



# Design of 24x7 Water Supply System for Ranebennur Town

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**ABSTRACT:** The project highlights the work carried out on the population forecast, water requirement and water supply to the Ranebennur town, Haveri district, Karnataka,-India. The Current project has been carried out on design a 24x7 water supply scheme for a Ranebennur town for domestic use. It also includes the provision of design of intake structure, water treatment work, for the area in order to supply the treated water to the publics. Providing distribution networks, pipe appurtenances, and water meters, to save water. Quality and quantity of water supplied should be satisfactory.

**KEYWORDS:** Water, Surface Water, Water Quality, Water Supply, Water Treatment Scheme

## I. INTRODUCTION

Water is one of the most basic amenities required for every living being. Apart from using the water for domestic needs, water resources have been the most widely exploited natural system since man occupied this earth. The other beneficial uses of water includes, for industries, generation of electric power, transportation, recreation and many other uses. Not only the use of water is increasing rapidly with the growth in population, but also there is an acute shortage of both surface and underground water due to many manmade activities, thus, man himself has been root cause of many problems and the proper management of water usage, which assumes a great importance in this modern world.[1]

24x7 Water means water supply system, in which water is available in the tap round the clock on all days on a continuous basis as in case of electric supply. In a continuous supply, the distribution system remains continuously pressurized so that no contamination can come into the water pipelines even when there are small leaks in the system. It also means water with sufficient pressure so that it can flow automatically up to the third floor of the houses without need of any in-home storage or pumping. And, most importantly, it means water, free from contamination that can be drunk right from the tap without fear of illness.[2]

Safe and adequate water readily and conveniently accessible by users at all times and in all situations.

## BENEFITS OF 24x7 WATER SUPPLY SYSTEMS

- 24x7 supply delivers better quality water for public health.
- 24x7 Supply gives significantly better service to all consumers
- 24x7 supply revolutionizes service to the poor.
- 24x7 supply converts household coping costs into resources for the service provider.
- 24x7 supply reduces the burden on water resources.
- 24x7 supply delivers effective 'supply management' and 'demand management'.
- 24x7 supply enables improved efficiency of service provision.

The main objective of this project is to propose a 24x7 water supply. So in the proposed project of supplying drinking water for the town of Ranebennur, the above points are kept in mind and designed as such.

## II. LITERATURE REVIEW

Many projects suggested on Design of 24x7 water supply scheme. This research paper highlights the recent work carried out on the water quality status and water supply near KalindiVihar Colony, TediBagiya, and Agra, India. The Current research has been carried out on Ground water quality in the area in order to design a water supply scheme for an under developing residential colony i.e. EWS houses there. It also includes the provision of design of water treatment scheme for the area in order to supply the treated water to the houses.[3]



### III. RESEARCH SITE

**Location:** Ranebennur is the largest urban center in the Haveri district and situated in the central part of Karnataka. Geographically, the town is located at 14.62°N 75.62°E with an average elevation of 605 m. This is the biggest town in Haveri district and is an important trade centre. It is located on the Pune-Bangalore Highway (NH-4) at a distance of 300 km from Bangalore, 35 km from Haveri and 107 km from Hubli and Dharwad. The town extends to an area of 9.98 sq. km and houses population of 1,06,406 as per Census 2011. The town is well connected by roads with the Bangalore and neighboring towns – Byadagi, Hirekerur, Hanagal, Savanur and Shiggaon. Tungabhadra Rivers flows along the southern border of Ranebennur Taluka.

**Climate:** The town is characterized with hot summer months, cold winters and with low rainfall during monsoon. The temperature varies between 42 °C during summer and 17 °C during winter. Generally, April and May are the hottest months while December to February is cold. The town experiences southwest monsoon from June to September and the period between the months of October and November can be termed as post monsoon months.

As per the seismic zoning map of India, Ranebennur Town falls under Zone II, which is the lowest earth quake risk zone in India. This zone is termed as “low damage risk zone”.

### IV. DESIGN DETAILS

The period of design varies from 20 to 40 years or even up to 50 years. But for normal projects, the period of design is taken as 20 to 30 years. For this project period of design is taken as 30 year. By using following methods, the computation of population can be done.

**Table 5.1: The census records of required site shows the population as follows**

Year	Population
1991	67,442
2001	89,618
2011	1, 06, 406

#### Basis for Population Projection

The population for design period i.e. year 2046 has been worked out considering the available data for three decades i.e. 1991, 2001, 2011 census using following method

- Arithmetical increase method  
Population in 2046 = 1, 74,593 no's
- Geometrical increase method  
Population in 2046 = 2, 31,000 no's
- Incremental Increase Method  
Population in 2046 = 1, 81,016 no's

Thus the future population at the end of 3 decades is considered as 2,31, 000 no's

