



# केन्द्रीय भूमिजल बोर्ड

जल शक्ति मंत्रालय, जल संसाधन, नदी विकास  
और गंगा संरक्षण विभाग

भारत सरकार

**Central Ground Water Board**

Ministry of Jal Shakti,  
Department of Water Resources, River Development  
and Ganga Rejuvenation  
Government of India

Report on

## **AQUIFER MAPPING AND MANAGEMENT PLAN**

**T.Narasipura Taluk, Mysore District, Karnataka**

दक्षिण पश्चिमी क्षेत्र, बेंगलुरु

South Western Region, Bengaluru

भारत सरकार  
जल शक्ति मंत्रालय  
जल संसाधन, नदी विकास  
एवं गंगा संरक्षण विभाग  
केन्द्रीय भूमिजल बोर्ड  
दक्षिण पश्चिमीक्षेत्र, बंगलुरु

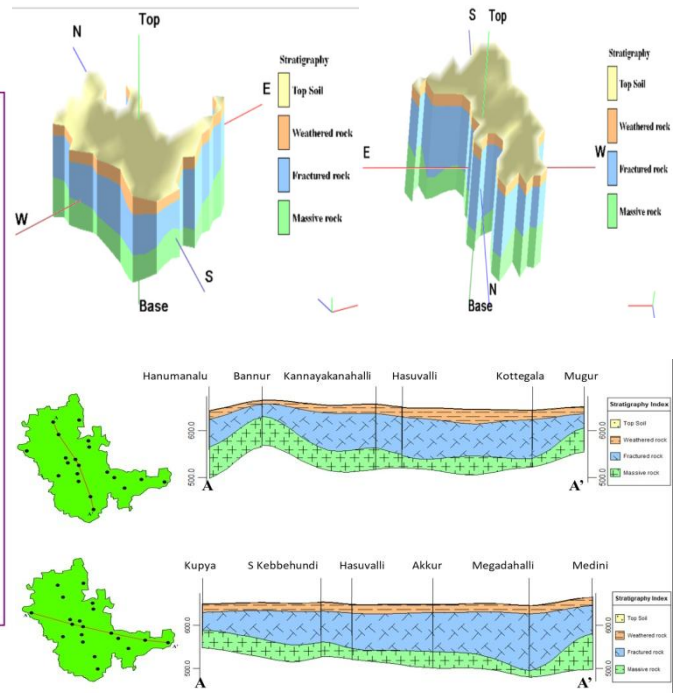
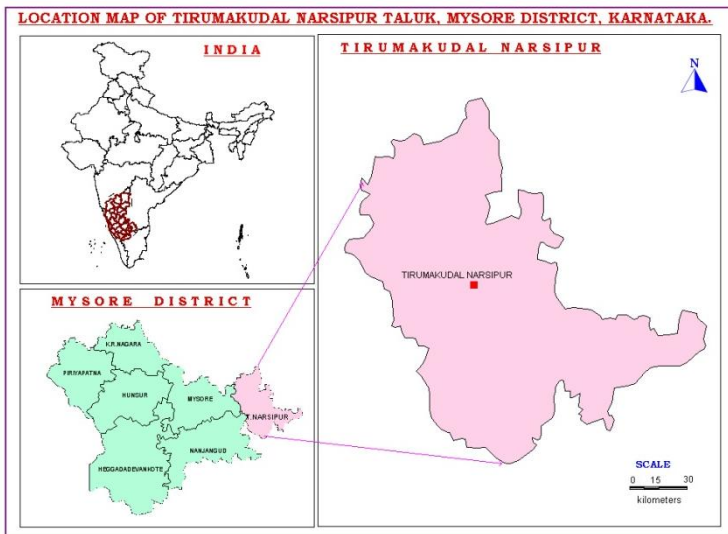


FOR OFFICIAL USE ONLY  
No. SWR/RP/NQM/2022-23/30

Government of India  
Ministry of Jal Shakti  
Department of Water Resources,  
River Development &  
Ganga Rejuvenation  
Central Ground Water Board  
South Western Region, Bengaluru

# AQUIFER MAPS AND MANAGEMENT PLAN, T.NARASIPURA TALUK, MYSURU DISTRICT, KARNATAKA STATE

(AAP: – 2021-2022)



By

V.HEMALATHA, Assistant Hydrogeologist, CGWB, SWR, Bengaluru

AUGUST 2022

# AQUIFER MANAGEMENT PLAN OF T. NARASIPURA TALUK, MYSORE DISTRICT, KARNATAKA STATE

---

## Contents

<b>1 SALIENT FEATURES .....</b>	<b>1</b>
1.1 Study area .....	1
1.2 Population.....	2
1.3 Rainfall .....	2
1.4 Agriculture & Irrigation .....	3
1.5 Geomorphology, Physiography & Drainage:.....	4
1.6 Geology, Soil and Landuse .....	5
1.7 Ground water resource availability and extraction .....	6
1.8 Existing and future water demands (as per GWRA-2017 and 2020) .....	6
1.9 Water level behavior .....	7
<b>2 AQUIFER DISPOSITION .....</b>	<b>7</b>
2.1 Aquifer Types .....	8
2.2 3D Aquifer disposition, Aquifer Fence Diagram and 2D Cross-Sections.....	8
<b>3 GROUND WATER RESOURCE, EXTRACTION, CONTAMINATION AND OTHER ISSUES .....</b>	<b>10</b>
3.1 Comparison of Ground Water Resource and Extraction .....	10
3.2 Chemical quality of ground water and contamination .....	10
<b>4 GROUND WATER RESOURCE ENHANCEMENT .....</b>	<b>12</b>
4.1 Resource Enhancement by Supply Side Interventions .....	12
4.1.1 Benefit of Artificial recharge scheme.....	13
4.2 Resource Savings by Demand Side Interventions.....	14
4.2.1 Advanced irrigation practices .....	14
4.2.2 Change in cropping pattern .....	14
4.2.3 Regulation and Control .....	14
4.2.4 Other interventions proposed .....	14
<b>5 SUMMARY AND RECOMMENDATIONS .....</b>	<b>15</b>

# AQUIFER MAPS AND MANAGEMENT PLAN, T. NARASIPURA TALUK, MYSURU DISTRICT, KARNATAKA STATE

## 1 SALIENT FEATURES

Name of the Taluk: T. NARASIPURA

District: Mysuru

State: Karnataka

Area: 600 Sq. Kms.

