.2	56.0
Bytco Point	14.11.2020	65.9	54.1	71.2	70.5	60.2	54.9

Location	Date	Day time (6AM-10PM) values in dB (A)					
CBS	16.11.2020	65.6	59.2	70.1	69.2	63.8	59.8
Panchavati	16.11.2020	65.3	58.2	70.2	69.4	63.6	59.6
Dahipool	16.11.2020	65.4	57.6	70.1	68.8	63.8	58.2
CIDCO Residential	16.11.2020	64.3	54.2	69.5	68.3	61.9	54.9
Bytco Point	16.11.2020	65.5	55.1	71.5	69.7	62.8	56.0
Location	Date	Night time (10P M-6AM) values in dB (A)					
CBS	16.11.2020	60.8	53.5	67.4	62.4	57.7	53.9
Panchavati	16.11.2020	61.4	54.4	68.4	63.6	56.9	55.1
Dahipool	16.11.2020	60.8	53.4	67.1	63.8	56.9	54.0
CIDCO Residential	16.11.2020	60.8	53.4	67.2	64.5	56.0	54.0
Bytco Point	16.11.2020	61.7	54.2	68.4	64.2	59.9	54.5

Source - MPCB website





**Fig 10.5- Noise level During Diwali Festival 2020**



**Conclusion:** The level of Noise is high and noise pollution is high as per the Ambient Noise quality standards. The highest noise level was observed on the first day during the noise monitoring at CBS during day time is low and night time high.



**Fig 10.6 -Noise pollution during Diwali Festival**

Fire crackers contain hazardous chemicals and heavy metals like Aluminium, Sulphur dioxide, Potassium Nitrate, Barium etc., which have dangerous health impacts. Fancy fire crackers contain heavy metals like Copper, Cadmium, and Chromium to give colorful lights. Aftercracking, these heavy metals from crackers mix with dust and causes harm to humans, animals and vegetation.

### **Summary**

The intensity of the noise in urban areas is growing day by day, caused due to industrialization, railways, aircrafts, vehicles as well as fireworks, speakers and DJ' systems.

Noise pollution by definition is wrong sound; these components may be in the wrong place and the wrong time for the next generation. Noise pollution is a silent killer producing unwanted energy and emotion that results in the person's body getting affected mentally and physically as well. Noise pollution also affects on the body of animal and vegetation. Noise pollution affects on living things. Noise pollution is growing due to industrialization and increasing number of vehicles.





### Impacts on human health due to noise pollution

1. High sound levels above 100dB lead to deafness.
2. Increased noise levels lead to enhanced blood pressure, lack in concentration, irritation, mental & physical imbalance.
3. Noise pollution may cause diseases like heart disease etc.
4. Noise also affects migration of birds & animals.
5. Noise pollution may adversely affect pregnant women.
6. Probable harmful impacts on human health by sound pollution at different levels are mentioned in **Table 10.5**.

**Table 10.5- Impact of Noise levels on human body**

Sr. No.	Noise levels in dB	Health Hazards
1	80	Annoying
2	90	Pain in ear
3	95	Very annoying
4	110	Stimulation of skin
5	120-130	Pain threshold
6	130-135	Dizziness, vomiting
7	140	Pain in ear & Headache
8	150	Significant change in heart pulse rate

1. Avoid use of loud crackers and it should not be burst in residential area.
2. Provide sound proof chambers to the generator sets being used.
3. No honking in the city.
4. Implementation of the rules by Supreme Court to control noise pollution.
5. Report instances of violation of noise pollution norms to the Police Department.

\*\*\*\*\*



## Chapter 11

# Solid Waste Management

### 11.0 Introduction

Solid waste management is a term that is used to define collection and treating solid waste. It likewise offers answers for reusing things that don't have a place with junk or waste. For as long as humans have been living in settlements and local locations, junk or solid waste has been an issue. Integrated Solid Waste Management is about how solid waste can be changed and utilized as a significant asset in a more systematic and holistic way. Solid waste administration ought to be understood by every last family including the entrepreneurs over the world. Industrialization has brought a great deal of good things and terrible things also. One of the negative impacts of industrialization is the formation of solid waste.

The scientific meaning is the collection, treating and disposal of solid material that is discarded because it has served its purpose or is no longer useful. Improper disposal of municipal solid waste can create unsanitary conditions and these conditions in turn can lead to pollution of the environment and to outbreaks of vector born disease i.e. diseases spread by rodents and insects.

#### **Type of Solid waste:**

##### **A) Bio-degradable waste**

It includes any organic matter in waste which can be broken down in to carbon dioxide, water, methane or simple organic molecules by microorganism and other living things using composting, aerobic digestion, anaerobic digestion or similar process. For example: Grass clippings, wastage of vegetables, kitchen waste, animal waste, dead animals, wood, etc.

##### **B) Non - Biodegradable waste**

Non-Biodegradable wastes are the type of waste that cannot breakdown or degrade for many years. This type of waste cannot change into manure and hence piles up causing pollution. Burning of these fuels causes more pollution in the environment. The non-biodegradable wastes



can become useful when they are recycled. Non Biodegradable waste can be divided into two subclasses:

**B - 1. Reuse/Recycle:** Recycling is the method used to convert the waste materials into products which can be reused. The common waste materials which have the potential to be reused can be recycled as raw materials, can reduce energy consumption and need for waste disposal. Includes plastic, paper, glass, cloth, iron, rubber, etc. means this can be sold out to scrap dealer.

**B - 2. Non-recyclable:** Non-recyclable waste will end up at the dumping ground to be buried. It does not contain any of the recyclable waste because of prior sorting out. Wrapping, bags, Thermacol, tetra pack, water bottles, etc. This material is not purchased by anyone.

### **Various Grades of Solid Waste**

1. Organic waste: Food, wet waste, vegetables etc.
2. Combustible: Paper, Wood, Grass Clippings, packed garbage etc. (High level organic and less wet ingredients).
3. Inflammable: Metal, alcoholic bottles, bottles, stones, etc.
4. Ash/Sand: Fine residues used for cooking.
5. Heavy solid waste: Branch of trees, tyres, etc.
6. Hazardous Waste: Oil, acid battery, medical waste, etc.
7. Construction waste: construction debris, soil, stones, etc.

### **Origin of Solid waste**

1. Household waste: Vegetables, Fruits & other peels, clothes, plastic, other waste generated from home.
  2. Agricultural Waste: Crops waste, spoiled fruits, leaves, tree trunk, etc.
  3. Other: Companies waste material, dead animals, glass, waste furniture, industrial ash, etc.
- Solid waste management has an important factor that is its classification.
4. It can be classified as below:

### **Solid waste classification**

1. Wet Waste/ Biodegradable waste
2. Dry Waste/Non biodegradable waste
3. Reusable solid waste



4. Waste management or waste disposals are all the activities and actions required to manage waste from its inception to its final disposal. Waste management is not only collecting & incinerating by disposing off the waste. Waste management means to segregate waste, according to it reuse it or give a proper treatment and then dispose it. As per Municipal Solid Wastes (Management and Handling) Rules, 2016 waste classification is necessary and throwing waste on open site is banned.

#### **D – Driving Force**

1. Increasing population
2. Increasing no. of slums
3. Increasing industrial development in NMC area
4. Increasing solid waste during festival & occasion
5. Lack of waste classification

#### **P – Pressure**

1. Increased waste quantity due to Urbanization, Transportation, and Industrialization
2. Due to improper classification of waste
3. Increase of suspended particulate matter in Pandavleni and surrounding area
4. Various bacteria and growth of diseases from it
5. Increased quantity of solid waste
6. Difficulties during waste collection, segregation, transportation and disposal
7. Degradable and non-degradable waste should be collected together.

#### **S - Status**

##### **11.1 Current Status of SWM in India**

Every day 1.15 Lakh per day solid waste is generated in urban areas in our country. Total waste generated in six mega cities is 21,000 TPD i.e. 18.35%, waste generated in metro cities 19,643 TPD i.e. 17.08%, waste generated in class one cities 42,635 TPD i.e. 37.07%. Management of Solid Wastes is of growing concern to the general public at large, local authorities and Business communities in cities and towns across India.



The problem is exacerbating in urban areas due to rapid strides in population growth, coupled with an economic boom that encourages the Consumption of goods and, hence, wastes generation. If waste produced in all the class one cities is talked, total percentage of waste scientifically managed would be 80 % of the total waste generated in India.

### **Reasons of Improper Management of Waste**

- Improper planning for waste management while planning the townships.
- Impractical institutional set up for waste management and planning and designing in urban local bodies
- Lack of technical and trained manpower
- Incomplete community involvement
- Less expertise and exposure to the city waste management using modern techniques and best practices
- Partial awareness creation mechanism
- Outdated Management Information Systems
- Less funds with urban local bodies
- Indifferent attitudes of urban local bodies in user charges and sustainability

The Local Governing Bodies (LGBs), viz. municipalities and municipal corporations, are responsible for providing SWM services in the urban areas. In most of the urban areas, insufficient funds, use of obsolete/ inefficient technologies, lack of public awareness/training, and improper infrastructure have resulted in a state of poor SWM.

### **MSW – Municipal Solid Waste**

MSW primarily comprises of 51% of Organic fraction, 17% of recyclables (paper, plastic and paper 32%) and inert material less than 1% of glass and metal (Report of Task Force on Waste to Energy). Currently India produces 42 million tons of MSW annually (200 to 600 gms per capita).



## **11.2 Initiatives to Improve SWM in India**

In recent years, the Government of India has taken several initiatives to improve existing SWM Practices in the country. The solid waste policy in India specifies the duties and responsibilities for hygienic waste management for cities and citizens of India. The policy was framed in September 2000, based on the March 1999 Report of the Committee for solid waste management in Class 1 cities of India. Some of the key initiatives and recommendations are discussed below:

### ***A) Honorable Supreme Court of India Recommendations***

In recent years, the current SWM system in India has received considerable attention from the Central and State Governments and local municipalities. The first initiative was taken by the Honorable Supreme Court of India in 1994, which resulted in the formation of a Committee to study the current status of SWM in Indian cities. This Committee identified the deficiencies/gaps in the existing SWM system in the country and prepared the “Interim Report on SWM Practices in Class I Cities”. Class I are cities with a population ranging between one lakh to ten lakhs (1, 00,000 – 10, 00,000).