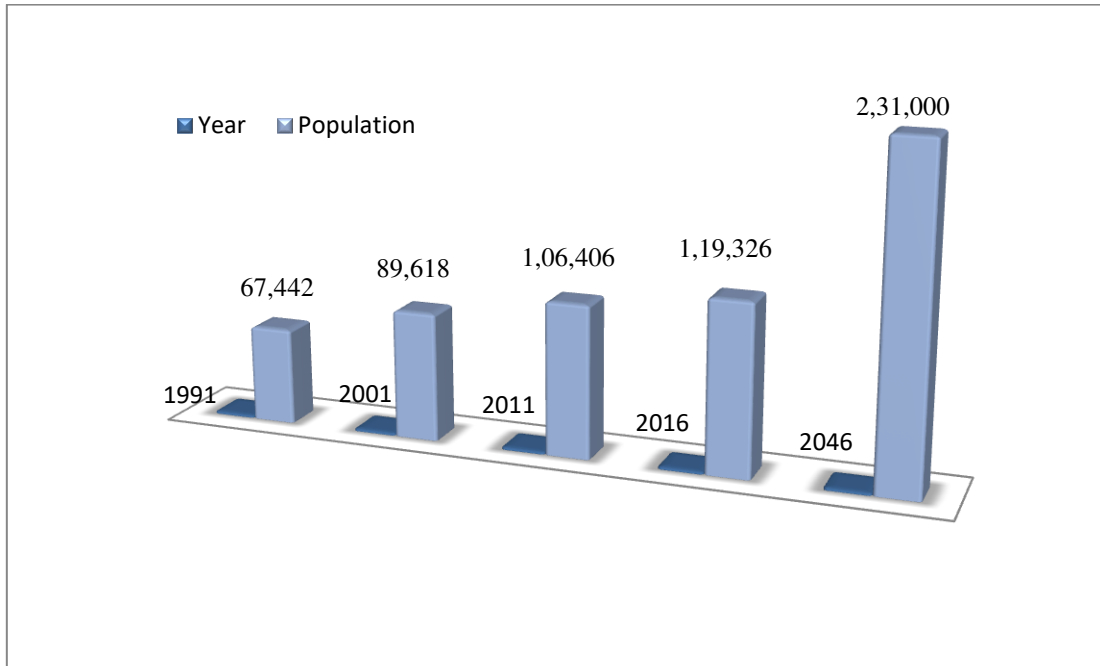


Fig 4.1: Population Projection of the Ranebennur town

**Water demand**

$$\begin{aligned}
 &= 231000 \times 200 \text{ lpcd} \\
 &= 46.20 \times 10^6 \text{ ltr/day} \\
 &= 46.20 \text{ Mld}
 \end{aligned}$$

**V. RESULTS**

**A .GENERAL**

- |                              |  |
|------------------------------|--|
| 1. Source                    | Tungabhadra River near Mudenur village |
| 2. Nature of river bed       | Rocky                                  |
| 3. Width of river            | 50m                                    |
| 4. Depth of water in summer  | 0.6m                                   |
| 5. Population in 2046        | 2, 31,000 no's                         |
| 6. Rate of water supply      | 200lpcd                                |
| 7. Rate and hours of pumping | 24hrs                                  |
| 8. Intake proposed           | Surface intake                         |

**B. RIVER HEAD WORK**

**B1. Intake chamber**

- |                            |      |
|----------------------------|------|
| 1. Diameter                | 4.3m |
| 2. Depth of intake chamber | 3m   |

**B2. JACKWELL AND PUMPHOUSE**

- |                                   |              |
|-----------------------------------|--------------|
| 1. Site                           | Mudenur      |
| 2. Diameter of jack well          | 8m           |
| 3. Depth of H.F.L                 | 8.3m         |
| 4. Plinth height of engine house  | 10.3m        |
| 5. Depth of jack well from plinth | 10.3m        |
| 6. Size of pump house             | 5m x 5m x 4m |

**C. WATER TREATMENT WORK**

**C1. SETTLING TANK**

- |                         |                      |
|-------------------------|----------------------|
| 1. Type Proposed        | Horizontal flow      |
| 2. Detention period     | 7 hrs                |
| 3. Surface area loading | 13475 m <sup>3</sup> |



4. Size of tank	84m x 32.1m x 5.5m
5. Type of loading arrangement	Gravity flow
<b>C2. FILTERS</b>	
1. Type of filters	Rapid sand filter
2. Rate of filtration	5000 lt/hr/m <sup>2</sup>
3. Size of filter bed	10m x 6m
4. No. Of filters units	10 no's
<b>C3. DISINFECTION OF CHLORINE</b>	
1. Amount of chlorine required per day	14kg
2. Amount of bleaching powder required per day	46.6kg
3. Annual consumption of bleaching powder	17.01 tones
4. Chlorine demand of water	0.30mg/l
<b>D. WATER TANK</b>	
1. Capacity	19250m <sup>3</sup>
2. Depth	7.5m (above ground level)
3. Diameter	19m
4. No of tanks	10
4. Type	ELSR
<b>E. PUMP</b>	
1. Type of pump	Centrifugal pump
2. H.P of motor	625 HP
3. Discharge	0.802cum/sec
4. Static head	76.37m
5. Loss of head	93.65m
6. Net head	183.32m
7. R.L of inlet @ elevated tank	606.290m
8. NO. Of pumps	4no's (2 standby)
<b>F. DISTRIBUTION</b>	
1. Type of supply	Continuous water supply
2. Type of system	Dead end system

## VI. CONCLUSION

At the beginning our aim was to supply pure wholesome drinking water to the public of Ranebennur town with minimum cost. As such we have also calculated population projection and quantity of water required to the town at year 2046. But as far as possible we have avoided costly installation and gone for conventional methods which may prove economical. This mode will be less costly as compared to the one which has been discussed here. The initial plan was same as just mentioned above, but after the results of analysis of water it became necessary to treat the water before supply and hence a full water supply scheme was designed for benefit of the people who are going to reside there. People will get safe, clean & clear water. As for as the design is concerned it can be efficiently executed with some minor alteration for the faults that may have been done in designing.

- Meters are providing for purpose of save water and it helps the complaints response time 24hrs to the customers, 100% computerized records maintained/bills based on monthly readings issued.
- Simplification of billing procedure with AMR type meter installation ensured that reading could be taken remotely by driving through the streets using radio-frequency driven hand-held devices.
- This Project has helped prove that 24x7 is feasible and doable Became milestone in India, other cities, in-state and outside state have shown interest in 24x 7 water supply systems.

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