Population: 2,92,035

Annual Normal Rainfall: 738 mm

### 1.1 Study area

Aquifer Mapping Studies have been carried out in T. Narasipura taluk, Mysore district of Karnataka, covering an area of 600 Sq. Kms under National Aquifer Mapping Project. The T. Narasipura taluk is located between North Latitudes  $12^{\circ}10'00''$  and  $12^{\circ}30'20''$  and East Longitudes between  $76^{\circ}52'30''$  to  $76^{\circ}52'40''$ . The study area is bounded on the East by Malavalli taluk of Mandya District, on the North by Mandya Taluk of Mandya District, on the South by Chamarajanagara taluk of Chamarajanagara District, on the West by Mysore Taluk of Mysore district. Location map of T. Narasipura taluk of Mysore district is presented in Fig-1. T. Narasipura is taluk headquarters. There are 130 villages and 36 Gram Panchayats in this taluk.

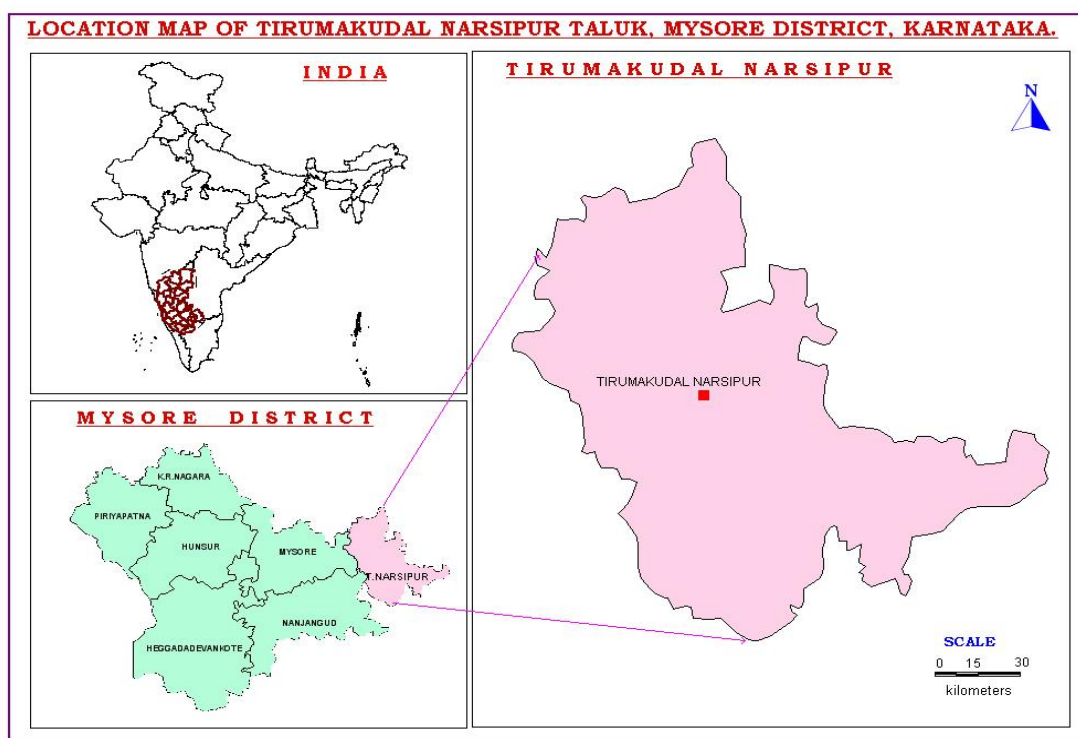


Fig. 1: Location Map

## 1.2 Population

According to 2011 census, the population in T.Narasipura taluk is 2,92,035, in which 1,46,258 male population and 1,45,777 is the female population . The taluk has an overall population density of 488 persons per Sq.Kms. The decadal variation in population from 2001-2011 is 4.67% in T.Narasipura taluk.

**Table-1: Population details**

Total	Male	Female	Share of the district population	Rural population	Urban population	Decadal change in population	Decadal change in rural population	Decadal change in urban population
2,92,035	1,46,258	1,45,777	9.73	2,40,540	51,495	4.67	-2.15	55.26

**Source:** District at a Glance 2020-21, Govt. of Karnataka

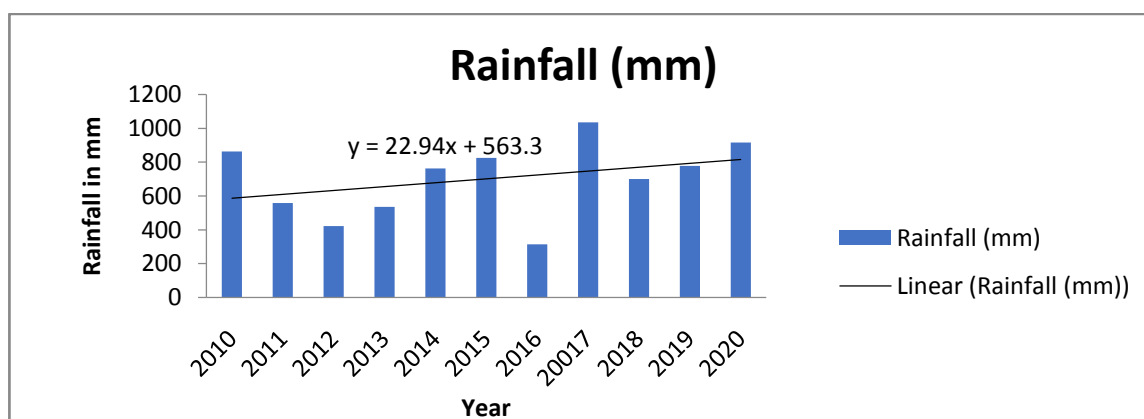
## 1.3 Rainfall

T.Narasipura taluk enjoys semi-arid climate. The normal annual rainfall in T.Narasipura taluk for the period 1961 to 2010 is 738 mm. The year is usually divided into four seasons: summer from March to May; rainy season or south-west monsoon season from June to September; post-monsoon season covering the months of October and November and dry or winter Season from December to February.

**Table-2 Actual Annual rainfall (mm) in rain gauge station from 2010 to 2020**

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Rainfall (mm)	864	559	422	535	762	825	314	1036	700	778	916

**Source:** District at a Glance 2020-21, Govt. of Karnataka



**Fig. 2: Rainfall Trend Analysis**

## 1.4 Agriculture & Irrigation

Agriculture is the main occupation in T.Narasipura taluk. Major crops are Paddy, Maize, Ragi Tur, Pulses, Tobacco, Fruits and Vegetables. Water intensive crops like Sugarcane and Paddy are grown in T.Narasipura Taluk (Table 3).

