

# Urban Sewage and Water Distribution Mapping In Panchavati Division Using Open Source Geo-Spatial Technology

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## Abstract

During the past decade, GIS and Remote sensing (RS) have been used for different branches and media of research, especially those researches that involves the geo-references spatial data on develop country. In USA, using GIS develop the map for water and sewage lines for easy to work. In this concept we are mapping of urban drinking water supply system and sewage. Because now-a-days GIS or Satellite water and sewage system plan are not available in Nashik. And this plan is very useful for smart city. This project show, how to linked GIS and RS facilities the mapping of urban drinking network and sewage network. The whole data is collected, NMC website and Google earth. This project explains the connectivity of sewage and water supply system, of Panchavati division, Nashik using GIS and RS techniques.

**Keywords:** Nashik City Sewage And Drinking Water Distribution Map, Land Use Mapping, Geographical Information System (GIS), Digital Elevation Model, Zone Wise Sewage And Drinking Water Networking Map, Global Position System (GPS), Remote Sensing, Q-GIS Software.

## I. INTRODUCTION

Sewage network plan and water networking plan are very complicated and it paper plan are very difficult to understanding common people and it is not easily available and it not available in one page means it is very complicated. Therefore in future to need to develop multi-support mapping or networking information system. Design of surface concern the exact location, length, as well as the operations of these to meet multiple purpose of objectives. Therefore paper sewage and water supply maps is convert for modern and multipurpose

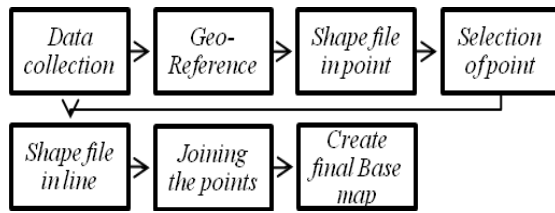
information maps. Due to this situation Remote Sensing and GIS are very suitable to make modern and multipurpose information map. Because of GIS is the modern survey instrument and GIS survey is very time consuming and less man power is required. In GIS, it is possible to visualize the water supply network and sewage network.

GIS is the most powerful tool for visualizing, storing, analyzing and manipulation. The complementation of GIS is cannot only minimize the timing realizing information but also ensure a more efficient use of the resource with high flexibility in time and scale. GIS is capable to store and display large amount of data graphically to greatly enhance the interpretation and analysis. One most important ability of GIS it is handling both digital spatial features. This is particularly important in many mapping applications, which require data on a wide variety of physical, geological, social and environmental attributes. This project discusses some aspects of mapping of GIS-base sewage and water network mapping in Panchvati, Nashik area.

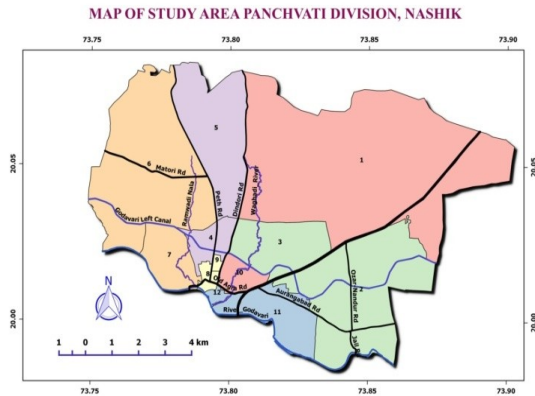
## II. PROBLEM STATEMENT

The Remote Sensing, GIS & GPS are very complicated and deep concepts. Therefore in Indian peoples very less knowledge of this concept. In India Base maps are not prepared so firstly we are prepared the base map on Panchavati division. In Nashik municipal corporation no updated sewage and drinking water networking plan are available and which certain plan available in NMC that are not available open sources. Some areas manholes totally cover under the road surface and some manholes are exactly centre for the high traffic road hence collecting this manhole location is very difficult.