### ***B) Municipal Solid Waste Management Rules***

As a second initiative, the Ministry of Environment, Forests & Climate Change (MoEF & CC), Government of India, published “Municipal Solid Waste (Management and Handling) Rules 2000” (modified in 2016). These rules were developed in conformance with Sections 3, 6 and 25 of the Environment Protection Act, 1946 and aim at standardization and enforcement of SWM practices in the urban sector. According to Rule 4 of the MSW Rule 2000, (modified in 2016) every municipal authority is responsible for infrastructure for segregation and processing of municipal solid waste (commonly known as garbage).

They dictate that, “Every municipal authority shall, within the territorial area of the municipality, be responsible for the implementation of the provisions of these rules and infrastructure development for collection, storage segregation, transportation, processing and disposal of municipal solid wastes”. In addition, “the CPCB shall coordinate with State Pollution Control Boards (SPCBs) and Pollution Control Committees (PCCs) in the matters of MSW disposal and its management and handling”.





### ***C) Jawaharlal Nehru National Urban Renewal Mission***

The Jawaharlal Nehru National Urban Renewal Mission (JNNURM) was a massive city modernization scheme launched by GOI under Ministry of Urban Development. It envisaged a total investment of 20 billion dollar over seven years. JNNURM provided funding for urban infrastructure development in 63 cities and towns of the country. This mission was initiated in December 2005 and was continued until 2014. The scheme primarily incorporated two sub missions in to its program i.e. urban infrastructure and governance administered by Ministry of Urban Development with a focus on water supply and sanitation, solid waste management, road network, urban transport and redevelopment of old city area and development of basic services to the urban poor (BSUP) administered by the Ministry of Housing and Urban Poverty Alleviation with a focus on integrated development of slums.

### ***D) Urban Infrastructure Development Scheme for Small and Medium towns***

The primary objective of this scheme is to improve the urban infrastructure in towns and cities in a planned manner and to promote public-private partnership (PPP) in infrastructure development. This scheme was introduced in the year 2005-06 and was to continue for seven years. This scheme is applicable to all cities/towns as per 2001 census, except the cities/towns covered under the JNNURM. One of the components of this scheme is to renew the old sewerage and solid waste disposal systems in inner (old) areas.

### ***E) Swatch Bharat Mission or Abhiyan***

Swatch Bharat Mission (SBM) was launched on 2<sup>nd</sup> of October, 2014 with a vision to achieve a clean India as a tribute to the father of the nation, Mahatma Gandhi, on his 150<sup>th</sup> birth anniversary, in 2019.

The campaign in India that aims to clean up the streets, roads and infrastructure of Indian cities, smaller towns and rural area. The objectives of SBM include eliminating open defecation through the construction of household owned and community owned toilets and establishing an accountable mechanism of monitoring toilet use. Run by the GOI, the mission aims to achieve an open defecation free India up to 2<sup>nd</sup> October 2019.



SBM is being implemented by the Ministry of Urban Development (MoUD) and by the Ministry of Drinking Water and Sanitation (MoDWS) for urban and rural areas with a given set of guidelines for improved sanitary services and capacity building initiatives.

Municipal Solid Waste Management (MSWM) a major component of the SBM (urban)- “refers to a systematic process that comprises of waste segregation and storage at source, primary collection, secondary storage, transportation, secondary segregation, resource recovery, processing, treatment, and final disposal of solid waste.”

Under the provisions of SWM, the local bodies are to prepare Detailed Project Reports in consultation with the state government based on the identified needs of the City Sanitation Plans. Provision also mentions clustering of smaller cities for attracting Private investment. The DPRs should be prepared on lines with Govt. of India’s goals outlined in the NUSP 2008, SWM rules, advisories, CPHEEO manuals (including cost-recovery mechanisms), O&M practices and Service-level Benchmark advisories released by Mo UD and Manual on Municipal Solid Waste Management Rules, 2000 (modified in 2016).

#### ***F) National Green Tribunal Recommendations***

Action plan for management of municipal solid waste (MSW) CPCB has framed and notified the Action plan for management of municipal solid waste (MSW) in compliance with the National Green Tribunal order dated 5th Feb 2015 in the matter of OA No. 199 of 2014. The action plan emphasizes on strengthening the planning exercise at national, state as well as city Level by improvising through the waste management value chain. In addition to that, the plan suggested the concept of regional duster approach as well as technology options on the basis of quantum of MSW generation which has been re produced below in nutshell.



The Regional Cluster approach is based on the concept of discouraging setting up of individual waste processing and disposal facilities leading to mushrooming of innumerable facilities which are difficult to monitor and sustain. The approach requires a detailed survey of the study area and identification of location for regional facility with adequate size of land free from public objections. An indicative distance of say up to 50 km for each local body may be feasible based on local condition, fixing of criteria by the local body to transport the waste for common disposal point without causing public nuisance and traffic hurdles. However, alternate options can be worked out for smaller local bodies.

Common facility should be 'integrated' with facilities for sorting, compost, RDF and energy plant and followed by inert recycling/re-use. Only a fraction of inert waste should go for land-filling. The Action Plan has outlined indicative plan based on the quantum of waste generated in the cluster. The indicative plans have been given for towns/ cities in four ranges of waste generation

**Table 11.1- Indicative Plans for Municipal Solid Waste Management**

<b>Range</b>	<b>Plans of Treatment</b>
>500TPD	Modernization/ mechanization of waste storage and transportation facilities Privatization/contract with operators for collection of waste from various sources and its transportation. Seeking support of private entrepreneurs for setting up for waste processing and disposal facility.



Between 100-500 TPD	Modernization/ mechanization of waste storage and transportation facilities Privatization/contract with operators for collection of waste from various sources and its transportation. Seeking support of private entrepreneurs for setting up for waste processing and disposal facility.
Less than 100 TPD	Proper system for waste collection, storage and transportation considering the local situation. Aerobic composting Such towns can be the member of cluster/Regional facility.
Less than 50 TPD	Technological solutions which could be managed without high skill operations. Proper collection of waste and motivating citizens for segregation of waste Composting Such towns located near the Regional facility, should be the part of it.

Individual city has to establish its own waste processing plant and to provide its disposal facility it. So, due to these nearby surrounding areas has increased the number of processing plant whose care should be taken for further spam of time which is little bit expensive. Therefore, public establishment is better than individual establishment. For the public establishment, land survey should be taken done before used which should not be opposed by public, transportation point should be taken into consideration whose distance should be minimum 50 km local administration centre. Waste must be in solid form. Apart from these, smaller alternatives are needed to be found out.

### 11.3 Current Status of Solid waste Generation in NMC

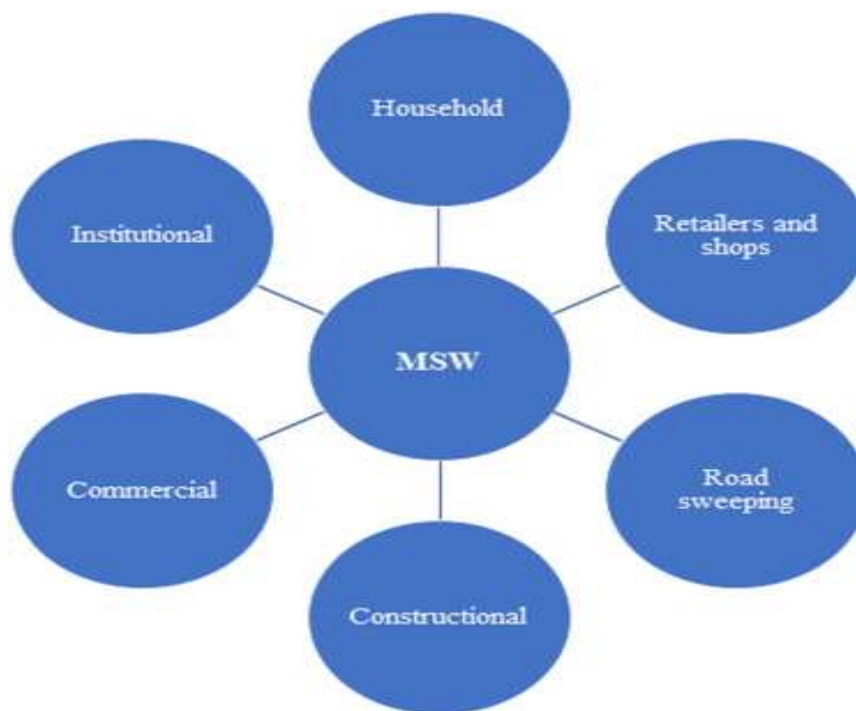
Nashik city is governed by Municipal Corporation which comes under Nasik Metropolitan Region. The Nashik city is located in Maharashtra State of India. As per provisional reports of Census, the population of Nashik city in 2011 is 1,486,053. Accordingly, the population has reached to 14.86 lakh in 2011 and is estimated to reach 22.38 lakhs in 2021 and over 33.72 lakhs in 2031. The population annual average growth rate of the city is 3.09%, which is a healthy growth rate. NMC area is generating approximately 550 Metric Tons of solid wastes per Day (MTD).

#### A) Waste Collection

Nashik Municipal Corporation collects solid waste from door to door by Ghanta gadis, small vehicles. Currently 646 MT solid wastes are collected every day in which approximately 50% is wet waste and 48% is dry waste.



**Fig 11.1- Solid Waste Management**



**Fig 11.2- Sources of Municipal Solid Waste Generation**



Waste is the end product of any process. The characteristics of waste vary at different sources of generation. It is important to identify these sources and incorporate in our study to understand the versatility of waste characteristic in a city. The sources are as follows.