**Table-3: Cropping pattern in T.Narasipura taluk as per 2019-2020 (Ha)**

Crops	Cereals (Area in Ha)				Pulses (Area in Ha)						
	Paddy	Jowar	Ragi	Maize	Tur	Horse gram	Black gram	Green gram	Avare	Cowpea	Bengal gram
	21,515	226	598	1,263	17	3,416	2,203	389	25	250	5
<b>Total</b>	<b>23,621</b>				<b>6035</b>						
<b>Total Food grains – 29,656</b>											
Fruits (Area in Ha)	Veg (Area in Ha)	Oil seeds (Area in Ha)				Commercial crops (Ha)					
		Groundnuts	Sun flower	Castor	Sesame	Cotton	Sugarcane	Tobacco			
<b>2013</b>	<b>754</b>	833	135	2	145	6	4,334	0			
		<b>Total Oil seeds – 1,115</b>				<b>Total - 4,340</b>					

**Source:** District at a Glance 2020-21, Govt. of Karnataka

It is observed that net sown area accounts 35,205 (Ha) and area sown more than once is 10,938 (Ha) of total geographical area 58,672 (Ha) in T.Narasipura taluk (Table-4). Area under Forest is 154(Ha) Area not available for cultivation and Fallow land cover 6,268 (Ha) and 14,241 (Ha) of total geographical area respectively. 24,785 (Ha) of net area is irrigated from surface water and are irrigated from Groundwater is 4,685 (Ha) (Table-5).

**Table-4: Details of land use in T.Narasipura Taluk as per 2019-2020 (Ha)**

Total Geographical Area	Area under Forest	Area not available for cultivation	Other uncultivable land	Fallow land	Net sown area	Area sown more than once	Gross sown area
58,672	154	6,268	2,804	14,241	35,205	10,938	46,143

**Source:** District at a Glance 2020-21, Govt. of Karnataka

**Table-5: Irrigation details in T.Narasipura taluk as per 2019-2020 (Ha)**

Sl.No	Source	Length in Km/No of structures	Gross area irrigated	Net area irrigated
1	Surface water	Canals	272	22,422
		Tanks	35	2,363
		Lift irrigation	0	0

		<b>Total</b>		<b>27,958</b>	<b>24,785</b>
2	Ground water	Dug wells	156	1,080	51
		Bore wells	6,320	5,080	4,634
		<b>Total</b>		<b>6,160</b>	<b>4,685</b>
<b>Grand Total</b>				<b>34,118</b>	<b>29,470</b>

Source: District at a Glance 2020-21, Govt. of Karnataka

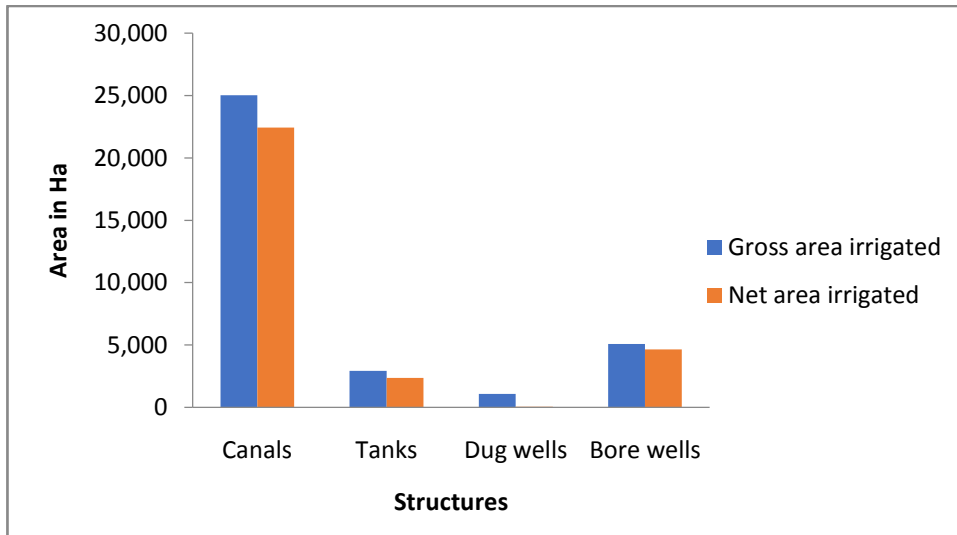


Fig. 3: Sources of Irrigation

### 1.5 Geomorphology, Physiography & Drainage:

The geomorphology of the T.Narasipura is formed by various land forms like hills and plateaus, piedmont zone, plains and river/stream, etc. Hilly area in central part and plain region in covered all over the taluk. The elevation in the taluk varies from 640m to 670m in the taluk. The taluk is endowed with a number of perennial and non-perennial rivers/streams. The rivers/streams which flow towards North West to South East direction. The drainage system is well developed in the taluk. The differential altitude is significant because, it is likely to cause irregular ground water flow patterns on the microscale (Fig.-4). Topography is dominantly controlled by geological structures. The entire T.Narasipura taluk falls in Cauvery river basin. The Drainage pattern is dendritic to subdendritic (Fig.-5).

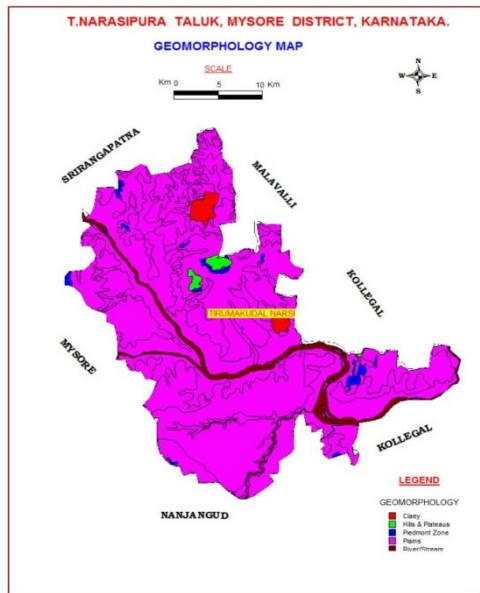


Fig-4: Geomorphology Map

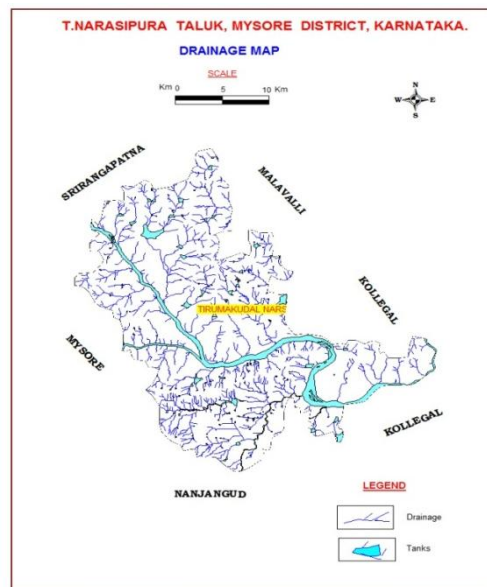


Fig-5: Drainage Map

## 1.6 Geology, Soil and Landuse

Geologically, the taluk is mainly composed of igneous and metamorphic rocks of Pre-Cambrian age either exposed at the surface or covered with a thin mantle of residual and transported soils. The rock formation in the taluk falls into two groups, gneissic complex and schistose formation. The geology map has been given in Fig. 6.