## III. METHODOLOGY

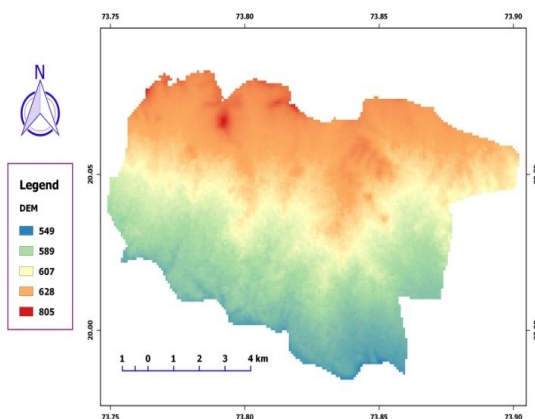


**Study Area**



Panchvati lies between Nashik City, Maharashtra state, India. In Panchvati area 2 rivers are passing namely as Godavari and Waghadi. Godavari river are passing from ward no.6,7,8,12,11,3 and Waghadi are passing from ward no.1,3,10,12. In Panchvati division NH3 are from ward no.11, 3 and 1. In Panchvati division Peth road, Matori road, Dindori road, Old Agra road, Aurangabad road, Ozar-Nandur road this passing from different wards. In Panchvati area ward no.1,3 and some part of ward no.6 are place in north boundary, ward no.7,11 and some part of 3 are place in south from east 7,6 and from west 1 and 3 are place. Climatic condition of Nashik city is temperature rise from October but this is followed by the cool season temperature is 28°C. Overall in Nashik city climate is cool for rainy and wind season.

**ELEVATION MAP OF PANCHVATI DIVISION, NASHIK**



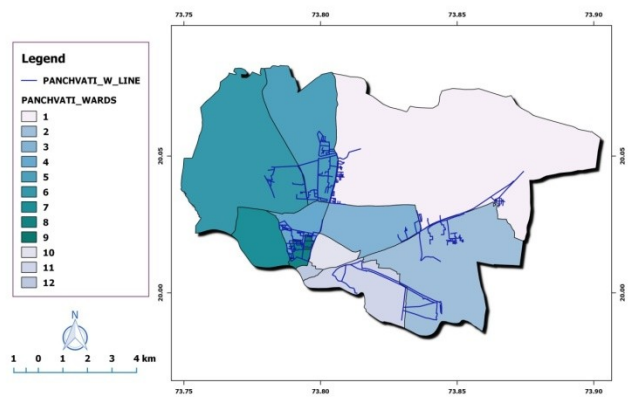
Panchvati division highest elevation from ward no.1, 5 and 6 in north hence the population of this area is less. But south side elevations are less because of Godavari river are passing this area and hence population of this area are more. In this division highest is 805m in ward no.1, 5 and 6. Lowest elevation is 549m in ward no 7, 8, 12, 11 and some part of ward no.3. Average elevation between 607min some part of ward no.6, 4 and 3.

**IV.RESULT & DISSCUSSION**

**1. Drinking Water Line Network :-**

We are mapping the water distribution network in total 12 wards in Panchvati Division. In this map we are observed that ward no.4, 8, 9 and 5 are high water networking but ward no. 6,3 and 11 are very less networking and another wards networking is averagely.

**DRINKING WATER LINE NETWORK OF PANCHVATI DIVISION**



(This map are based on NMC prepared 2D

Map)

Ward No	Length of line (km)	Area of ward (sq. m)
1	23.87	2829
2	20.114	1037
3	2.156	78
4	9.709	76
5	13.804	500
6	3.564	340
7	0.563	16
8	40149	24
9	2.107	11
10	-	402
11	5.514	70
12	-	74

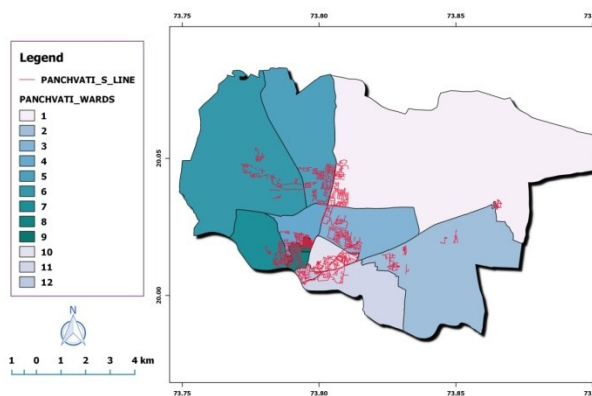
This table show actual length of water networking in Panchvati Division. In Panchvati division highest length of water Distribution network is 23.87km in ward no.1 and lowest is 0.563 in ward no.7. In Panchvati Division average length of water distribution line is 7.79km. This map is base on NMC prepared 2D maps.