Type of Establishment	Predominant waste
Residential	Biodegradable (Wet) Waste & Dry waste
Restaurant	Biodegradable & Non-Biodegradable (Dry) Waste
Wholesale & Retail Stores	Non-Biodegradable (Dry) Waste
Vegetable & Fruit Market	Biodegradable (Wet) Waste
Institutions	Non-Biodegradable (Dry) Waste
Industries	Biodegradable, Non-biodegradable, (Dry) waste (Ambad and Satpur MIDC)

**Table 11.2 - Sources of Solid waste in NMC**

**Table 11.3- Current status of Solid waste generation in NMC**

Sr. No.	Particulars	2019-20
1	Population of NMC Area (census 2011)	1,486,053
2	Total solid waste collection per day	646 MT/day
3	Per capita quantity of solid waste generated metric ton per Day	434.78 gms
4	Percentage of segregation	Wet 52%, Dry 48%
5	Location of the solid waste processing site	Sr. No. 278, Pathardi Shivar, Behind Pandav Caves, Pathardi Phata, Nashik – 422010
6	Authorization for this site	MPCB Authorization up to 2027
7	Area of solid waste processing site (Sq.mt.)	331842 sq.mt
8	Distance from city to solid waste processing site (Km)	12 Km
9	Manpower required for management of waste	100 Nos
10	No. of vehicles for management of solid waste	26 ( use at composting project)
11	No. of vehicles (private /NGO'S)for handling waste	262 (solid waste collection)
12	Present mode of treatment disposal	Aerobic Composting Unit, Inert Processing Unit, Leachate Treatment Plant, Refuse Derived Fuel Plant, Animal Carcass Incinerator, Sanitary Landfill





## B) Solid waste collection:

Waste from the roads is collected through sweeping while household waste is collected by door to door collection by 'Ghantagadi' with the help of the 2582 sweepers. Nashik is the only city in Maharashtra which has taken lead towards scientific management of MSW in abidance of MSW Rules 2000 & MSW Rules 2016. With the up gradation of entire SWM system, this facility could act as a lime light training and development center for the state of Maharashtra.

NMC has given contract of collection and transportation of solid waste of the 6 divisions and 31 wards to two contractors. Contract of collection and transportation includes door to door collection of solid wastes through Ghanta Gadies, and transportation to MSW treatment plant. Solid waste is collected from households of different wards of the city through 262 vehicles and ownership of the vehicle is with NMC.

Municipal Corporation has installed Nirmalya Kalash at various locations along with rivers for collecting Nirmalya from the city.

**Table 11.4 - Average Characteristics of Fresh Municipal solid wastes**

Sr. No.	Component	Proportion (kg)
<b>A)</b>	<b>Biodegradable Waste</b>	
1	Green Vegetable	39.64
2	Kitchen Waste	3.51
3	Slaughter House	0.63
4	Coconut Shell	1.18
5	Paper & Paper Products	2.31
<b>Total</b>		<b>47.28 /60.59%</b>
<b>B)</b>	<b>Non-Biodegradable Waste</b>	
1	Plastic & Plastic Products	7.13
2	Cloths, Cloth Products	14.62
3	Sand, debris, stones, etc.	1.83
4	Glass, crokeries, china pots	1.31
5	Rubber, tyre, tubes, etc.	1.92
6	Steel, aluminium, tin, copper, etc.	0.89
7	Leather, chappals, shoes, etc.	0.93
8	Synthetic, leather, etc.	1.61
9	Handling Loss	0.50
<b>Total</b>		<b>30.74 /39.41%</b>



Source: SWM Department, NMC

### C) Solid Waste Transportation

Waste is transported from the collection points to the landfill site near Pandav Leni Caves every day. Planned vehicles for transport of waste near Pandav Leni Caves with route cost optimization and time. The schedule of all vehicle prepared which includes time, capacity of bin, route and ward no. Also record of fuel, condition and maintenance of vehicle are carried out. Separate vehicles are assigned for hotel waste collection.



Fig 11.3 - MSW Management Practices

### D) Solid waste Disposal (Treatment methods)

Integrated information about waste treatment plant installed in **Compost Plant** near Pandav Leni Caves by Municipal Corporation is presented in **Table 11.5**.

**Table 11.5 - Showing particulars of various waste treatment plants of Compost Plant near Pandav Leni Caves**

Sr. No.	Plant	Capacity(TPD)	Present treatment
1	Electro-mechanical Segregator	500 TPD	600 TPD
2	Composting Plant	500 TPD	600 TPD
3	Inert Processing Unit	50 TPD	50 TPD
4	Leachate Treatment Plant	0.4 MLD	0.6 MLD
5	RDF Plant	150 TPD	150 TPD
6	Animal Carcass Incinerator	250 kg/h	300 Kg/Hr
7	Sanitary Landfill	2 Hector	2 Hector

Source: SWM Department, (Manual on Solid Waste Management Plan for Nashik Municipal Corporation) NMC TPD – Tonnes per day.



**Fig 11.4 - MSW Treatment Plant and Sanitary Landfill site at Compost Plant, Nashik**

Proper arrangement for collection and transportation of leachate has been made. The leachate from the waste is also regularly treated & disposed of scientifically. As leachate is primarily generated in monsoon season and during other period, same plant is utilized for biogas generation from organic waste. 40 KW power is generated through the plant and utilized for operation of pumps at MSWM Facility. NMC is responsible for proper and scientific way of collection, segregation and disposal of municipal solid wastes within the limits of its jurisdiction, in compliance with:

- ✚ Environment Protection Act 1986
- ✚ Government of India Municipal Solid Waste (Management and Handling) Rules 2000 & Solid Waste (Management and Handling) Rules 2016.



### Compost Plant near Pandav Leni Caves, Nashik

#### Pre-sorting Unit

It is electro-mechanical segregation system for incoming non segregated MSW with the capacity of 500 TPD and it comprises of two lines with all necessary requirements and materials. After mechanical segregation compostable material will go to windrow composting, material with calorific value goes to RDF plant and inert will be further processed at Inert Processing plant.





### **Aerobic Composting Unit**

Composting is done through windrow composting method and sheds have been constructed for windrows. Today out of total MSW 3% to 5 % is converted into compost. The compost has already become popular amongst the farmers within 100 km radius of Nashik. Once segregation at source will be increased, then the quantity of generation of compost will increase up to 10% to 15 % of total MSW. The Compost Plant has been given on PPP basis for operation.

### **Inert processing unit**

Inert processing unit, with a capacity of 50 TPD, comprises of mechanical sieve and air density separator. Main purpose of inert processing plant is to recover the construction material from the waste and to recycle it by selling or utilizing it for in-house construction activities. This is mainly to minimize landfill burden on O&M cost and also saving of land.

### **Leachate treatment plant**

Leachate treatment plant with capacity of 0.4 MLD leachate has been installed for treatment of leachate coming out from the windrows, the solid waste dumps and sanitary landfill site. Proper arrangement for collection and transportation of leachate has been made. As leachate is primarily generated in monsoon season and during other period, same plant is utilized for bio gas generation from organic waste. 40 KW power is generated through the plant and utilized for operation of pumps at MSWM facility.

### **Refuse Derived Fuel (RDF) Plant**

The high calorific energy containing materials present in MSW are to be handled separately from the stage of receiving at the tipping floor onwards. RDF plant with capacity of 150 TPD is installed for generation of fuel pellets from high calorific value materials. Woody materials, paper products, textiles, jute etc forms the main constituents of RDF which is a valuable source of alternate energy. The technology for RDF primarily focuses on refinement of MSW through material re-combinations, segregation, drying, size reduction, blending and homogenization. This material is further refined for separation of sand, dust, metals, glass etc before grinding or shredding. The shredded material is obtained as fluff (<2 cm size) which is



Further processed into pellets, briquettes or bailing. NMC is exploring the possibilities for marketing of fuel pellets and nearby industries have shown their interest for fuel pellets.

### **Animal Carcass Incinerator**

Dead animal's carcass incinerator with the capacity of 250 kg per hour is installed for the incineration of dead animals such as dogs, cattle etc.

### **Sanitary landfill**

The solid waste that is not suitable for any processing is transported to the sanitary landfill site. For this purpose, a sanitary landfill in an area of 2 hector has been developed. All the necessary aspects of scientific land filling were considered during creation of sanitary landfill. Proper arrangement for leachate is also provided and this is connected to the leachate treatment plant for further processing.

Details of solid waste disposal in Compost Plant are documented in **Table 11.7 to 11.13**. Analytical reports of composts, capping soil, pit soils, air qualities, and fertilizer values of wastes and surface & ground water characters of the areas in and around Compost Plant, Near Pandav Leni Caves are presented in **Tables**.



**Sanitary Landfill**





**Table 11.6 (i) - Solid waste disposal in SWM Plant, Near Pandav Leni Caves during 2021-22**

Sr. No.	Month	Waste Received	Compost Production	RDF Production	Reject (MT)
1	April 21	17858.92	1130.00	3303.00	3460.0
2	May 21	19074.74	1260.00	3528.00	3566.0
3	June 21	19303.00	965.00	3585.00	3496.0
4	July 21	19894.81	1010.00	3679.00	3709.0
5	August 21	20230.98	191.00	3742.00	3760.0
6	September 21	20477.34	950.00	3787.00	3638.0
7	October 21	21436.55	965.00	3965.00	3834.0
8	November 21	19209.01	900.00	3552.00	3612.0
9	December 21	19216.785	935.00	3448.00	3596.0
10	January 22	18906.15	960.00	3497.64	3591.0
11	February 22	17084.925	977.00	3160.722	3264.0
12	March 22	19834.965	608.00	3669.469	3657.0
<b>Total (MT)</b>		<b>232607.255</b>	<b>11551.00</b>	<b>39641.861</b>	<b>43183.0</b>

*Source: SWM Department, NMC*

**Table 11.7- Physico-chemical properties of Manure, city compost of the pit in SWM Plant, Near Pandav Leni Caves in 2021-22**

**i. Manure analysis Report of fresh MSW**

Sr. No.	Parameter	Result	Unit	Standard Method
<b>Physical Parameter</b>				
1	Moisture content	22.2	-	FCO, Schedule IV, Part D-2 Page No.218
<b>Chemical Parameter</b>				
1	Organic matter	37.63	% by wt	FCO, Schedule IV, Part D-5
2	Total Nitrogen	1.21	% by wt	% Part D-6, Page-219
3	C:N ratio*	18.03	-	% Part D-7, Page-219
<b>Elemental Testing</b>				
1	Potassium (as K)	0.64	% by wt	% Part D-9, Page-219
2	Phosphorous (as P2O5)	0.79	% by wt	Part D-8 Page-219