The soils of T.Narasipura taluk can broadly be classified into Clayey soils and Clayey Skeletal soils and Loamy soils. These soils vary in depth and texture, depending on the parent rock type, physiographic settings and climatic conditions (Fig-7) and mainly this taluk covered by agricultural land. Land Use and Land Cover map also included (Fig.8).

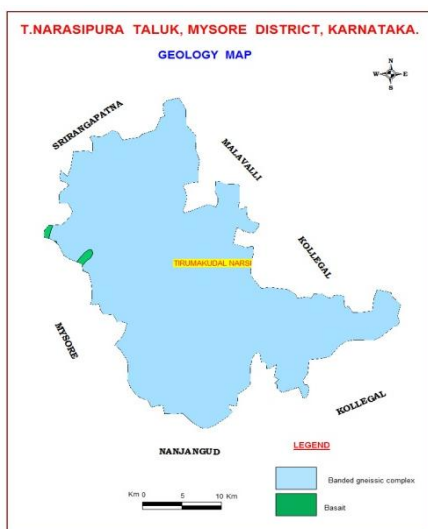


Fig-6: Geology Map

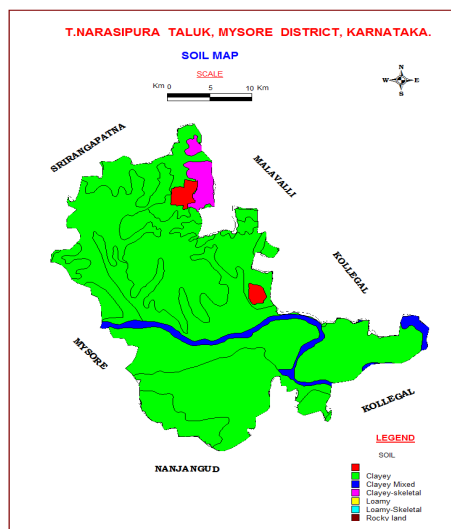


Fig-7: Soil Map



Fig-8: Land use Map



## 1.7 Ground water resource availability and extraction

As per the ground water resource estimation 2017 (**Table 6a**), the data on ground water resources shows that the net annual ground water availability is 10,244ham. The existing gross groundwater for irrigation Domestic and Industrial is 4,978ham. The stage of groundwater development is 48.59% and falling under 'Safe' category.

**Table-6a. Detail of Dynamic Ground Water resource, (March 2017 Ham)**

Annual Extractable GW Resource (Ham)	GW Extraction for Irrigation Use (Ham)	GW Extraction for Domestic and Industrial Use (Ham)	Total Extraction (Ham)	Annual GW Allocation for Domestic and Industrial Use for next 25Yaers (Ham)	Net GW Availability for future Irrigation Development (Ham)	Stage of GW Extraction (%)	Categorization
10,244	4,615	363	4978	610	5172	48.59	Safe

Aquifer-wise total ground water resources down to 160 m depth are given in **Table-6b** below as per 2017 estimations.

**Table-6b: Total Ground Water Resources (2017) (Ham)**

Taluk	Annual replenishable GW resources	Fresh In-storage GW resources		Total availability of fresh GW resources
T.Narasipura	10244	Phreatic	Fractured(Down to 160m)	Dynamic + Phreatic in-storage + fractured
		8212	1403	

## 1.8 Existing and future water demands (as per GWRA-2017 and 2020)

As per the GWRA 2017, the net ground water availability is 10,244 ham and the total ground water draft for all uses is 4,978 ham with stage of development at 48.59% and the taluk falls in Safe category. The domestic (Industrial sector) demand for next 25 years is estimated at 610 Ham.

The details of dynamic (Phreatic) ground water resources for T.Narasipura taluk as on March 2020 is shown in Table-7. It is observed that the stage of ground water extraction is slightly gone up in the taluk from 48.59 % to 56.09 % from 2017 to 2020.

**Table-7. Detail of Dynamic Ground Water resource, (as on March 2020)**

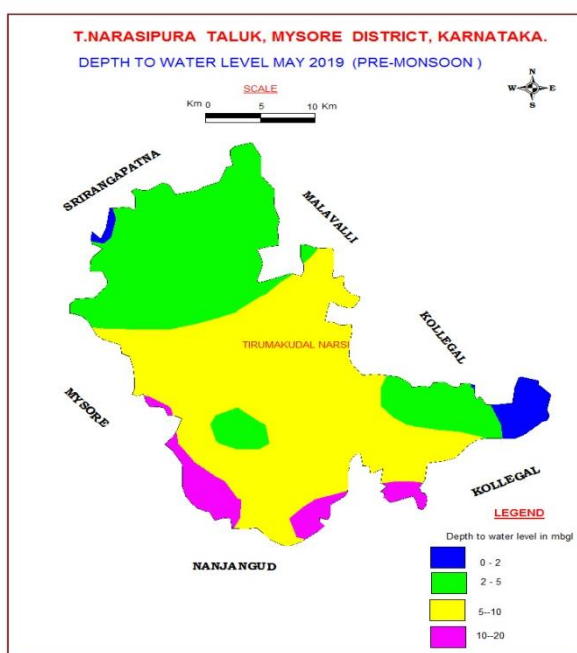
Annual Extractable GW Resource (Ham)	GW Extraction for Irrigation Use (Ham)	GW Extraction for Industrial Use (Ham)	GW Extraction for Domestic Use (Ham)	Total Extraction (Ham)	Annual GW Allocation for Domestic Use as on 2025 (Ham)	Net GW Availability for future use (Ham)	Stage of GW Extraction (%)	Categorization
9037.47	4503.82	0	565.70	5069.53	710.97	4020.45	56.09	Safe

## 1.9 Water level behavior

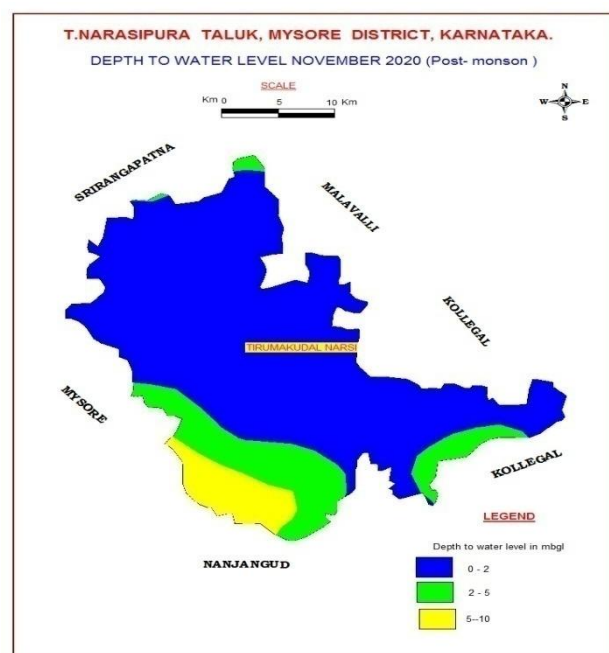
The water level data have been monitored from the representative dug wells monitoring for both pre and post monsoon seasons in Aquifer I (**Table 8**). During Pre-Monsoon season water level ranges from 2.97 to 17.47 mbgl, whereas in Post Monsoon it varies from 0.71 to 16.2 mbgl and the maps shown in **Fig 9** and **10**.

