



# 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**

**Channarayapatna Taluk, Hassan District,  
Karnataka**

दक्षिण पश्चिमी क्षेत्र, बेंगलुरु  
South Western Region, Bengaluru

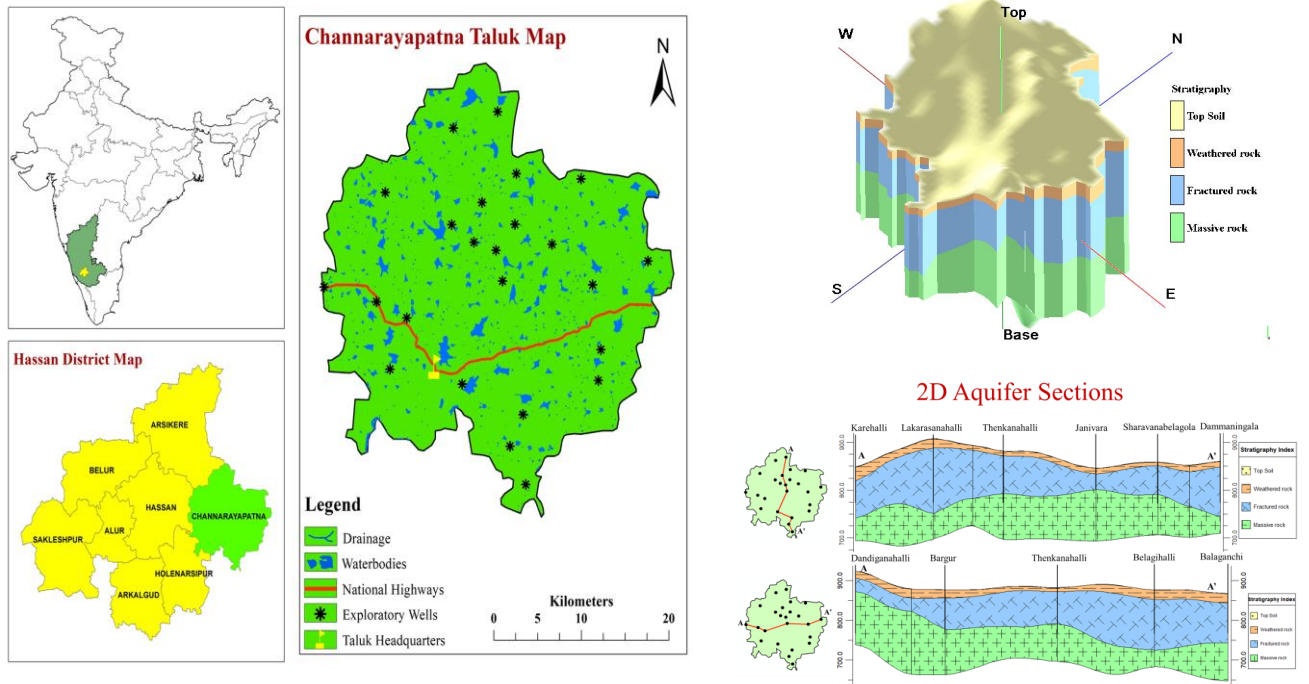
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Bengaluru

# AQUIFER MAPS AND MANAGEMENT PLAN, CHANNARAYAPATNA TALUK, HASSAN DISTRICT, KARNATAKA STATE

(AAP: – 2020-2021)



By  
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# AQUIFER MANAGEMENT PLAN FOR CHANNARAYAPATNA TALUK, HASSAN DISTRICT, KARNATAKA STATE