*Source: SWM Department, NMC*



**Table 11.8 - Manure Analysis Report of RDF MSW**

Sr. No.	Parameter	Result	Unit	Standard Method
<b>Physical Parameter</b>				
1	Moisture content	18.4	-	FCO ,Schedule IV PART D-2 Page No.218
<b>Chemical Parameter</b>				
1	Organic matter	24.23	% by wt	FCO ,Schedule IV Part D-5
2	Total Nitrogen	0.81	% by wt	FCO ,Schedule IV Part D-6 Page-219
3	C:N ratio*	17.34		FCO ,Schedule IV Part D-7Page-219
4	Calorific value	4119	Kcal/Kgs	IS1350 (Part ii)1970 Reaffirmed 2009
<b>Elemental Testing</b>				
1	Potassium (as K)	0.53	% by wt	FCO ,Schedule IV Part D-219
2	Phosphorous (as P <sub>2</sub> O <sub>5</sub> )	0.65	% by wt	FCO ,Schedule IV Part D-219

**Source: SWM Department, NMC**

**Table 11.9 - Analysis of City Compost at SWM Plant, Near Pandav Leni Caves 2020-21**

Sr. No.	Specification as per FCO	Composition as per Analysis (in %)
<b>A</b>	<b>Physical Characteristics</b>	
	1. Moisture	23.5
	2. A. Particle Size: + 4.00 mm	97.1
	2. B. Particle Size: + 4.00 mm	
	3. Bulk Density (gm/cm <sup>3</sup> )	0.5164
<b>B</b>	<b>Chemical Characteristics</b>	
	1. Total Organic Carbon	30.03
	2. Total Nitrogen	1.69
	3. Total Phosphate P <sub>2</sub> O <sub>5</sub>	0.0836
	4. Potash	0.82
	5. C:N Ratio	17.76
	6. pH	7.33
<b>C</b>	<b>Heavy Metals</b>	
	1. Zinc (as Zn) mg/kg	503
	2. Cadmium (as Cd) mg/kg	3.13
	3. Lead (as Pb) mg/kg	57.7
	4. Copper (as Cu) mg/kg	223

**Source: SWM Department, NMC**



**Table 11.10 - Analysis of Leachate at SWM Plant, Near Pandav Leni Caves- 2021-**

22

Sr. No.	Parameter	Leachate-1 Raw	Leachate 2 Treated	Leachate After Primary Treatment	Leachate Raw	Unit
1	TSS	370	50	-	-	mg/lit
2	TDS	2750	130	-	-	mg/lit
1	pH	6.7	7.5	-	-	--
2	BOD	1200	30	-	-	mg/lit
3	COD	4700	91	-	-	mg/lit
4	Chlorides as Cl	417	103	-	-	mg/lit
5	Phenol *			-	-	mg/lit
6	Ammonical Nitrogen	5.7	1.0	-	-	mg/lit
7	Total Kjeldahl Nitrogen	8.2	1.3	-	-	mg/lit
11	Fluoride as F *	1.2	0.9	-	-	mg/lit
9	Arsenic as As*	BLQ(LOQ :0.1)	BLQ(LOQ:0.1)	-	-	mg/lit
10	Mercury as Hg*	0.173	0.09	-	-	mg/lit
11	Lead as Pb*	29.5	1.18	-	-	mg/lit
12	Cadmium as Cd*	4.21	0.16	-	-	mg/lit
13	Chromium as Cr*	7.13	0.25	-	-	mg/lit
14	Copper as Cu	21	6	-	-	mg/lit
15	Zinc as Zn	319	28	-	-	mg/lit
16	Nickel as Ni	36.1	4.7	-	-	mg/lit

**Source: SWM Department, NMC**

**BDL - Below Detectable Level**



**Table 11.11 - Ground water qualities in and around SWM Plant, near Pandav Leni Caves- Average 2021-22**

Sr. No.	Parameter	Ground water	Unit
1	Phenol*	BLQ (LOQ :0.001)	mg/lit
2	Ammonical Nitrogen	0.19	mg/lit
3	Total Kjeldahl Nitrogen	2.13	mg/lit
4	Fluoride as F *	0.8	mg/lit
5	Arsenic as As*	BLQ (LOQ :0.005)	--
6	Mercury as Hg*	BLQ (LOQ :0.0008)	mg/lit
7	Lead as Pb*	BLQ (LOQ :0.008)	mg/lit
11	Cadmium as Cd*	BLQ (LOQ :0.002)	mg/lit
9	Chromium as Cr*	BLQ (LOQ :0.02)	mg/lit
10	Copper as Cu	BLQ (LOQ :0.02)	mg/lit
11	Zinc as Zn	BLQ (LOQ :0.05)	mg/lit
12	Nickel as Ni	BLQ (LOQ :0.01)	mg/lit

*Source: SWM Department, NMC*

**Table 11.12 - Surface Nala and Surface pond water qualities in and around SWM Plant, near Pandav Leni Caves - Average 2021 - 22**

Sr. No.	Parameter (mg/lit)	Surface Nala water	Surface Water Pond	Std. IS10500:2012
1	Phenol*	BLQ(LOQ:0.001)	BLQ(LOQ:0.001)	Clause 6 of IS3025 (Part 43:1992)
2	Ammonical Nitrogen	0.39	0.31	
4	Fluoride as F *	1.0	0.9	IS 3025 (Part60):2008
5	Sulphate as P *	86	79	IS 3025 (Part24):1986
6	Nitrate as NO3*	39.3	40.1	APHA,4500-NO 3.4127
7	Arsenic as As*	BLQ(LOQ:0.005)	BLQ(LOQ:0.005)	IS 3025(Part 2):2019/15011885:2007
8	Mercury as Hg*	BLQ(LOQ:0.0008)	BLQ(LOQ:0.0008)	IS 3025(Part 2):2019/15011885:2007
9	Lead as Pb*	BLQ(LOQ:0.008)	BLQ(LOQ:0.008)	IS 3025(Part 2):2019/15011885:2007
10	Cadmium as Cd*	BLQ(LOQ:0.002)	BLQ(LOQ:0.002)	IS 3025(Part 2):2019/15011885:2007
11	Chromium as Cr*	BLQ(LOQ:0.02)	BLQ(LOQ:0.02)	IS 3025(Part 2):2019/15011885:2007
12	Copper as Cu	BLQ(LOQ:0.02)	BLQ(LOQ:0.02)	IS 3025(Part



				2):2019/15011885:2007
13	Zinc as Zn	BLQ(LOQ:0.05)	BLQ(LOQ:0.05)	IS 3025(Part 2):2019/15011885:2007
14	Nickel as Ni	BLQ(LOQ:0.01)	BLQ(LOQ:0.01)	IS 3025(Part 2):2019/15011885:2007

**Source: SWM Department, NMC**

**Conclusion** - From above table it is observed that results of some hazardous chemicals have exceeded standard limits.

### E) Biomedical Waste Management

According to Biomedical Waste (Management and Handling) Rules, 2016 of India “Any waste which is generated during the diagnosis, treatment or immunization of human beings or animals or in research activities pertaining there to or in the production or testing of biological.

**Table 11.13- Average Annual Air quality testing report at SWM Plant, near Pandav Leni caves**

Sr. No.	Parameter	Near ETP	Near Main Gate	Unit	NAAQ Standards (µg/ M3)
1	Ambient Temperature	30.25	30.3	0 C	
2	Dry Bulb Temperature	29.75	30	0 C	
3	Wet Bulb Temperature	23	22.3	0 C	
4	Relative Humidity	48	49	% RH	
5	Sampling Duration	1440	1440	Min	
6	Sulphur Dioxides (So2)	23.18	19.26	µg/m3	80
7	Oxides of Nitrogen (No2)	36.54	25.32	µg/m3	80
8	Particulate Matter PM 10	36.54	59.55	µg/m3	100
9	Particulate Matter PM 2.5	25.26	23.29	µg/m3	60
10	Ozone (O3)	13.24	15.52	µg/m3	180
11	Lead (Pb)	BDL	BDL	µg/m3	1.0
12	Carbon Monoxide(CO)	0.33	0.43	mg/m3	04
13	Ammonia (NH3)	BDL	BDL	µg/m3	400
14	Benzene (C6H6)	BDL	BDL	µg/m3	05
15	Benzo (a) Pyrene (BaP)	BDL	BDL	ng/m3	01
16	Arsenic (As)	BDL	BDL	ng/m3	06
17	Nickel (Ni)	BDL	BDL	ng/m3	20

**Source: SWM Department, NMC**



The GOI Notification, 1998 specifies that hospital waste management is a part of hospital hygiene and maintenance activities. This involves management of range of activities, which are mainly engineering functions, such as collection, transportation, operation or treatment of processing systems, and disposal of wastes. One of India's major achievements has been to change the attitudes of the operators of health care facilities to incorporate good HCW management practices in their daily operations and to purchase on-site waste management services from the private sector. World Health Organization states that 85% of hospital wastes are actually non-hazardous, whereas 10% are infectious and 5% are non-infectious but they are included in hazardous wastes. About 15% to 35% of Hospital waste is regulated as infectious waste. This range is dependent on the total amount of waste generated.

The World Health Organization (WHO) has classified medical waste in to eight categories as

Category No. 1: Human Anatomical Waste

Category No. 2: Animal Waste

Category No. 3: Microbiology & Biotechnology Waste

Category No. 4: Waste Sharps

Category No 5: Discarded Medicines and Cytotoxic Drugs

Category No 6 Soiled Waste (Item Contaminated with Blood and Body Fluids)

Category No 7 Infectious Solid Waste

Category No 8: Liquid Waste

Category No 9: Incineration Ash

Category No 10: Chemical Waste

In general Biomedical Waste consists of

- Human anatomical waste like tissues, organs and body parts
- Animal wastes generated during research from veterinary hospitals
- Microbiology and biotechnology wastes
- Waste sharps like hypodermic needles, syringes, scalpels and broken glass
- Discarded medicines and cytotoxic drugs
- Soiled waste such as dressing, bandages, plaster casts, material contaminated with blood, tubes and catheters





- Liquid waste from any of the infected areas
- Incineration ash and other chemical wastes

### Legal aspect

The Central Government, to perform its functions effectively as contemplated under sections 6, 8, and 25 of the Environment Protection Act, 1986, has made various Rules,

Notifications and Orders including the Bio-medical wastes (Management & Handling) Rules, 1998.