**Table.8 Depth to Water level in T.Narasipura Taluk**

	Pre Monsoon		Post Monsoon	
	Aquifer-I	Aquifer-II	Aquifer-I	Aquifer-II
<b>Range</b>	2.97-17.47	-	0.71-16.2	-



**Fig-9: Pre-monsoon Depth to Water Level**



**Fig-10: Post-monsoon Depth to Water Level**

## 2 AQUIFER DISPOSITION

The occurrence and movement of water in the subsurface is broadly governed by geological frameworks i.e., nature of rock formations including their porosity (primary and secondary) and permeability. The principal aquifers in the area are Gneisses and Schist and the occurrence and movement of ground water in these rocks is controlled by various factors and it primarily depends on the degree of interconnection of secondary pores/voids developed by fracturing and weathering in the hard rock.

## 2.1 Aquifer Types

In T.Narasipurataluk, there are mainly two types of aquifer systems;

- Aquifer-I (Phreatic aquifer) comprising weathered Gneisses and Schistose.
- Aquifer-II (Fractured aquifer) comprising fractured Gneisses and Schistose.

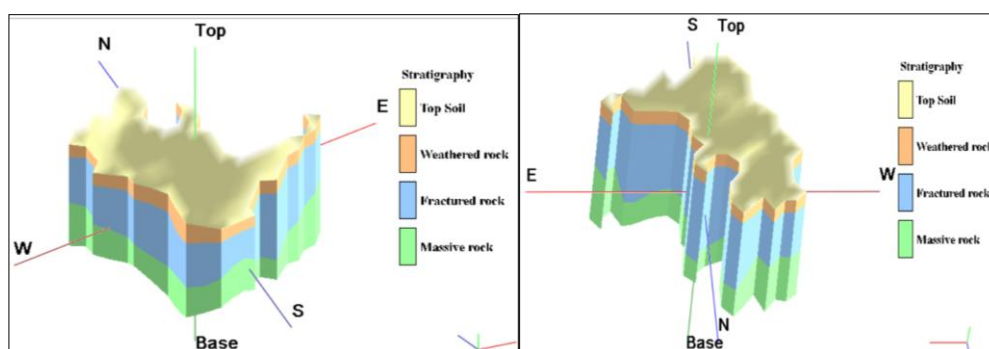
In T.Narasipura taluk, Schist and Granitic gneiss are the main water bearing formations. Ground water occurs within the weathered and fractured Schist, Granite and Granitic gneiss under water table condition and semi-confined condition. In T.Narasipura taluk bore wells were drilled from a minimum depth of 100mbgl to a maximum of 160mbgl. Depth of weathered zone ranges from 5mbgl to 25mbgl. Ground water exploration reveals that aquifer-II fractured formation was encountered between the depths of 80 to 160mbgl. Yield ranges from Negligible to 4.5lps. The basic characteristics of each aquifer are summarised in **Table-9**.

The 3D aquifer disposition models, 2D aquifer sections and 3D aquifer fence diagrams have been prepared and presented in **Fig. 11a, b and c**.

**Table-9: Basic characteristics of each aquifer**

Aquifers	Weathered Zone (Aq.-I)	Fractured Zone (Aq.-II)
Prominent Lithology	Weathered Granitic gneiss	Fractured Granitic gneiss
Thickness range (mbgl)	5-25	Fractures upto 160 mbgl
Depth range of occurrence of fractures (mbgl)	-	80-160
Range of yield potential (lps)	-	<1 – 4.5