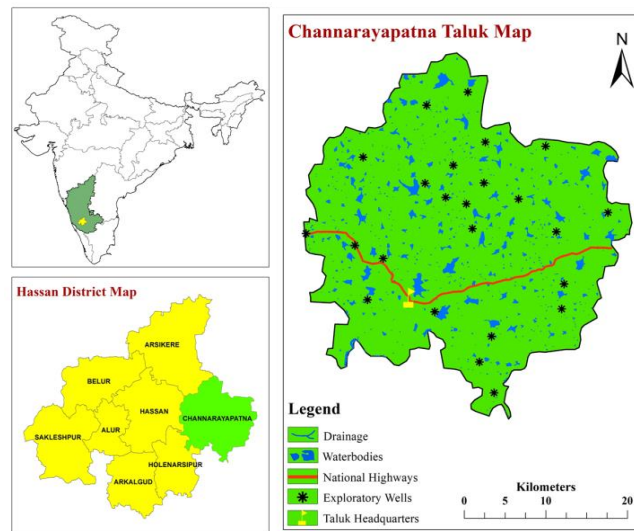
## 1. SALIENT FEATURES

Name of the Taluk	: Channarayapatna
District	: Hassan
State	: Karnataka
Area	: 1044 sq.km
Population (Census 2011)	: 279798
Normal annual rainfall	: 693 mm

### 1.1 Study area

Aquifer mapping studies have been carried out in Channarayapatna taluk, Hassan district, Karnataka State under National Aquifer Mapping Project. Channarayapatna covering an area of 1044 sq.km and situated between latitudes 12°54'23"N - 13°10'18"N and longitudes 76°16'24"E - 76°38'06"E. The area is bounded on the north by Arsikere taluk, on the south by Holenarasipura taluk, on the east by the Tiptur, Turuvekere, Nagamangala taluks and on the west by the Hassan and Holenarasipura taluks. The taluk has 06 hoblies, 41 Gram Panchayaths and 384 villages. Channarayapatna is the taluk headquarters.

The location map of the Channarayapatna taluk is presented in **Fig-1**.



**Fig 1: Location Map**

### 1.2 Population

According to 2011 census, the human population in Channarayapatna taluk is 279798 out of which 17% constitutes the urban population and 83% constitutes the rural population. The taluk has an overall population density of 268 persons per sq.km. In Channarayapatna taluk, the decadal variation in population from 2001-2011 is 0.61%. The population details are given in **Table-1**.

**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
279798	138276	141522	15.75	232896	46902	0.61	-4.59	26.41

Source: District at a glance 2018-19, Govt. of Karnataka

### 1.3 Rainfall and Climate

Channarayapatna taluk enjoys semi-arid climate. Dryness and hot weather prevails in major part of the year. The area falls under Southern Dry agro-climatic zone of Karnataka state and is categorized as drought prone.

The climate of the study area is quite agreeable and free from extremes. 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.

The data from the year 1981 to 2010 is analysed and presented in **Table2**. The data pertaining to these gauges is of long term nature and are well maintained. It is presumed that they are representative of the taluks and the same is used for analysis. Normal annual rainfall in Channarayapatna taluk for the period 1981 to 2010 is 702 mm. The 10 years average monthly, seasonal and annual rainfall data of Channarayapatna taluk is given in **Table 3**. The Channarayapatna taluk has received less than normal annual rainfall during the last 10 years (2010 to 2019) except 2010 and 2017.

**Table 2 : STATISTICAL ANALYSIS OF NORMAL ANNUAL RAINFALL OF CHANNARAYAPATNA TALUK, HASSAN DISTRICT (1981-2010)**

	Jan	Feb	Mar	Apr	May	PRE MONSOON	Jun	Jul	Aug	Sep	SOUTH WEST MONSOON	Oct.	Nov	Dec	NORTH EAST MONSOON	Annual
NRM	2	2	15	44	88	152	73	70	77	124	344	152	48	6	206	702
STDEV	6	6	34	45	47	71	49	50	51	75	109	103	49	9	121	179
CV%	268	304	219	103	54	46	67	72	66	60	32	67	101	151	59	25