A brief summary of the provisions in Bio-medical wastes (Management & Handling) Rules, 1998 is given below.

- Section 3 establishes the authority of the government to undertake various steps for protection and improvement of the environment.
- Section 5 provides for issuance of directions in writing.
- Section 6 empowers the government to make rules.
- Section 8 permits the education of individuals dealing with hazardous wastes regarding various safety measures.
- Section 10 bestows authority to enter the premises and inspect.
- Section 15 allows the government to take punitive steps against defaulters. This involves imprisonment up to five years or penalty of upto rupees one lakh or both. In case the default continues, it would then attract a penalty of rupees five thousand per day up to one year and thereafter imprisonment up to seven years.
- Section 17 provides for punishment in case of violations by government departments

**Table 11.14- Medical facilities available in Nashik Municipal Corporation Area**

Sr. No	Type of Medical Establishment	Nos.
1	Total no. of beds available	12715
2	Private nursing homes, Maternity & Hospitals	571
3	NMC Hospitals	04
4	Municipal nursing homes	05
5	Dispensaries & City primary health center	30
6	Mobile dispensaries	-



7	Sonography centers	329
8	Govt. hospitals	02
9	ESIC hospitals	01
10	ISP hospitals	0
11	Immunization center	34
12	Aids center	01
13	Gov. Recognized MTP center	123
14	Family planning centers	55 Pvt. + 9 Gov. = 64
15	Leprosy unit	01
16	Leprosy center	11
17	Medical centre	30
18	Vaccination centre	34

**Source: Health Department, NMC**

In Nashik, Water grace Products provide facilities of Biomedical Collection, Transportation, Segregation and disposal. Since last 15 years M/S Water grace Products provide this facility for Nashik District. They collect biomedical waste by visiting door to door in municipal corporation area. All the necessary setups of common biomedical waste collection, transportation, treatment and disposal facilities are available with them. They provide treatment as per MPCB and CPCB norms.

**Table 11.15- Details of Biomedical Waste and Quantity of Bio medical waste generation**

S. No	Details	2021-22
1	Total Bio Medical waste generated in (kg)	1003680 kg
2	Process treatment of Bio Medical waste	As per environment act
3	Total nos. of collection center for Bio Medical waste from Health Care Establishment's Nashik city	Through 08 vehicles
4	Total nos. of disposal units for Bio Medical waste	One (through incinerator machines )
5	How much waste is treated out of total generation of Bio Medical waste	1003680 kg
6	No. of vehicles is used for collection of Bio	08 Vehicles



	Medical waste	
7	No. of collection center of Bio Medical waste	06 center
8	Total no. of beds covered	13053 (including private hospitals)
9	Use of solar energy (fan, light etc.)	No
10	STP/ETP plant is established or not?	Yes
11	Quantity of recycle water	NA/39,00,000 Ltr.

*Source - Health Department, NMC*

### **Hazardous waste**

Nashik city has two MIDC areas namely Ambad and Satpur. There are number of Industries, out of which few industries are of Red categories which generate Hazardous waste. The industries which generate hazardous waste come under Red category as per the CPCB norms. The industries have to follow the Hazardous & Other Wastes (Management & Tran boundary) Rules 2016. Industries which generate the hazardous waste have to take the membership from authorized company. MIDC is constructing a CETP Plant in MIDC Area in Ambad.

### **Summary**

#### **Initiatives to be taken for Integrated Solid Waste Management in NMC:**

In general Municipal Corporations or ULB's mostly suffer from lack of funds and man power to perform the required functions. Moreover, with increasing urbanization and rate of solid waste generation, the burden has also magnified. The MSW Rules, 2000 (modified in 2016) have set responsibilities for ULBs, State governments and Central & State pollution control boards for different aspects of MSW management. These rules make ULB's responsible for their implementation and for any other infrastructure development pertaining to collection, storage, segregation, transportation, processing and disposal of municipal solid waste.



## **Information, Education and Communication Strategy (IEC) :**

Identification and selection of target groups plays a key role in creating effective awareness

### **A) *Environment Education:***

Education becomes the next significant factor in creating public awareness. It requires people to have basic understanding in waste management project activities. They will be briefed on various aspects of MSW system right from its generation to disposal. The education would also disseminate them with ideas such as why it needs to be discussed at such big platform, what will be the benefits of processing it scientifically and why if not treated properly; it can lead to havoc in coming years. This component shall help in bringing citizens together from various walks of life such as students, NGOs, intellectual class and teachers etc.

They can share a platform to partner with the authorities who are engaged in waste treatment technologies so that system shows high level of efficiency and effectiveness.



### **B) *Communication***

Communication is an integral part of planning for sustainable development. The development of human society is largely because of its ability to communicate information and ideas with each other and to use such information and ideas for progress. The approach of NMC campaigns,



programs should be to emphasize on communication with target groups, local community for the implementing programme of Solid Waste Management in respective areas.

### **NMC imposes**

- Penalties on the waste generator if the segregated waste is not provided to the waste collector.
- Penalties on the waste generator if two bin system are not followed.
- Penalties on littering of waste on the roads.
- Negative publicity of the waste generators in the case of default.

To create awareness and promote adoption of desired behaviors in all stakeholders, a phase-wise approach will be followed.



### **C) Grievances Cell Establishment**

To strengthen the service delivery system, a grievance registering mechanism has been developed in the NMC where general public can register a grievance in case of poor waste management, garbage disposal, etc.

#### **11.4 Special Initiatives of NMC**

- ❖ Helpline – Information dissemination and grievance redressal system
- ❖ Citizen’s Charter



- ❖ Corporation's Web Portal (<http://nashikcorporation.gov.in>)
- ❖ 45 Online Services
- ❖ Online Development Plan & Part plan / Zoning Certificate
- ❖ Online Building Permission with Auto DCR System.

i) Information about Open Defecation Free activities implemented for Nashik

Under the Swachh Bharat Abhiyan, Toilets were personally constructed to 7932 families in Nashik Municipal Corporation. ODF++ has been declared by the State Government of Nashik Municipal Region. According to the circular, after Open defecation free of city to maintain the status of independent city free from Open defecation, the rules for granting ODF++ and 3 star statuses of the cities were implemented by the State Government. All those governing instructions are implemented in order to get ODF++ and 3 star status in the city. Nashik city has been declared ODF++ and 3 star status in Nashik Municipal Corporation approved by the General Assembly resolution No. 136, dated 19.11.2018.

ii) Information about the scheme For personal toilets

Swachh Bharat Abhiyan (Civil) of the Central Government provides the facilities of toilet in order to prevent the problems related to the environment and the health of all the citizens in the city and to ensure that waste is safely and properly managed and 'Ghar Tithe Shochalya' concept was brought up on the basis of the principles of Swachh Bharat Mission (Civil)', Government is going to give subsidy.

To increase the number of household individual toilets to ensure that waste is safely and properly managed. Government ensures subsidy under the Swachh Bharat Mission.

Accordingly, prepare the work done by the eligible beneficiaries and surveyed. In the first week of the particular toilet construction Rs.6000/- and the remaining Rs. 6000/ - after construction. That's the total number. Rs 12,000/- is payable. At present, the construction of the household toilet of 7932 families of Nashik Municipal Corporation has been completed. Nashik Municipal Corporation ODF + has been announced through the state government.

iii) Special Activities implemented under cleanliness campaign





All the places owned by Municipal Corporations include jogging tracks, playgrounds, schools, toilets, halls, vegetable market; various public messages were painted on the wall under the follower of Swachh Sarvekshan 2021

Cleanliness of the road side by way of lifting of the soil in the pavement, road divider along the road in the Nashik municipal area. Similarly, the work done to repair the roads, attached roads, to the toilets of the city was met.

### **11.5 List of Online Services Provided by NMC**

Under Urban Governance NMC has provided the below online services for the citizens

- ❖ Property Tax
- ❖ Water tax
- ❖ E-Tender
- ❖ Birth and Death Certificate
- ❖ Building Permission
- ❖ Local Body Tax (LBT)
- ❖ Grievance Management
- ❖ RTI online
- ❖ Marriage Registration
- ❖ Health Card
- ❖ File tracking
- ❖ Sports facility booking

### **I - Impact**

1. Scarcity of land for processing of solid wastes- Increase in population growth & urbanization enhance prices of land, resulting in scarcity of land for solid waste management.
2. Generation of leachate from solid waste during rainy season causes water & soil pollution and nuisance of flies, while open dumping of solids wastes generates methane gas that ultimately affects environment.
3. People working on solid waste, like rag pickers are ignorant about hazardous health effect of solid wastes. Usually they do not use hand gloves, gum shoes and other safety measures, causing infection of various serious diseases.



4. The quantity of solid wastes increases day by day due to population growth & urbanization in NMC area.

## R - Response

The waste has several components which have potential to be reduced-reused-recycled. This potential is underutilized on account of lack of awareness among generators, lack of sense of ownership and responsibility, lack of sufficient infrastructure. 75 percent of total waste can be reduced from going to landfill by practicing 3R"s This will not only reduce pollution caused by dumping but also make today's waste as tomorrow's resource.

## Proposed Initiatives of NMC

- ✓ In NMC area, capping of solid wastes, generated during last 20 years, has been completed in phases I &II
- ✓ NMC has set up Waste to Energy project for food wastes from hotel and residential complexes
- ✓ NMC has a plan to set up a system for collection of E-Waste. The work is under progress. Special attention has been given towards treatment of solid waste and disposal by scientific method.



**Nashik Waste Management is probably the only plant in India that handles every aspect of Solid Waste Management. This plant is now being projected as a Role Model by the Urban Development Department.**

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## Chapter - 12

# Ecology and Biodiversity

### 12.0 Introduction

#### Ecology

Ecology is the scientific study of interactions of organisms with one another and with the physical and chemical environment. Ecology includes the study of plants and animal populations, plant and animal communities and ecosystems. Ecology is distinguished from natural history, which deals primarily with the descriptive study of organisms. It is a sub discipline of biology, which is the study of life. The ecological studies will help in conservation of nature, wetland management, natural resource management, city planning (urban ecology), community health, economics, basic and applied science and it provides a conceptual framework for understanding and researching human social interactions.