**2. Sewage Line Networking:-**

We are mapping total 12 wards in Panchvati Division. In this map we are observed that ward no.1, 5, 3, 10, 12, 8, 9 and 4 are very strong sewage networking but ward no.2 are very poor networking.

Ward no	F Population	M Population	Total
1	13640	15273	28913
2	8846	9628	18474
3	8739	9653	18392
4	6863	7483	14346
5	11029	11998	23027
6	5924	6310	12234
7	7341	7971	15312
8	6358	7188	13546
9	4714	4730	9444
10	4490	4477	8967
11	6232	6520	12752
12	6660	7185	13845

SEWAGE LINE NETWORK OF PANCHVATI DIVISION



(This map are based on NMC prepared 2D map)

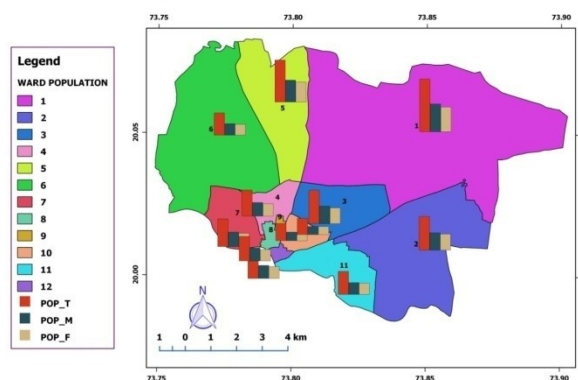
This table show actual length sewage networking in Panchvati division. In Panchvati highest sewage line is 60.706km in ward no. 4 and lowest is 6.33km in ward no. 11. In Panchvati average length of sewage line is 15.96km. This table is based on MNC prepared 2D map.

**3. Population map of Panchvati Division :-**

We are collecting the population on Panchvati Division and prepared this map. In this map we are mention the male as well as female population in ward to ward.

Ward No.	Length of Sewage Line in Km	Area (sq. m)
1	14.431	2829
2	9.446	1037
3	18.001	78
4	60.706	76
5	15.404	500
6	8.430	340
7	10.479	16
8	7.309	24
10	7.266	11
11	26.962	402
12	6.333	70
	6.658	74

POPULATION MAP OF PANCHVATI DIVISION, NASHIK



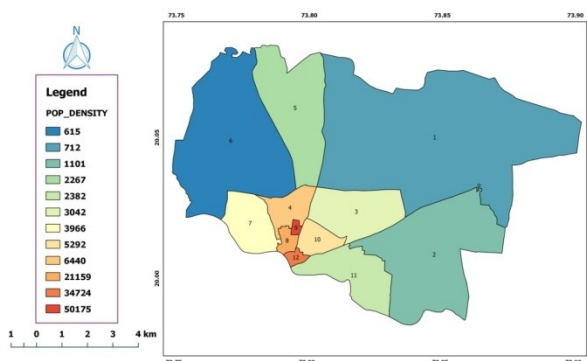
(This map are based on Census 2011)

This table show the population of Panchvati of Panchvati Division with reference to 'census 2011'. With reference to census 2011 highest population in Panchvati division in 28913 in ward no.1 and lowest is 8967 in ward no.10. average population is 15771.

**4. Population Density map:-**

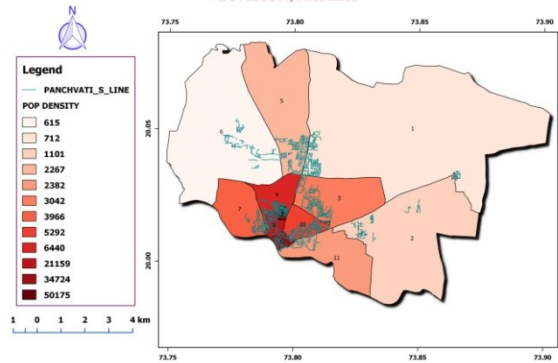
This map show the population density for Panchvati Division. Population density means the intensity of land use expressed as number of people per square kilometre or square mile.