**Table 3: ANNUAL RAINFALL OF CHANNARAYAPATNA, HASSAN DISTRICT (2010 to 2019)**

Year	Jan.	Feb.	Mar.	Apr.	May.	PRE	Jun.	Jul.	Aug.	Sep.	MON	Oct.	Nov.	Dec.	POST	Annual
2010	0	0	0	81	106	187	61.7	66.9	148.6	88	365.2	132	124	1	257	809.2
2011	0	2	13	104	99	218	73	16	41	13	143	119	72	0	191	552
2012	0	0	0	122	43	165	43	42	99	64	248	33	40	0	73	486
2013	0	0	0	65	0	65	43	42	99	64	248	33	40	0	73	386
2014	0	0	0	50.3	103	153.3	47	76	86	87	296	86	15	13	114	563.3
2015	0	0	20	37	111	168	74	13	160	73	320	66	108	4	178	666
2016	1	4	2	4	50	61	106	95	25	22	248	10	18	22	50	359
2017	0	0	13	28	124	165	0	51	129	214	394	156	2	7	165	724
2018	0	0	53	7	115	175	115	26	20	129	290	89	0	0	89	554
2019	0	0	0	10.6	131.1	141.7	42	3	190	51	286	133	8	2	143	570.7

## 1.4 Agriculture & Irrigation

Agriculture is the main occupation in Channarayapatna taluk. Major Kharif crops are ragi, maize and vegetables. Important crops of Rabi season are maize, vegetables and oilseeds (**Table-4**). Water intensive crops like sugarcane grown in 2% of the total crop area. Coconuts grown in 31.5% and oil seeds in 0.5% of total crop area in the taluk. Pulses are grown in 5.8% of the total area. The annual crop sugarcane is grown in 1312 Ha (2%) and short duration crop vegetable is grown in 2356 Ha (3.8%) of the crop area which require ground water during post monsoon season especially during summer.

**Table-4: Cropping pattern 2017-2018 (Ha)**

Crop	Paddy	Maize	Bajra	Jowar	Ragi	Wheat	Pulses	Fruits	Vegetables	Oil seeds	Sugar cane	Cotton	Coconuts	Total crop
Area(ha)	0	6932	0	0	27730	0	3638	685	2356	267	1312	0	19700	62620
Area %	0	11	0	0	44.4	0	5.8	1	3.8	0.5	2	0	31.5	100

**Source:** District at a glance 2018-19, Govt. of Karnataka

About 0.7% of the geographical area is covered by forest. It is observed that net sown area accounts for 55.9% and area sown more than once is 4.9% of total geographical area in Channarayapatna taluk. Area not available for cultivation, the other uncultivable land and fallow land cover are 15.3%, 10.1% and 18% respectively of total geographical area. About 1% of net area irrigated is from wells, 49.55% are from bore/tube wells and 49.45% from tanks constituting 49% of irrigation is from surface water and 51% from ground water. Thus major source of irrigation is groundwater (**Fig.-2**). The details of land use and the details of Irrigation are given in **Table 5 and 6** respectively. The land use pattern is given in **Fig.-3**.

**Table-5: Details of land use 2017-2018 (Ha)**

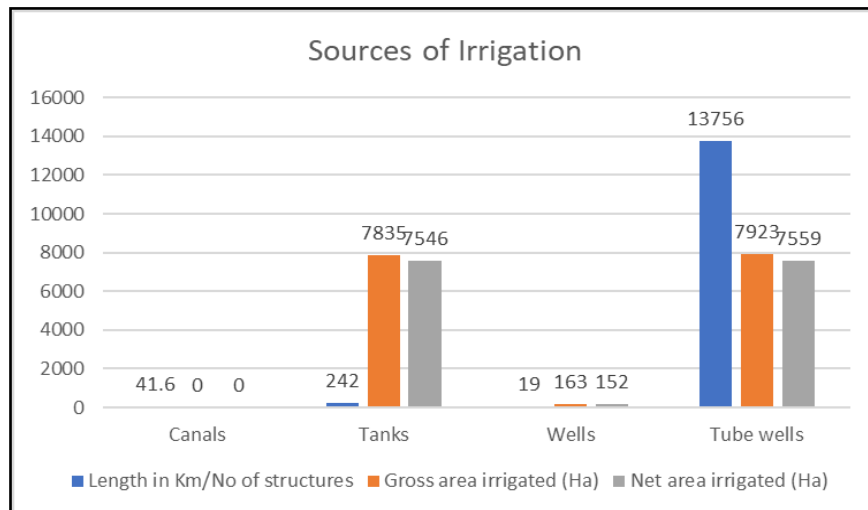
Total Geographical Area	Area under Forest	Area not available for cultivation	Other uncultivable land	Fallow land	Net sown area	Area sown more than once	Gross sown area
103464	697	15918	10519	18525	57805	5077	62882
% of the area	0.7	15.3	10.1	18	55.9	4.9	60.8