## 2.2 3D Aquifer disposition, Aquifer FenceDiagram and 2DCross-Sections



**Fig-11a: 3D Aquifer Dispositions**

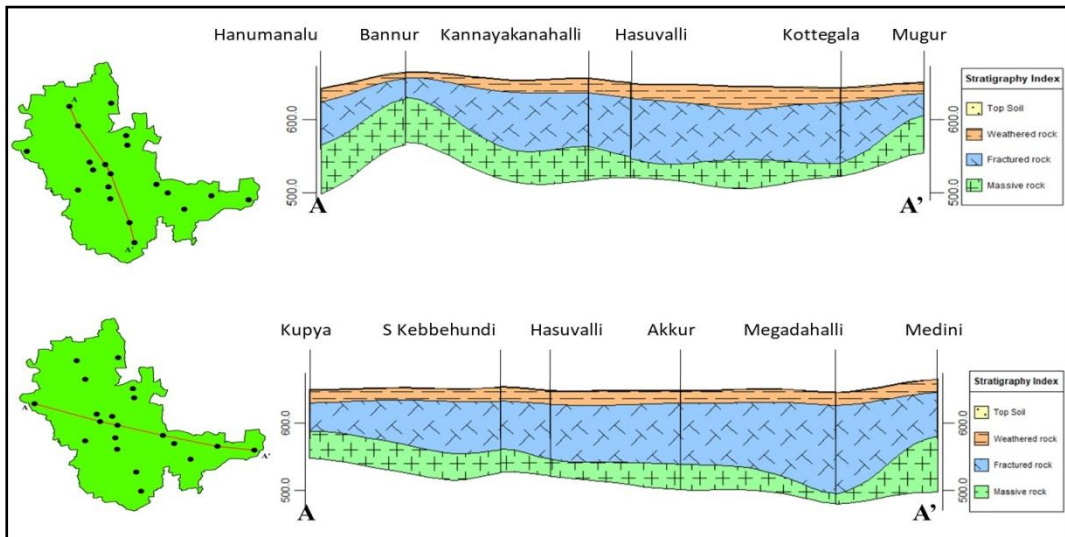


Fig-11b: 2D Cross sections in different directions

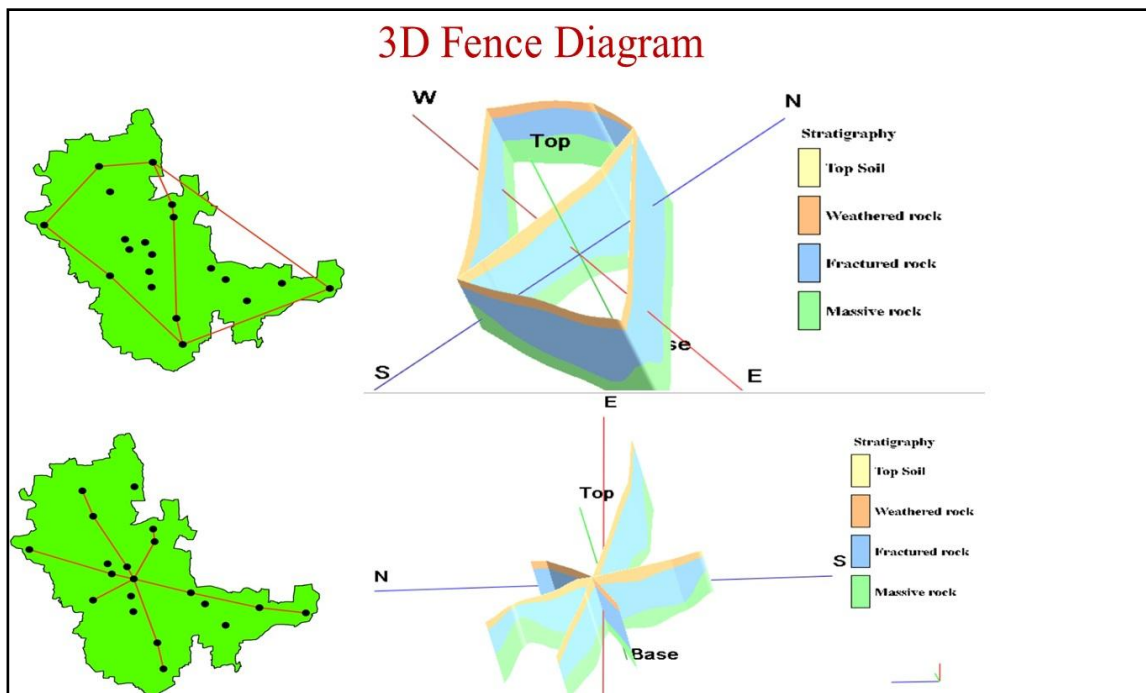


Fig-11c: 3D Aquifer Fence Diagram

### 3 GROUND WATER RESOURCE, EXTRACTION, CONTAMINATION AND OTHER ISSUES

The main ground water issues are over exploitation, Limited Ground Water Potential / Limited Aquifer Thickness / Sustainability, deeper water levels especially in Aquifer II, declining water level trend and urbanized areas of T.Narasipura city thereby reducing the ground water recharge worthy areas which are all inter-related or inter dependent.

#### 3.1 Comparison of Ground Water Resource and Extraction

The Dynamic Ground Water Resource 2017 and as on 2020 have already been summarised above and are shown in Table 10. It is observed that the ground water availability in 2020 is less compare to 2017 due to decrease in rainfall and in water table. It is attributable to the improvement in the irrigation practice, influence of command area and also due to the water conservation / recharge activities carried out in the taluk by various state govt. and other agencies.

**Table-10 Comparison of ground water availability and draft scenario in T.Narasipura taluk**

Taluk	GW availability (in ham)	GW draft (Extraction) (in ham)	Stage of GW development	GW availability (in ham)	GW draft (Extraction) (in ham)	Stage of GW development
T. Narsipura	<b>2017</b>			<b>2020</b>		
	10244	4978	48.59%	9037.47	5069.53	56.09%

#### 3.2 Chemical quality of ground water and contamination

The water samples were collected in different parts of T.Narasipura taluk and the data is given below in **Table 11** and **Fig 12**.

The results of quality parameters show that:

- **Electrical Conductivity:** EC values range from 520 to 1760  $\mu$ S/cm at 25°C.
- **Nitrate:** Nitrate concentration in ground water ranges from 2 to 127 mg/l.

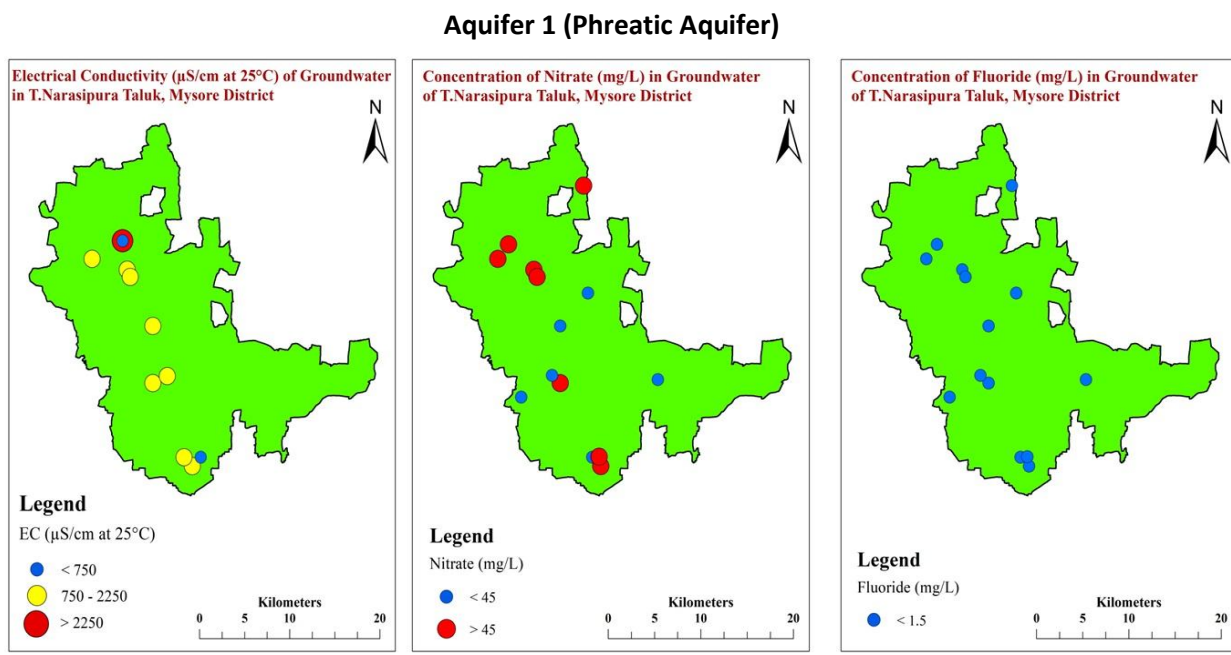
The villages which have more nitrate value than the permissible limit are B.Seehalli, Rangasamudra, Ramanathapura Hundi, Alagodu, Muguru, B.Bettahalli and Ganiganakoppalu.

- **Fluoride:** Fluoride concentration in ground water ranges between 0.09 to 1.10 mg/l.