#### Biodiversity

Biodiversity is defined as the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystem and the ecological complexes of which they are part. This includes diversity within species, between species and of ecosystems. Biodiversity forms the foundation of the vast array of ecosystem services. Biodiversity is important in human managed as well as natural ecosystems. Decisions humans make that influence biodiversity affect the well being of themselves and others. Biodiversity has three essential elements i.e. Genetic Diversity, Ecosystem diversity and Species diversity.

Urban biodiversity and ecosystem services can play a critical role in reducing the ecological footprints of cities while enhancing resilience, health, and quality of life for their inhabitants. Investing in nature-based solutions can offer a valuable return for cities and urban areas, which is demonstrated by a diversity of examples the Cities and Biodiversity Outlook has compiled from different parts of the world. Biodiversity and ecosystem services are critical natural capital. Valuing ecosystems in both monetary and non-monetary terms is an important tool for mainstreaming ecological considerations into the management of a city.



By illustrating that natural capital contributes to job creation, that it is a cost effective alternative, and it complements services already provided by municipalities such as disaster-risk management and food security, municipal leaders can be encouraged to make decisions that favour the environment rather than harm it.

Urban ecosystem services and biodiversity can help contribute to climate change mitigation and adaptation. Cities contribute to 60-70% of global greenhouse gas emissions. Investing in urban biodiversity and ecosystem services, can play an important role in mitigating and adapting to climate change. Urban green spaces, such as parks, agriculture, residential lawns and roof gardens can increase carbon storage and uptake, as well as significantly contribute to cooling the city. Blue spaces, such as functional watersheds, provide access to safe water for drinking and irrigation. Increasing the biodiversity of urban food systems can enhance food and nutrition security. The capacity of urban, peri-urban, and rural areas for developing greater food self-reliance needs to be considered within a local biodiversity context, and investments are needed to protect local plant and animal species. Local alternatives can reduce vulnerability to global shocks and counterbalance price and supply volatility as well as reduce the ecological footprint of cities. Ecosystem services must be integrated in urban policy and planning. Urban policy and planning provide opportunities to integrate biodiversity conservation into the design, building codes, zoning schemes, spatial plans, strategic choices, and enforcement of city management. The practice of urban planning, which can range from green infrastructures to promotion of organic and environmentally friendly products and services, is widely recognized as a vehicle for securing the long-term public good at the city scale.

### **D-Driving Force**

#### **Factors Affecting Biodiversity (Driving Force)**

- ✓ Demand of increasing residential areas due to escalation of human population and urbanization
- ✓ Indiscriminate growth of industries causing pollution (air, water, noise and soil)
- ✓ Sedimentation of sludge and disposal of wastes in water bodies



## S-Status

### Biodiversity in NMC area (Status)

The goal is to work on, prepare a biodiversity register, to keep record of traditional focus on biodiversity, biodiversity protected area, follow the commercial rule etc. the managing committee will guide this body on maintaining the city's ecological balance. The committee will be helpful in mapping the city's biodiversity and planning measures to conserve the flora and fauna. The centre has formulated a law for maintaining ecological balance and made it compulsory for states to implement it at the local governing body level. The aim of the committee is to conduct ecological surveys like the tree census. The survey will include types and number of birds, animals etc., in the city.

#### 12.1 Terrestrial biodiversity in city

##### Gardens

There are 539 gardens having a total area of 1098068.44 sq.m. in NMC area. The Garden department of NMC works towards maintaining and increasing the open and green spaces of the city. Some specialized and popular gardens; such as, Pandit Jawaharlal Nehru Botanical Garden, Butterfly Garden, Dadasaheb Falke Smarak, Shivaji Udyan, Goda Park, Somani Garden, Nehru Garden, Pramod Mahajan Garden, etc.

**Table 12.1 - Information of Gardens in Nashik City**

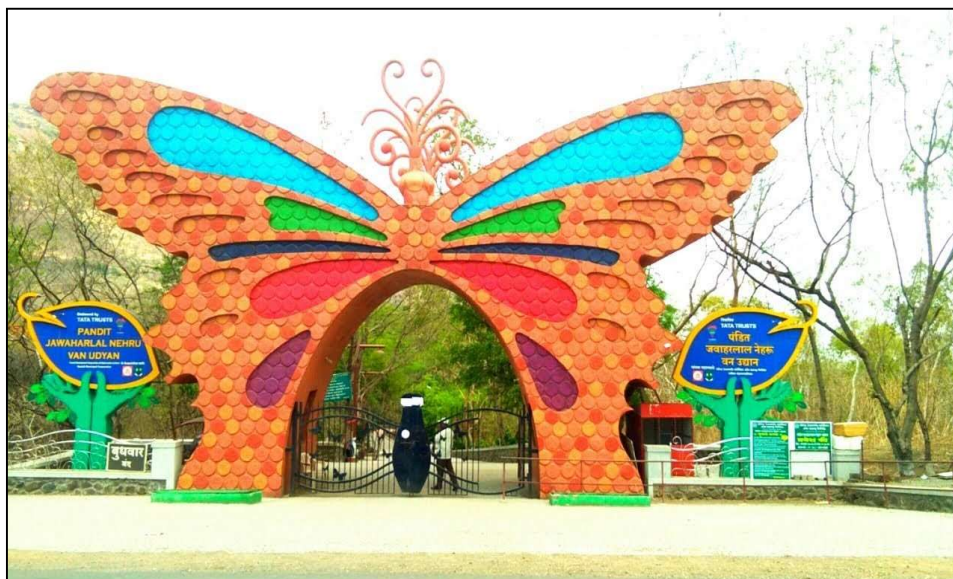
Sr. No.	Name of Division	Total No. Garden	Area in sq. m.
1.	Nashik West	85	179336.86
2.	Nashik East	75	150250.05
3.	Nashik Road	127	242790.64
4.	New Nashik	88	177,825.55
5.	Satpur	46	187.308.00
6.	Panchwati	118	347,865.34
	Total	539	1098068.44

*Source: Garden Department, NMC*





**A) Botanical/ Butterfly Garden**



**B) Pramod Mahajan Garden**





**C) Phalake Smarak Udyan**



**D) Goda Park**





## 12.2 Comparative characteristics of various gardens

A comparative account of the particulars of 5 major gardens, located in Nashik area, is summarized in below table:-

**Table 12.2 - List of various Gardens in NMC**

Sr. No	Name of the garden	Salient Features	Approximately no. of visitors every day
1	Dadasaheb Phalke Smarak	Dedicated to a great visionary and Father of Indian Cinema, Dadasaheb Phalke, the park adds glory to the beauty of Nashik city. Located next to the Mumbai-Agra Highway or NH3 near Pathardi Phata, Nashik, it is the biggest park and is spread across a huge expanse accounting 29 acres & Impressive layout, dinosaur model, lawn, jogging track and waterfall	Five hundred of visitors every day
2	Shivaji Udyan	Being one of the oldest parks in Nashik, Located near the core of city, Central Bus Stand/CBS, Shivaji Park is best option to spend time with your family or friends. You will get several street-food stalls close at hand. Some of them serve mouth-watering Bhel, a sort of Chat, there.	Hundreds of visitors every day
3	Goda Park	Lawn and jogging track	
4	Pramod Mahajan Udyan	One of the most recent public parks in Nashik, Pramod Mahajan Udyan is well-landscaped garden. It has multiple toys for kids, small jogging track for adults and benches to relax for senior citizens.	500+ Visitors per day
5	Somani Garden	Sited near Muktidham, Nashik Road, this garden has seen many generations playing here. The all green public park gains its spirit every day in the evening Impressive layout,	300+ Visitors per day
6	Nehru Udyan	Located on the Pandav Lane Road in Nashik. The butterfly gate, located on the main road connecting Mumbai and Nashik, which gives the message of Nashik's entrance attracts people towards itself. The light and sound show at night with electronically lighted trees and sound of birds is something that pulls visitors towards this garden, The best time to visit the Nehru Van Udyan is during the cool months or spring time. But kids also love visiting this garden during their summer vacations to make the best of their holidays.	400+ visitors every day



7	Amrit Van Udyan, Tavli Phata	One of the most recent public parks in Nasik, Amrut Van Udyan is well-landscaped garden. It is located in Makhmalabad area. The civic body developed the Tavli Amrut Van Udyan. Tavli Amrut Van Udyan is of the best spot of winter season.	200+ visitors every day
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*Source: Garden Department, NMC*

### 12.3 Tree plantation

During the years 2021-2022, 17283 tree saplings were planted, by NMC. Permissions to cut trees during road widening and other private developments were received subject to plantation of specified number of new saplings.

According to Maharashtra (Urban Area) Tree Protection and Preservation of Trees Rules, 2009 Ref. Article 16; Municipal Corporations are expected to plant atleast 10,000 trees in each year. NMC Tree Authority has laid down following guidelines for tree plantation by private developers.

1. For constructions on plots up to 500 sq. m area, 1 tree is to be planted every 100 sq. m.
2. One tree is to be planted at every 60 sq. m for a proposed construction on a plot of 500 sq.m to 2000 sq. m.
3. For proposed construction on plots greater than 2000 sq m., 1 tree is to be planted for every 80 sq. m.
4. Specifications for planting only indigenous species of saplings, as well as minimum distance from roads are also specified amongst others.

### 12.4 Plantation scheme

According to the provisions of Maharashtra (Urban Areas) Protection and Preservation of Trees Act 1975 and Hon'ble High Court, computerized system has been started to calculate all the trees existing in the city and counting of 25 lakh trees is planned. But when actual tree counting started, it was observed that the number of trees in the Nashik city area has increased and the tree count is likely to be exceed 25 lakhs. The planning is to be done to complete the desired tree plantation for this year. During the year 2017, a total of 12000 endemic tree plantation of nearly 10 feet height have been completed in the Nashik Municipal Corporation area, and the maintenance of the trees should be done for one to five year span.