**Source:** District at a glance 2018-19, Govt. of Karnataka

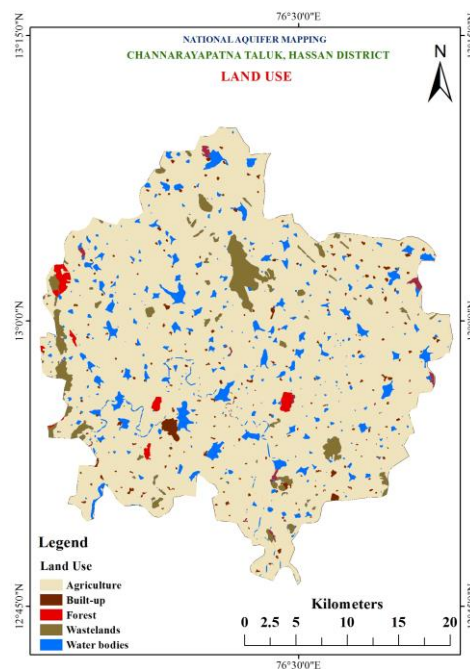
**Table-6: Details of Irrigation**

Source of Irrigation	Length in Km/No of structures	Gross area Irrigated (Ha)	Net area Irrigated (Ha.)	% of area
Canals	41.60	0	0	0
Tanks	242	7835	7546	49.45
Wells	19	163	152	1
Tube wells	13756	7923	7559	49.55
Lift Irrigation	0	0	0	0
Other Sources	0	0	0	0
Total	14017	15921	15257	100

**Source:** District at a glance 2018-19, Govt. of Karnataka



**Fig 2-Sources of Irrigation**



**Fig. 3: Land use/land cover map**

### 1.5 Geomorphology, Physiography & Drainage

The geomorphology of an area is the external appearance of landforms that gives a reliable picture of the underground strata and its physio-chemical condition. The different formations and the layer confirms and cogent to its geomorphology. The major part of the taluk area is occupied by pediplain followed by pediments. The general slope of the area is towards south direction (**Fig.4**).

The Taluk is drained by 1st to 4<sup>th</sup> streams which flow towards south and east wards. The southern boundary of the Taluk is coinciding with the Hemavathi River. The tank system is well developed in the Taluk. The general drainage pattern is dendritic to sub-dendritic in nature and mostly joins Hemavathi River (**Fig.5**).