POPULATION DENSITY MAP OF PANCHVATI DIVISION



(This map are based Census 2011 )

POPULATION AND SEWAGE NETWORK MAP OF PANCHVATI DIVISION, NASHIK



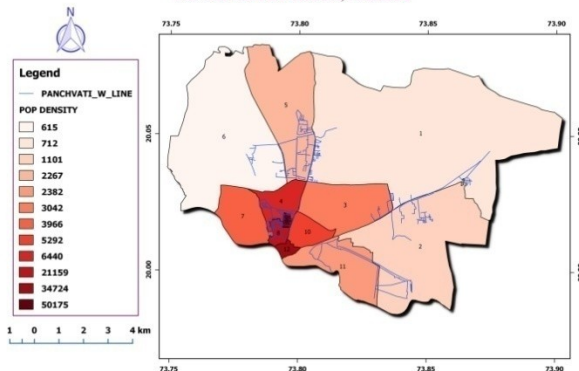
(This map are based on NMC prepared 2D map)

map)

### 5. Population And Drinking Water Network Map :-

For mapping the water network this map are merge in population density map for checking water networking are suitable or not. The following map is show the actual situation of drinking water system on Panchvati with respect to population of census 2011.

POPULATION AND DRINKING WATER NETWORK MAP OF PANCHVATI DIVISION, NASHIK



(This map are based on NMC prepared 2D map)

This map are show for ward no.4, 9 and 8 water networking are strong because in this wards population are more and as compare to this wards, another wards networking are average.

### 6. Population And Sewage Network Map :-

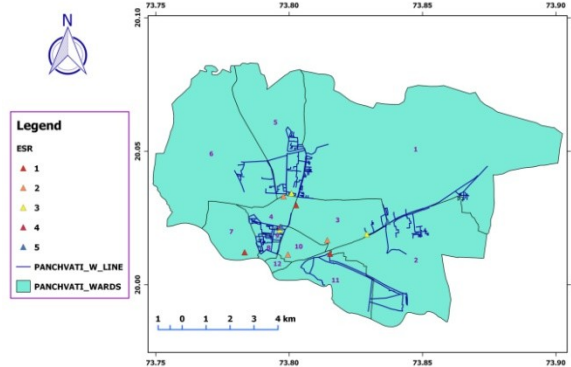
This map is show the sewage networking in Panchvati Division with respect to population on Panchvati.

For above map, population of 1, 3 and 4 no. wards is more and hence sewage networking on this ward is strong. Overall in Panchvati division sewage network are good with respect to population.

### 7. ESR Location And Drinking Water Network :-

In Panchvati Division total 6 ESR are available for Drinking Water following map are show the location of ESR.

ESR LOCATIONS AND DRINKING WATER NETWORK



(This map are based on NMC prepared 2D map)

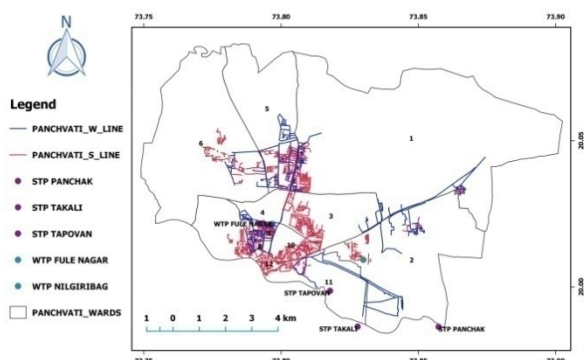
map)

Location	Capacity in lit.	Ward no.
Mhasrul	20 lakh	1
Fulenagar	16.5 lakh	9
Panchvati	20.5 lakh	10
Saptarang,	20 lakh	6
Pethroad	05 lakh	6
Hanuman wadi	15 lakh	2
Dhatrakphata		

### 8. Location Plan of STP And WTP :-

The following plan is show the sewage treatment plant and water treatment plant with its location. In Panchvati division there are three STP plants and two WTP plants.