Pandit Jawaharlal Nehru Park has been developed near Pandavleni on 35 acres of forest area by Nashik Municipal Corporation under CSR fund with Tata Trust, Mumbai, where various types of landscapes and laser shows have been developed.

An amount of Rs 13.50 crores have been sanctioned in the 2018-19 budget for the development of capital works. In the last financial year, there has been an increase of over Rs. 9.51 crores. A total amount of Rs. 26.32 crores has been approved in 2018-19 budgets. There has been an increase by 53.22% from the last year.



**Table 12.3- Tree plantation scheme by NMC**

Sr. No.	Ward	No. of trees Planted
1	East	500
2	West	500
3	New Nashik	1870
4	Satpur	8741
5	Nashik Road	3490
6	Panchawati	2182
	Total	17283

*Source-Garden Department, NMC Municipal Corporation.*

**Table 12.4- Flora in different gardens**



Sr. no.	Particulars	No of flora
1.	Total number of trees	4795387
2.	Total number of exotic trees	3147284
3.	Total number of indigenous trees	1648103

*Source-Garden Department, NMC Municipal Corporation*

## 12.5 Terrestrial fauna & Aquatic Environment

### A) Terrestrial fauna

Being a significant part of the ecosystem, fauna has a great role towards control and balance of the environment. If any of the species become extinct, the whole ecosystem may be in danger. Field observations of representative fauna, particularly avifauna and butterflies, were undertaken in NMC area.

### B) Butterfly

Butterflies and moths are important, both in their own right but also as quality of life indicators. There are many intrinsic and aesthetic values of butterflies as follows.

- Butterflies and moths are intrinsically valuable and are worthy of conservation in their own right.
- Butterflies and moths are part of life on earth and an important component of its rich biodiversity.

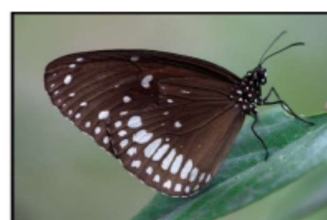
As per the study conducted, 24 species of butterflies were recorded in NMC area e.g. Indian crow, blue tiger and grass yellow butterfly. None of them, except common Indian crow (*Euploea core*), and are enlisted as sensitive, as per the Wildlife (Protection) Act, 1972. Common Indian crow is enlisted under schedule IV of the Wildlife (Protection) Act, 1972. A detailed list of species recorded during survey is presented in **Table 12.5**



Blue tiger



Common grass yellow



Common Indian crow

**Fig 12.1- Common types of butterflies found in city**





In this area the diversity of butterfly appears to be good. The varieties are common in most parts of the Western Ghats of India. Increased butterfly populations indicate good plant diversity and other pollinator groups within the area.

**Table 12.6 -Checklist of butterflies recorded in the NMC area**

Sr. No.	Scientific Name	Common Name
1.	<i>Papiliopolymnestor</i>	Blue Mormon
2.	<i>Junoniaorithya</i>	Blue pansy
3.	<i>Tirumala limniace</i>	Blue tiger
4.	<i>Melanitiseda</i>	Common evening brown
5.	<i>Euremahecabe</i>	Common grass yellow
6.	<i>Euploea core</i>	Common Indian crow
7.	<i>Phalantaphalantha</i>	Common leopard
8.	<i>Papiliopolytes</i>	Common mormon
9.	<i>Junoniaatlites</i>	Gray pansy
10.	<i>Papiliodemoleus</i>	Lime butterfly
11.	<i>Danauschrysippus</i>	Plain tiger
12.	<i>Ionolyce helicon</i>	Pointed line blue
13.	<i>Talica danayseus</i>	Red pierrot
14.	<i>Euremabrigitta</i>	Small grass yellow
15.	<i>FlathaAlispi</i>	Small leopert
16.	<i>ColotisErdia</i>	Small orange tip
17.	<i>JunoniaViyarita</i>	Yellow Fany

## B) Birds

- Birds play a vital role in various ecosystems. Their diversity is an indication of congenial habitat for survival.
- Avifauna is an important part of the ecosystem, playing various roles as scavengers, Pollinators, predators of insect, pest, etc.
- They are the bio-indicators of different status of Environment like urbanization, Industrialization and human disturbance. The areas having good bird diversity signifies Healthy forest. They can be sensitive indicators of pollution problems and function as early warning system. A list of the birds observed in the area is recorded in **Table 12.9**.



***DPSIR Indicator for 'Green Spaces' illustrates that green parks, green lands, open areas and playgrounds, play an important role for the city environment. Green spaces symbolize peace, minimal stress and a cleaner environment for many people.***

**Following conclusions were made from the study:**

- A total of 28 bird species, including aquatic birds were recorded. None of these birds are endangered (Sch-I) as per Wildlife (Protection) Act, 1972.
- The birds like Indian myna, house crow, blue rock pigeon, red whiskered bulbul, purple un bird, Indian black drongo, cattle egret, small green bee eater, etc. were recorded in all the locations surveyed.

An objective of this indicator is to provide as many parks, green lands, open areas and play grounds in a city as possible. Green spaces in urban areas are important for recreational purposes and for generally enhancing the quality of life of people who live in urban areas.



**Small Green Bee eater**



**Magpie Robin Indian**



**Black Dragon**



**House Sparrow**

**Fig 12.2- Common types of Avifauna found in city**



**Table 12.7 - Avifauna found in NMC**

<b>Sr. No.</b>	<b>Common name</b>	<b>Scientific name</b>	<b>Local Name</b>
1.	Barheaded geese	<i>Anserindicus</i>	Rajhans
2.	Black kite	<i>Milvus migrans</i>	Ghar
3.	Black winged stilt	<i>Himantopus himantopus</i>	Shekotya
4.	Blue rock	<i>pigeon Columba livia</i>	Nil Kastur
5.	Cattle egret	<i>Bubulcus ibis</i>	GaiBagala
6.	Common babbler	<i>Turdoidescaudatus</i>	SamanyaSatbai
7.	Common swallow	<i>Hirundinirustica</i>	Pakoli
8.	Crow pheasant	<i>Centropusindicus</i>	Bhardhwaj
9.	Yellow headed wagtail	<i>Motacillaalpestris</i>	Piwala dhobi
10.	Grey heron	<i>Ardeacinerea</i>	RakhiBagala
11.	House crow	<i>Corvus splendens</i>	Kawala
12.	House sparrow	<i>Passer domesticus</i>	Chimani
13.	Lime butterfly	<i>Papilio demoleus</i>	Limboli
14.	Red pierrot	<i>Talica adaneseus</i>	Lalzenda
15.	Indian baya	<i>Ploceus philippinus</i>	Sugran
16.	Indian black drongo	<i>Dicrurus adsimilis</i>	Kotwal
17.	Indian cuckoo	<i>Cuculus micropterus</i>	Kokil
18.	Indian myna	<i>Acridothera tristis</i>	Maina
19.	Indian plover	<i>Charadrius dubius</i>	Chikhalya
20.	Indian reef heron	<i>Egretta tagularis</i>	SamrudiBagala
21.	Indian robin	<i>Saxicola fulicata</i>	BhartiyDayal
22.	Indian roller	<i>Coracias benghalensis</i>	BhartiyPankh
23.	Jungle crow	<i>Corvus macrorhynchus</i>	Domkawala
24.	Little cormorant	<i>Phalacrocorax niger</i>	ChotaPankawala
25.	Magpie robin	<i>Copsychus saularis</i>	Dayal
26.	Pond heron	<i>Ardeola grayii</i>	Dhokari
27.	Purple sunbird	<i>Nectarinia asiatica</i>	JambhalaShinjir
28.	Redvented bulbul	<i>Pycnonotus cafer</i>	Lalbudya Bulbul
29.	Redwattled lapwing	<i>Vanellus indicus</i>	Titawi
30.	Redwhiske red bulbul	<i>Pycnonotus jocosus</i>	Shipai Bulbul
31.	Roseringed parakeet	<i>Psittacula krameri</i>	Popat
32.	Small blue kingfisher	<i>Alcedo atthis</i>	Khandya - NilaDhiwar
33.	Small green bee eater	<i>Merops orientalis</i>	Yeda Raghu
34.	White breasted kingfisher	<i>Halcyon smyrnensis</i>	PandharyaChatichaDhiwar

**Source – Garden Department , NMC**



## S-Summary

- ❖ Total 539 nos. of garden are developed in NMC area.
- ❖ Total area of Garden is 1098068.44 S.qm.
- ❖ From 2020-21, total 17283 trees are planted.
- ❖ Per hect. 1320 nos. of trees is planted but the quantity of trees seems to be very low. Therefore, plantation of 2000-2500 nos. per hect. Of trees is very essential. It should be noted that some plants do not get developed.
- ❖ In NMC area inspection for birds & butterflies. Birds & butterflies is imp. in env. Total 14 no. of butterflies of 24 species are seen. Therefore it can be said that good kind of butterfly diversity in the area is observed.
- ❖ The area in which Biodiversity is more, that area indicates ecological sustainability of life.
- ❖ In the area 34 nos. of birds are listed under the wildlife Act 1972 as endangered/protected birds, which were not observed in NMC area.
- ❖ On biodiversity potential effect & impact are given below-
  1. Growth of people
  2. Fast growth of urbanization
  3. Increased industry
  4. Lack of citizen awareness
  5. Sewage release in water
  6. Lack of solid waste & disposal.

Therefore these above points are harmful to Environment. They have an effect on biodiversity.

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## Chapter - 13

# Disaster Management

### 13.0 Introduction

Disaster is a serious disruption of the functioning of a society, causing widespread human, material, or environmental losses which exceed the ability of the affected society to cope using its own resources.

Disaster Management can be defined as the association and management of resources and responsibilities for dealing with all humanitarian aspects of emergencies, in particular preparedness, response and recovery in order to lessen the impact of disasters.







**Fig 13.1 - Disaster Management in NMC**

### **D- Driving Forces**

#### **Factors affecting Disasters (Driving force)**

1. Rapid urbanization
2. Poverty
3. Lack of information/awareness
4. Population growth
5. Environmental Degradation





## P- Pressure

### Possible changes in Environment due to identified driving forces (Pressure)

#### 1. Rapid urbanization:

Everybody wants to settle in urban area but due to higher rates it can't be possible for every individual of every class to get accommodated. It results in growth of slums, unplanned construction without regulations.