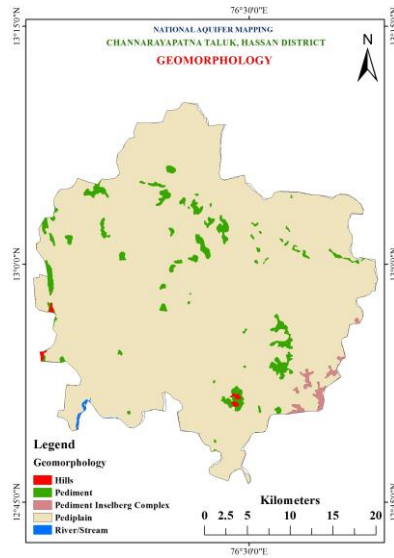


Fig. 4: Geomorphology map

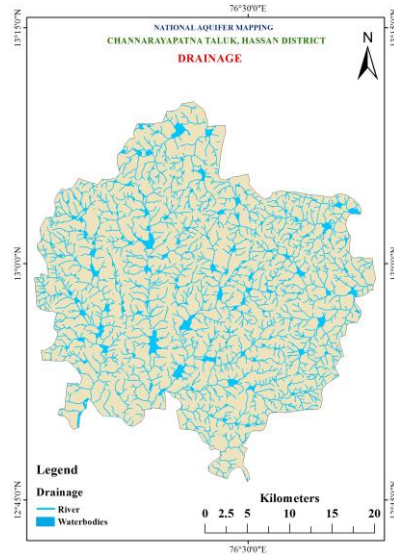


Fig. 5: Drainage map

### 1.6 Soil

Soils play a major role in hydrologic control of the infiltrating water. Soils are generally classified by taking their color, texture, fertilities and chemical combinations includes salts, minerals and the solution effect over them. Most of the area consists of clayey soils. Clayey skeletal soil is noticed in western and southern parts of the taluk (Fig.6).

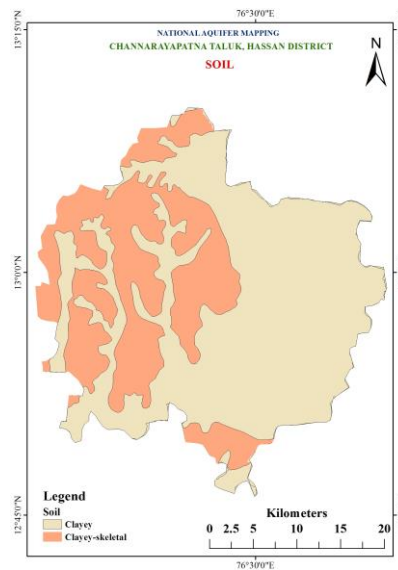


Fig. 6: Soil map

### 1.7 Ground water resource availability and extraction

As per the ground water resource estimation 2017 (Table 7), the data on ground water resources shows that the net annual ground water availability is 12473 ham. The existing gross groundwater for irrigation is 11558 ham. The stage of groundwater development is 97% and falling under 'Critical' category.



**Table.7 Dynamic Ground Water Resource, (March 2017 Figures in Ham)**

Net Annual Ground Water Availability	Existing Gross Ground Water Draft for Irrigation	Existing Gross GW Draft for Domestic and Industrial Water Supply	Existing Gross Ground Water Draft for All Uses	Allocation For Domestic and Industrial Use for Next 25 Years	Net Ground Water Availability for Future Irrigation Development	Existing Stage of Ground Water Development	Category
12473	11558	568	12126	693	3173	97	CRITICAL

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

As per the GWRA 2017, the net ground water availability is 12473 ham and the total ground water draft for all uses is 12126 ham with stage of development at 97% and the taluk falls in Critical category and there is a scope for future irrigation development @ 3173 ham. The domestic (Industrial sector) demand for next 25 years is estimated at 693 ham.

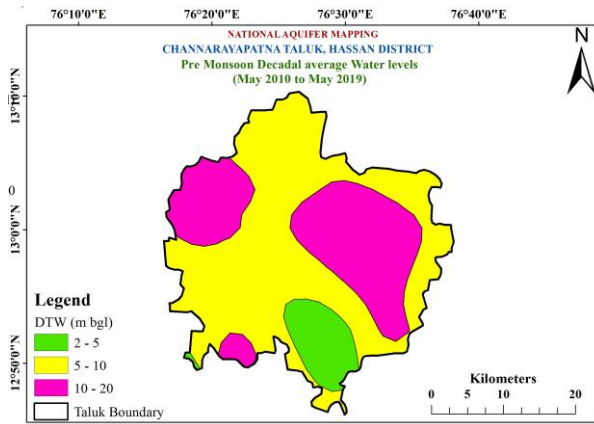
The details of dynamic ground water resources as on March 2020 is shown in **Table-8**. It is observed that the stage of ground water extraction is slightly gone down in the taluk from 97 % to 90.61 % from 2017 to 2020 with an increase in the net ground water availability during 2020 with a figure of 14286 ham.