**Table-11 Groundwater Quality data**

Sl. No	Location	Taluk	District	pH (6.5-8.5)	E C in $\mu$ S/cm	TH (600)	Ca (200)	Mg (100)	Na	K	CO <sub>3</sub>	HC O <sub>3</sub>	Cl (100)	SO <sub>4</sub> (400)	N O <sub>3</sub> (45)	F (1.5)	TDS <sup>&amp;</sup>
1	Chindravalli	T.Narasipura	Mysuru	7.40	600	175	42	17	53	1.7	0	226	21	70	13	1.10	357
2	Chikkakalkuni	T.Narasipura	Mysuru	7.35	780	285	68	28	34	1.1	0	201	85	75	15	0.77	429

3	Banagavadi	T.Naras ipura	Mys uru	7.5 7	750	24 0	60	22	62	5.0	0	281	46	60	15	1.1 0	442
4	Menasekyat hanalli	T.Naras ipura	Mys uru	7.4 4	550	15 0	54	4	52	1.8	0	98	43	10 0	31	0.9 5	346
5	Yadahalli	T.Naras ipura	Mys uru	7.3 5	860	35 0	12 0	12	32	1.6	0	275	46	80	37	0.6 7	496
6	Hanumanalu	T.Naras ipura	Mys uru	7.7 2	900	38 0	74	47	25	0.9	0	299	78	70	16	0.5 0	494
7	Bannurdw	T.Naras ipura	Mys uru	7.7 6	720	18 5	36	23	76	10. 7	0	287	53	45	11	0.2 6	430
8	Madigahalli	T.Naras ipura	Mys uru	7.8 7	520	17 0	50	11	37	1.2	0	207	28	35	2	0.1 3	291
9	B Seehalli	T.Naras ipura	Mys uru	7.7 9	700	26 5	58	29	32	2.9	0	183	60	55	53	0.3 9	403
10	B Seehalli	T.Naras ipura	Mys uru	7.7 1	950	33 5	74	36	42	42. 4	0	336	71	65	21	0.2 3	556
11	Rangasamud ra	T.Naras ipura	Mys uru	7.6 8	102 0	38 0	20	80	33	1.6	0	134	64	16 0	12 1	0.0 9	562
12	Ramnathapu ra hundi	T.Naras ipura	Mys uru	7.7 5	660	20 0	62	11	55	2.6	0	153	43	90	47	0.2 9	403
13	Gargeshwari	T.Naras ipura	Mys uru	7.9 5	104 0	40 0	40	73	49	1.5	0	378	82	70	8	0.1 6	554
14	T.Narasipura	T.Naras ipura	Mys uru	7.8 8	990	35 0	44	58	59	9.6	0	323	92	60	32	0.6 3	553
15	Bannahalli hundi	T.Naras ipura	Mys uru	7.4 9	990	39 0	68	53	43	3.1	0	256	11 7	80	55	0.6 8	576
16	Alagodu	T.Naras ipura	Mys uru	7.9 9	113 0	31 0	80	27	62	98. 7	0	427	64	75	55	0.1 5	721
17	Alagodu	T.Naras ipura	Mys uru	7.8 6	700	24 0	52	27	43	12. 4	0	336	28	30	5	0.4 8	402
18	Vattalu	T.Naras ipura	Mys uru	7.8 8	176 0	31 0	88	22	90	271 .2	0	384	27 7	11 0	40	0.3 6	1133
19	Adibettahalli	T.Naras ipura	Mys uru	8.3 0	860	20 0	30	30	10 8	7.6	0	336	64	55	15	1.0 0	516
20	Muguru	T.Naras ipura	Mys uru	7.7 6	162 0	52 0	10 4	63	11 0	23. 1	0	427	17 0	90	12 7	0.5 0	948
21	Charnnahalli	T.Naras ipura	Mys uru	7.7 3	640	22 5	58	19	35	1.4	0	195	50	65	17	0.3 6	365
22	B Bettahalli	T.Naras ipura	Mys uru	7.7 3	173 0	53 0	11 2	61	12 9	31. 8	0	293	26 9	16 0	90	0.9 7	1033
23	Attahalli	T.Naras ipura	Mys uru	7.5 4	113 0	31 5	92	21	10 4	1.9	0	366	11 0	60	19	0.4 4	631
24	Ganiganako ppalu	T.Naras ipura	Mys uru	7.8 2	127 0	29 0	96	12	15 6	2.3	0	305	17 0	10 0	44	0.1 9	768
25	Ganiganako ppalu	T.Naras ipura	Mys uru	7.9 9	115 0	31 0	76	29	11 5	2.4	0	250	15 6	90	45	0.4 6	667
26	Kethupura	T.Naras ipura	Mys uru	7.4 4	950	29 0	64	32	74	10. 8	0	275	14 2	30	13	0.7 8	533
27	Somanathap ura	T.Naras ipura	Mys uru	7.8 1	850	28 5	64	30	60	1.6	0	354	50	45	2	0.6 0	469
28	Horalahalli	T.Naras ipura	Mys uru	8.0 2	580	15 5	38	15	53	1.5	0	183	53	40	2	0.4 1	312



**Figure-12. Groundwater Quality Maps**

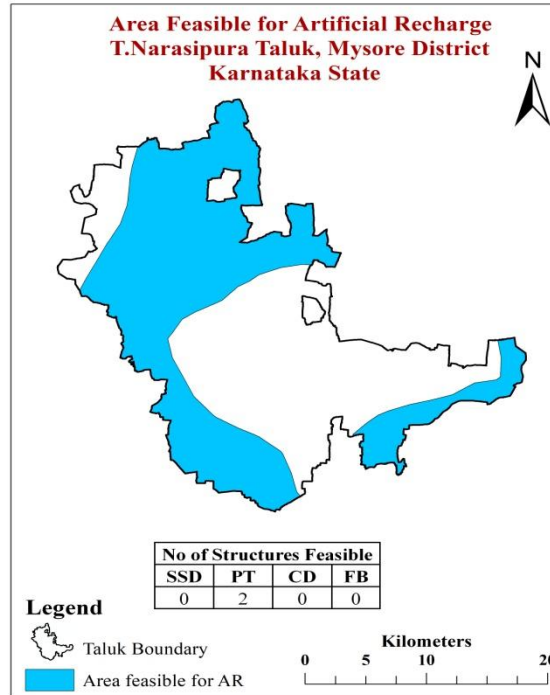
## 4 GROUND WATER RESOURCE ENHANCEMENT

### 4.1 Resource Enhancement by Supply Side Interventions

Recharge dry **phreatic aquifer (Aq-I)** in the taluk, through construction of artificial recharge structures, viz; check dams, percolation tanks & Sub surface dyke (**Table-12**). The choice of recharge structures should be site specific and such structures need to be constructed in areas already identified as feasible for artificial recharge. (**Fig.13**).