#### 2. Poverty:

Lack of resource bases, Support System, Insurance Opportunities

#### 3. Lack of information/awareness:

Centralized information is helpful only for a certain range of the population, particularly Government. Lack of knowledge in evacuation, First Aid, Rescue etc. and literacy.

#### 4. Population growth:

Effect on the people living in crowded areas.

### 13.1 Major phases of Disaster management Cycle:



Fig 13.2 - Disaster management cycle



**Table 13.1 - Key Stages of Disaster Management 1:**

<b>Pre Disaster (Before a disaster to reduce the potential for human, material, environmental losses caused by Hazards and to ensure that these losses should be minimized when the disaster actually strikes)</b>	<b>Prevention and Mitigation</b>	<b>The term prevention is often used to embrace wide diversity of measures to protect persons and property in case of disasters. Mitigation embraces all measures taken to reduce both the effects of the hazard itself and the vulnerable conditions in order to reduce the scale of a future disaster.</b>
	<b>Preparedness</b>	<b>The process embraces measures that enable Governments, Communities and individuals to respond rapidly to Disaster situations to cope with them effectively. Preparedness includes the formulation of viable emergency plans, the development of warning systems, the maintenance of inventories and the training of personnel.</b>
	<b>Early warning</b>	<b>This is the process of monitoring situations in communities or areas known to be vulnerable to slow onset hazards, and passing the knowledge of pending hazard to people.</b>
	<b>The Disaster event</b>	<b>This refers to real time event of a hazard occurring and affecting elements at risk. The duration of the event will depend on the type of threat; ground shaking may only occur for a matter of seconds during an earthquake while flooding may take place over a longer sustained period.</b>

**Table 13.2 - Key Stages of Disaster Management 2:**

<b>During Disaster (It is to ensure that the needs of victims are met to minimize suffering)</b>	<b>Response and Relief</b>	<b>This refers to the first stage response to any calamity, which includes setting up control rooms, putting the contingency plan in action for evacuation, taking people to safer places, rendering medical aid to the needy etc simultaneously rendering relief to the homeless, water, clothing etc, to the needy, restoration of communication, disbursement of assistance in cash or kind.</b>
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**Table 13.3 - Key Stages of Disaster Management 3:**

<b>Post Disaster (After a disaster to achieve rapid and durable recovery which doesn't</b>	<b>Recovery</b>	<b>Recovery is used to describe the activities that encompass the three overlapping phases of emergency relief, rehabilitation and reconstruction.</b>
	<b>Rehabilitation</b>	<b>Rehabilitation includes the provision of</b>



<b>reproduce the original vulnerable conditions)</b>		temporary public utilities and housing as interim measures to assist longer –term recovery.
	Reconstruction	Reconstruction attempts to return communities to improved Pre-Disaster functioning. It includes the replacement of buildings, infrastructure and lifeline facilities so that long term development prospects are enhanced rather than reproducing the same conditions which made an area or population vulnerable in the first place.
	Development	In an evolving economy, development process is an ongoing activity. Long term prevention/Disaster reduction measures like construction of embankments against flooding, irrigation facilities as drought proof in measures, increasing plant cover to reduce the occurrences of landslides, land use planning, construction of houses capable of withstanding the onslaught of heavy rains wind speed and shocks of earthquakes are some of the activities that can be taken up as part of development plans.



**Table 13.4 - Disaster Management Team and Equipment's available with NMC are as follows.**

S. No	Activity	Particulars	
1	Total no of DMP cells in NMC	1 No. Centralized	
2	No of QRT teams/trained manpower in rescue, fire fighting, first aid, evacuation etc. in Industries trained by NMC fire brigade or available during disasters for NMC assistance.	1. No independent QRT teams. Entire Fire Dept employees are trained for all sorts of emergencies and everybody on duty responds to any emergency. 2. Pvt companies have their own trained fire personnel who work in coordination with fire dept.	
3	No. of lifesaving boats, aerial ladder platform, availability of helicopter for evacuation.	Life Saving IR Boats (Rubber Boats) – 06 nos. Life jackets – 75 nos. Ropes – 80	
4	What type of training program taken against natural and manmade threat/bomb plantation/riots	Combined Training programmers and Exercises of CBRN, Fire, Flood Rescue, etc taken and trainees are sent to the national fire brigade services college at Nagpur for every year.	
5	Fire Stations in NMC Region	Total 06 fire stations are provided in NMC region. Total 139 employees working in these fire stations 1. Main Fire Station at Shingada Talav 2. Panchavati fire Station 3. New Nashik fire Station 4. Satpur fire Station 5. Nashik Road fire Station 6. Tapovan Sadhugram fire station	
		Rubber boat	06
		Life jackets	75
		Ropes	80
		Portable pump (diesel)	03
		Portable pump (Petrol)	06
		Wood cutter chain	18
		OBM	06
		Life rings	130
		Hooks	18
		BA sets (45 min)	44
		Smoke extractor	08



		Fire suits	113
		Pelican flood light	10
		Light tower	01
		Air lifting bags	03
		Chemical suits	18
7	Aerial Ladder Platform BRONTO SKYLIFT – RLX 55	DOP – Sep 2013 Use – High Rise Bldg Fire Fighting and Rescue purposes. Working Height – 52 meters (effective) i.e. up to 17th floor.	
8	Information regarding fire brigade	Details	2021-22
		Total no of fire station	No 06 (in words- six fire station)
	As per zonal offices ( A, B, C, D, E, F)	Total employee count	Chief Fire Officer -
		Station officer	-
		Sub officer	-
		Leading firemen	-
		Firemen	-
		Driver	-
		Total no of employees	139
	Available instruments and their count,	Water tender, Devdut rescue vehicle, Rescue van, Bullet etc.	09
		Mega bowser	02
		Bowser	03
		“Devdut” rescue vehicle	02
		Mini water mist	04
		Hydraulic platform	01
		Rescue van	01
		Flood rescue	01
		Hazmat rescue van	01
		B. A. van	01
		Bullet	02
		Car	01
		Jeep	01
		Total vehicles	29Types of tools-78

Source:-Disaster Management & Fire Brigade Dept NMC



**Table 13.5 - Some important services & instruments being provided by Disaster management department**

Sr. no.	Description of Disaster	Description of instrument being used
1.	Immediately rescuing people trapped under vehicle in accident scenario	Hydrolick system operated lifting bag/ Spreader jack
2.	Opening blocked doors in emergency situation	Door breaker (Hydrolicks Jacks, Spreader)
3.	Equipments being used for expeditious rescue of life and avoiding financial loss after accidents involving concrete slabs, big trees, advertisement boards, large vehicles.	Steel/ wood cutter, concrete cutter, spreader, Hydrolick tools
4.	For rescue operations in dark (Lighting arrangement)	Trolley Aska, Tube Aska, Pelikan flad light, infeleded Light Tower, Hand Touch
5.	Search of survivor in room or confined area having smoke due fire incident	B. A. Set, Thermal imaging camera, smoke detector, wireless life detector
6.	Immediate search of survivor at fire or accidental spot	Thermal imaging camera, wireless life detector
7.	Rescue of life at fire scene	B.A. Set
8.	For aid of security personals working at rescue mission at incident of Chemical leakage	P.P.E. kit, Chemical Suits, B.A. Set
9.	Rescuing personals trapped on top floor of high rise building	Branto skylift vehicle, chyut
10.	Rescuing personals trapped under concert slab by cutting the slab in minimal time	Concrete cutter, chipping hammer, concrete breaker
11.	Arresting fire over maximum possible area with minimum usage of water	Hose reel, water mist

**Source:-Disaster Management & Fire Brigade Dept NMC**





## I-Impact

### Serious major event happened in NMC -

1. In year 2016, Godavari water level raised and caused flash flood situation. Disaster management team rescued people from this situation.

## R-Response

### Disaster Management planning Activities undertaken in NMC:

NMC follows below activities for Disaster Management.

- A. Training Programmes.
- B. Awareness.
- C. Mock drills.
- D. Combined exercises.
- E. Special rescue operations.

### Flood & Fire rescue and rescue training in NMC

The work of the volunteers during any event is to assist the administration in making arrangements, crowd management and other services. The volunteers play a major role during emergencies such as drowning, electrical shock, accidental injuries and rescue operations during floods and fires.

If guidance & training is provided to every citizen / civilian of every city and villagers, it can be REAL Fire Safe INDIA. Fire Brigades & other civic authorities can take up the initiative towards Fire & Life Safety training to maximum possible citizens so they can behave in proper manner as First Responder to any emergency evacuation & rescue situations. Even principally if such training is given in school life, it will be more beneficial. Safety can be introduced as the subject for the coming generation; Elderly can be trained in various Safety programme.



**Fig 13.3 - Images of Training programs on Disaster management**

### **Awareness & Mock drills**

NMC has conducted various awareness programs to the citizens, schools, colleges, threat zones on necessary required measures to be followed in minimizing the damage or loss to the human, plants, animals and ecology of environment.





## **Combine Study (exercise) & Special rescue operations NMC disaster management**

Rescue operation team in collaboration with CBRN, Fire, Flood Rescue etc taken with YASHADA, etc has performed a tremendous response and saving the ecology of earth during natural disasters like floods, earth quakes and industrial accidents etc.,

### **S-Summary**

#### **Flood situations happened in NMC**



Nashik Municipal Corporation has completed all the preparations to deal with natural calamities due to accumulation of water in the areas along river bank and low lying areas. Considering flood to Godavari, Nandini, Waldevi and Waghadi rivers every year, NMC has kept its mechanism ready. Godavari River had witnessed major flood in 2007-08 and 2016 due to continuous rainfall for 3-4 days and water discharge from Gangapur dam. These floods were considered to be bigger after the major flood in 1961.

During the flood situation last year at Saraf Bazaar, as water level had touched steps of Sarkarwada, Prakash Supariwala shop, losses worth crores of rupees took place. Fire brigade had saved lives of many during this flood. NMC had shifted hundreds of families and had made alternative arrangement for them. Keeping in mind this past experience, the disaster management and fire brigade department has kept all the system ready. Like every year, work plan has been kept ready.

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