**Table.8 Detail of Dynamic Ground Water resource, (as on March 2020)**

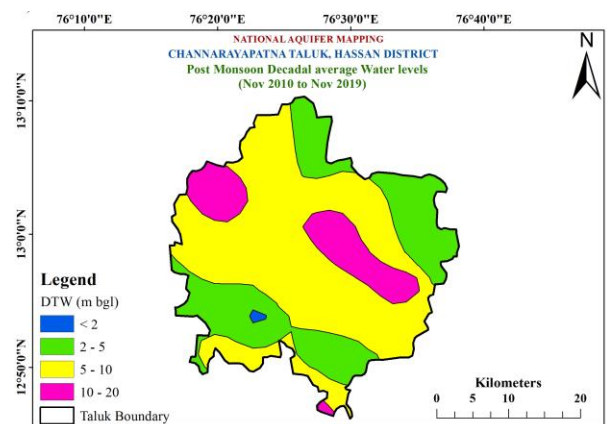
Annual Extractable GW Resource (Ham)	GW Extraction for Irrigation Use (Ham)	GW Extraction for Industrial Use (Ham)	GW Extraction for Domestic Use (Ham)	Total Extraction (Ham)	Annual GW Allocation for Domestic Use as on 2025 (Ham)	Net GW Availability for future use (Ham)	Stage of GW Extraction (%)	Categorization (Over-Exploited/ Critical/ Semi-critical/ Safe/Saline)
14286.10	12250.71	0.00	693.21	12943.92	755.13	3726.07	90.61	Critical

### 1.9 Water level behavior

The water level data have been monitored from the representative dug wells and borewells under NHS monitoring programme for both pre and post monsoon seasons during 2019 in Aquifer I. During premonsoon, the decadal average water level ranges from 2 to 11 mbgl (**Fig.7**), whereas in postmonsoon it varies from <2 to 11.45 mbgl (**Fig.8**). Whereas in Aquifer II, the water level ranges from 17.65 to 66.5 mbgl in premonsoon and 3.5 to 28.7 mbgl during post monsoon as per Ground water Department, Govt of Karnataka data.



**Fig7 Premonsoon decadal average water level**



**Fig 8 Post-monsoon decadal average water level**

## 2. AQUIFER DISPOSITION

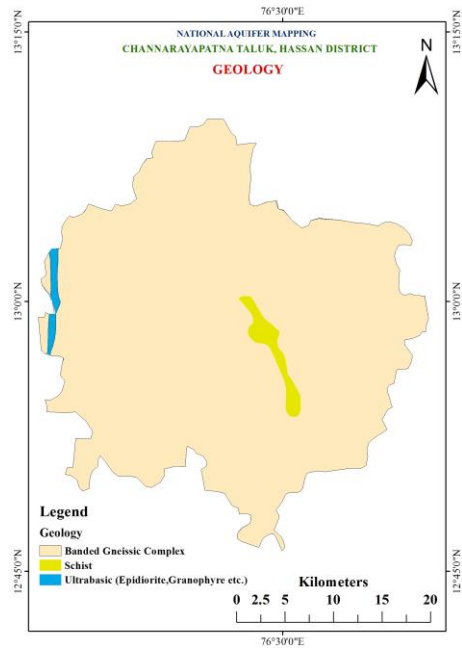
The occurrence and movement of water in the subsurface is broadly governed by geological frameworks i.e., nature of rock formations including their porosity (primary and secondary) and permeability. The principal aquifers in the area are Banded Gneissic Complex and Schist and the occurrence and movement 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

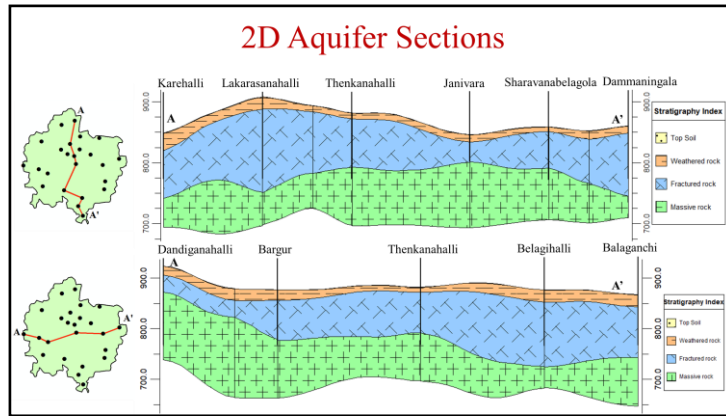
In Channarayapatna Taluk, there are mainly two types of aquifer systems;