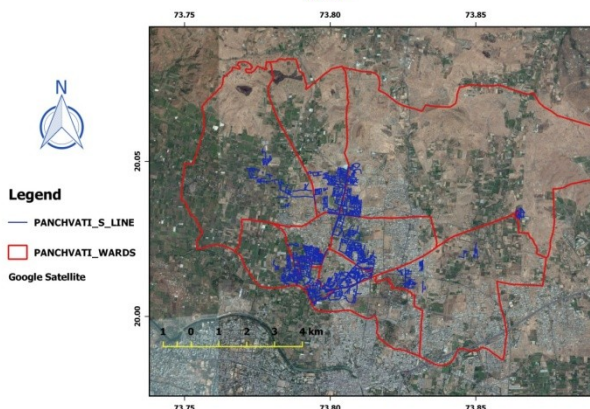
**SEWAGE AND DRINKING WATER NETWORK WITH STP AND WTP**



(This map are based on NMC prepared 2D map)

**9. Sewage Network And Satellite Image Composting Map :-**

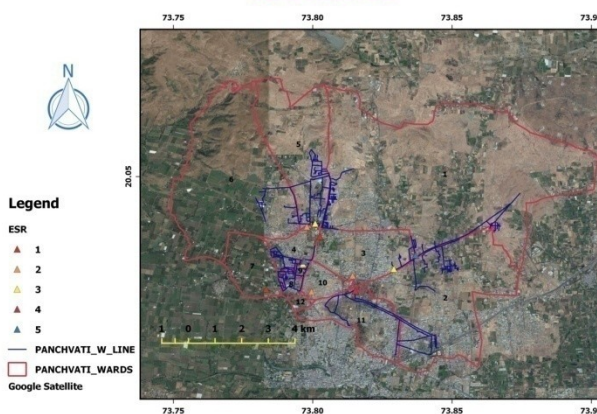
**SEWAGE NETWORK AND SATELLITE IMAGE COMPOSITE MAP**



This map is show the satellite image with sewage networking in Panchvati Division.

**10. Satellite Image With ESR And Drinking Water Networking:-**

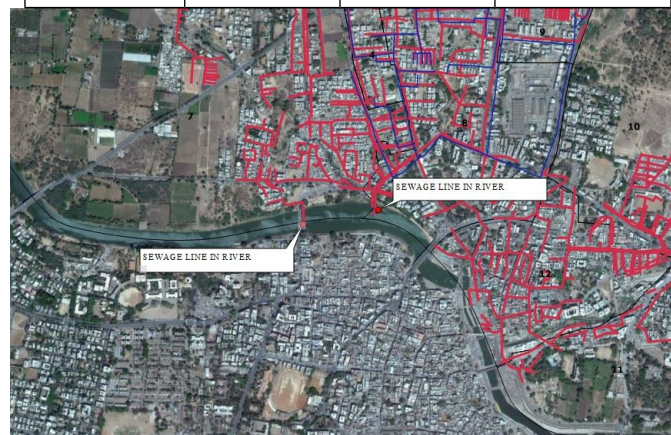
**ESR, DRINKING WATER NETWORK AND SATELLITE IMAGE COMPOSITE MAP**



This map is show the satellite image of drinking water network and ESR location on Panchvati Division.

**11. Sewage Line In River :-**

Location	Type of plant	Latitude	Longitude
Panchak	STP	19.58.884N	73.51.398E
Takali	STP	19.98.63N	73.82.80E
Tapovan	STP	19.99.88N	73.81.79E
Fulenagar	STP	20.1.188N	73.47.736E
Nilgiri bag	STP	20.1.182N	73.50.602E



During the work we noted for some sewage line are directly flow in Godavari River and it is not good for smart city.

**V.CONCLUSION**

The main conclusion in this project is for using GIS and GPS the field survey are taken as on the small lab and time are also reduce. In Panchavti division total length of sewage line is 191.355km and total length of drinking water networking is 85.79km. Population of Panchavti division is 18.952 out of which 98,416 is male and 90836 female mean approximately 19 lakh population out of which approximate 99000 male and 91000 female. In Panchavti division total 3 sewage treatment plants are working and 2 water treatment plant are working.

Some location sewage line is directly open in the Godavari river bank.

#### **Recommendation**

- 1) Close the open sewer lines for river bank.
- 2) Create other base layers/map using GPS and GIS.
- 3) Validation of STP plant is locations are suitable or not.
- 4) Create updated map of sewage and water networking because ward no.10 and 12, NMC map are show for no any drinking water line are passing these are but it is not possible because now-a-day ward no.10 and 12 are very strong population area.
- 5) We are recommended by NMC to use our plan for work.Updated maps are open that citizens

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