**Table-12: Quantity of non-committed surface runoff & expected recharge through AR Structures**

Details of Artificial Recharge structures in T.Narasipura Taluk		
Sl.No	Artificial recharge structures available/proposed	
1	Non committed monsoon runoff available in (MCM)	2.766
2	No of sub surface dykes	0
3	No of Check Dams	0
4	No of percolation tanks	2
5	Filter Beds	0
6	Tentative total cost of the project (Rs in lakhs)	51.268
7	Expected Recharge in (MCM)	0.42



**Fig-13.Area feasible for Artificial Recharge structures**

#### **4.1.1 Benefit of Artificial recharge scheme**

Artificial recharge structures namely check dams, percolation tanks, Filter Beds and Nala bunds can be taken up on large scale in the over-exploited areas as a management plan to tackle falling ground water levels.

- These structures have proved in building-up of ground water levels and sustainability of ground water abstraction structures, mainly in bore wells.
- An increase in the area irrigated by ground water source is also observed in the area of influence.
- Such activities help in providing sustainable drinking water to the rural population. The qualitative result from farmer's perception indicates that, there is rising trend in ground water levels in the area of influence, productivity of crops enhanced and improvement in yield is observed in bore wells.
- The cropping pattern has shown that farm households have resumed growing crops such as grapes which were not previously grown in the area.



## **4.2 Resource Savings by Demand Side Interventions**

### **4.2.1 Advanced irrigation practices**

It is observed that surface water is the major source for irrigation in the taluk. 16% of the irrigation through ground water and thus, by adopting the below mentioned techniques will contribute in ground water resource enhancement in the long run.

- Efficient irrigation practices like Drip irrigation & sprinkler needs to be adopted by the farmers in the existing gross irrigated area.
- Efficient irrigation techniques will contribute in saving ground water and thus will improve stage of development.

### **4.2.2 Change in cropping pattern**

Agriculture is the main occupation in T.Narasipura taluk. Water intensive crops like sugarcane is grown in 4,334 ha of net cropped area of 37,878 ha. However, oil seeds are grown during kharif and rabi period and sugarcane grown only in 4,334 ha of the cropped area. At present (2020), the stage of ground water extraction is @ 56.09% and taluk has been categorised as Safe, thus change in cropping pattern has not been suggested.

### **4.2.3 Regulation and Control**

T.Narasipura taluk has been categorized as **Safe**, since the stage of ground water development has reached 56.09% (GEC 2020), it may be encouraged to extract the ground water with care so that further ground water exploitation should not happen in the taluk However mandatory guideline issued by Government of Karnataka like rain water harvesting and Artificial recharge structures should be constructed. Ground water recharge component needs to be made mandatory in the non-command area of the taluk for further development of ground water.

### **4.2.4 Other interventions proposed**

- Periodical maintenance of artificial recharge structures should also be incorporated in the Recharge Plan.
- Excess nitrate concentration is found in ground water samples require remedial measures viz.
  - Dilution of nitrate rich ground water through artificial recharge & water conservation.
- Roof top rain water harvesting.

## 5 SUMMARY AND RECOMMENDATIONS

The main ground water issues are Limited Ground Water Potential / Limited Aquifer Thickness / Sustainability, deeper water levels particularly in Aquifer II in some parts, hilly and plateau areas which are all inter-related or inter dependent. The summary of ground water management plan of T.Narasipurataluk is given in **Table-13**.

**Table 13: Summary of Management plan**

Stage of GW Extraction and Category (2020)	56%, Safe
Annual Extractable GW Resource (Ham)	9037.47
Total Extraction (Ham)	5069.53
Ground Water Draft for Irrigation (Ham)	4503.82
<b>Ground Water Resource Enhancement by Supply side Interventions</b>	
No of Proposed AR structures	
SSD	0
PT	2
CD	0
FB	0
Expected Additional Recharge to GW due to AR (Ham)	42
Additional Irrigation Potential that can be created (Lakh Ha)	0.002
Total Estimated Expenditure (Rs. in Lakhs.)	51.268
Change in Stage of GW Extraction (%)	56 to 55

- Ground water resource enhancement:** Continuous drought, increase in agricultural activity, subjected to excessive ground water withdrawal leading to depletion of ground water level, reduction in yield and deterioration of ground water quality etc., suggests a need for proper ground water management and enhancement of storage capacity of aquifers, protection of ground water quality and proper utilization of ground water. To enhance the storage capacity of aquifers, the dewatered aquifers are to be recharged, for which the artificial recharge structures like Check dams, percolation tanks, point recharge structures etc have to be constructed.
- Ground Water resource:** As per the resource estimation – 2020, T.Narasipura taluk falls under Safe category with the stage of ground water extraction of 56.09 %. However, there is need to formulate management strategy to tackle the water scarcity related issues in the taluk during the summer and scarcity of water during the future days.

- **Ground water resource enhancement:** Increase in agricultural activity, excessive ground water withdrawal, depletion of ground water levels, reduction in yield and ground water quality related issues etc., suggests the need for scientific ground water management, enhancement of storage capacity of the aquifers and protection of ground water quality.
- **Quantity of water available through non-committed surface run-off:** The surplus non-committed monsoon run off is estimated to be approximately 2.766 MCM. This can be used to recharge the aquifer mainly through percolation tanks (about 2) (CGWB, 2020).
- **Advanced irrigation practices:** The important crops grown are Paddy, Ragi, Maize, gram, tur, groundnut, sunflower and sugarcane About 178.95 sq.km area is being by canal irrigation and the remaining part of the irrigated area is fed by ground water. In view of this, Water Use Efficiency (WUE) practices like Drip needs to be strengthened to save irrigation water by way of precision farming mechanism. This ultimately enhances the area under irrigation potential.
- **Conjunctive use plan in water logged area:** Out of the total 538 sq.km of the canal command area in the taluk, about 3268 ha is water logged. About 191 ha of this is reclaimed and 3071 ha is yet to be reclaimed since inception. (Source: CADA as on March 2021). In addition to this reclamation, conjunctive use plan is also recommended to benefit the tail end area of the irrigation command.
- **Change in cropping pattern:** Farmers are facing inadequacy of groundwater for agriculture during summer and can opt for more rain-fed millets and water efficient Pulses for agricultural production.
- **Drinking water Supply:** In view of ground water contamination with mainly higher concentration Nitrate and fluoride, drinking water supply from surface water needs to be explored/ ensured.
- **Regulation and control:** Taluk is categorized as "Safe". However, the mandatory guidelines like rainwater harvesting and artificial recharge issued by Karnataka Ground Water Authority needs to be strictly implemented in the taluk, so that quality of ground water will improve in due course of time.
- **Participatory management:** Awareness programmes and practice of participatory approach needs to be strengthened with the involvement of all the stake holders for sustainable management.