- i. **Aquifer-I (Phreatic aquifer)** comprising Weathered Banded Gneissic Complex / Schist
- ii. **Aquifer-II (Fractured aquifer)** comprising Fractured Banded Gneissic Complex / Schist

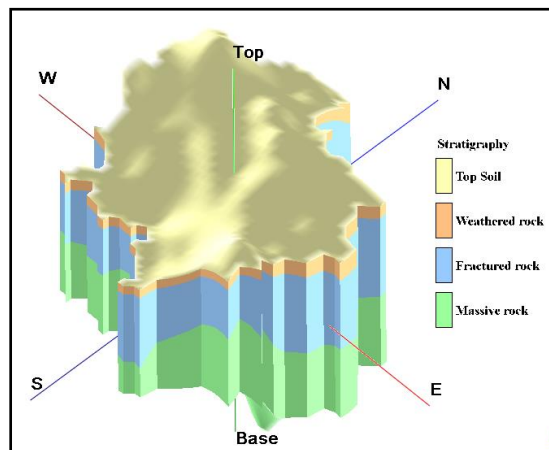
In Channarayapatna Taluk, Banded gneissic complex occupies major part of the taluk area and Schist formation noticed as a isolated pocket. (**Figure-9**). Ground water occurs within the weathered and fractured gneisses and schist under water table condition and semi-confined condition. In the Taluk, bore wells were drilled from a minimum depth of 51 mbgl to a maximum of 200 mbgl. Depth of weathered zone (Aquifer-I) ranges from 5 mbgl to 31 mbgl. Ground water exploration reveals that aquifer-II fractured formation was encountered between the depths of 10 to 183 mbgl. The yield of this aquifer unit II ranges from 0.3 to 59.4 m<sup>3</sup>/hr and dry at some places. During monsoon period the wells tapping this aquifer unit sustains for 2 to 4 hrs /day of pumping, while during non-monsoon period (May to July) sustains for 1 to 3 hour/day of pumping. In general ground water in fractured aquifer is potable. 2D and 3D aquifer disposition maps are shown in **Figure.10 and 11**.



**Fig-9: Geology**



**Fig. 10: 2D Aquifer section**



**Fig.11: 3D Aquifer model**

### 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 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 9**. 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 9: Comparison of groundwater availability and draft scenario (in ham)**

Taluk	March 2017			March 2020		
	GW availability	GW Extraction	Stage of GW development	GW availability	GW Extraction	Stage of GW development
Channarayapatna	12473	12126	97	14286.1	12943.92	90.61

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

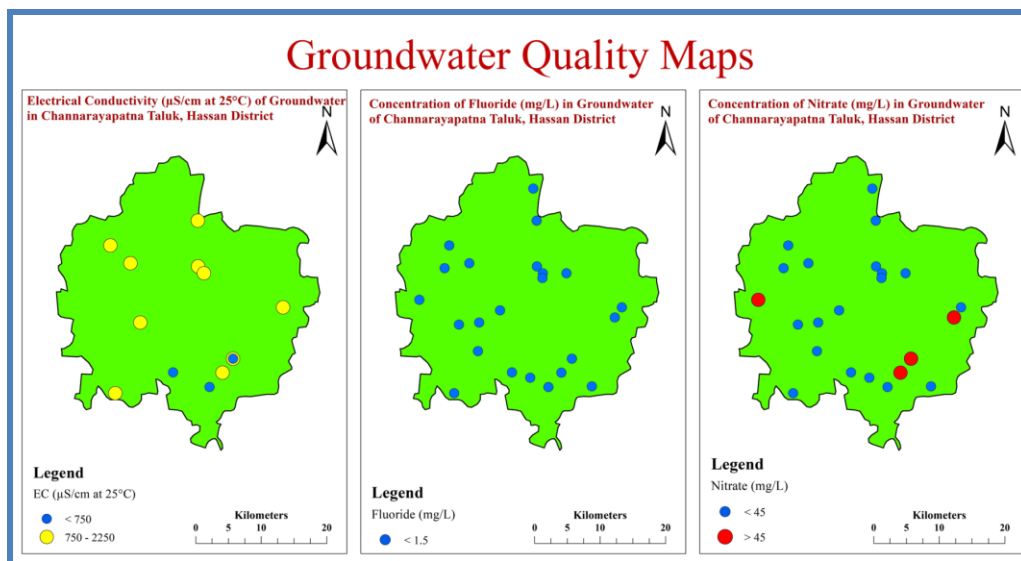
The quality of shallow ground water has been evaluated from CGWB monitoring wells and water quality of fractured aquifer in Channarayapatna taluk has been evaluated by sampling and analysis of water sample collected from wells inventoried during field work as monitoring wells of CGWB and State representing fractured aquifer are inadequate. The well wise chemical analysis data of the samples representing the fractured aquifer are given in the **Table 10**.

Electrical conductivity is the indicator of the total mineral content of water and hence it indicates the total dissolved solids (TDS) present in water. TDS of water determines its usefulness to various purposes. Generally, water having TDS <500 mg/L is good for drinking and other domestic uses. However, in the absence of alternative sources TDS up to 2000 mg/L may be used for drinking purposes. In phreatic aquifer groundwater quality is fresh, and ranging from 170 to 2100 ( $\mu\text{S}/\text{cm}$  at 25°C). In general, the ground water quality of phreatic aquifer is potable. All the groundwater samples of phreatic aquifer have recorded the the chemical parameters within the desirable limit. Quality maps given in **Fig.12**.

In case of fractured aquifer 35 % of wells analysed have recorded nitrate greater than the permissible limit of 45 mg/l.EC, Chloride and Fluoride are within desirable limit (Figure 12). In general, ground water quality in Channarayapatna Taluk is good for drinking purpose except in some areas, where nitrate is found to be greater than the permissible limit as per "Indian Standard Drinking Water Specification 2009".

**Table 10: Ground water quality of Channarayapatna taluk (2020)**

Water Quality analysis of wells inventory made in Channarayapatna taluk														
S.No	Location	Aquifer type	PH	EC	TH	Ca	Mg	Na	K	HCO <sub>3</sub>	Cl	SO <sub>4</sub>	NO <sub>3</sub>	F
				μS/cm	<.....mg/L.....>									
1	Karehalli	Semi-Confined	7.71	1665	480	56	83	161	7	403	234	94	25	0.86
2	Sathenahalli	Semi-Confined	7.36	1391	300	64	34	152	5	451	114	120	50	1.32
3	Kabbali	Semi-Confined	7.80	830	300	56	39	67	16	403	50	45	8	0.63
4	S.Shivara	Semi-Confined	8.01	855	260	80	15	63	6	299	43	57	52	1.20
5	Akkanehalli	Semi-Confined	7.88	964	280	80	19	86	10	445	50	60	28	0.81
7	Balaganchi	Semi-Confined	7.82	2220	300	88	19	179	219	677	220	132	71	0.96
8	Belagihalli	Semi-Confined	7.88	1371	460	128	34	86	35	482	121	96	58	0.62
9	Gowdagere	Semi-Confined	7.78	593	200	48	19	75	5	311	36	31	0	1.1
10	Dammaningala	Semi-Confined	7.47	1598	410	64	61	125	14	415	192	130	21	0.7
11	Thenkanahalli	Semi-Confined	7.59	875	220	56	19	86	10	275	71	69	74	0.92
12	Janivara	Semi-Confined	8.20	2000	220	56	19	158	340	747	156	104	37	0.62
13	Arakere	Semi-Confined	7.61	1291	320	56	44	111	15	393	114	112	49	0.8
14	Nagenahallikoppala	Semi-Confined	7.92	993	240	48	29	98	8	439	21	50	31	1.45



**Fig 12 Ground water quality maps**

## 4. GROUND WATER RESOURCE ENHANCEMENT AND PROPOSED MANGEMENT STRATEGY

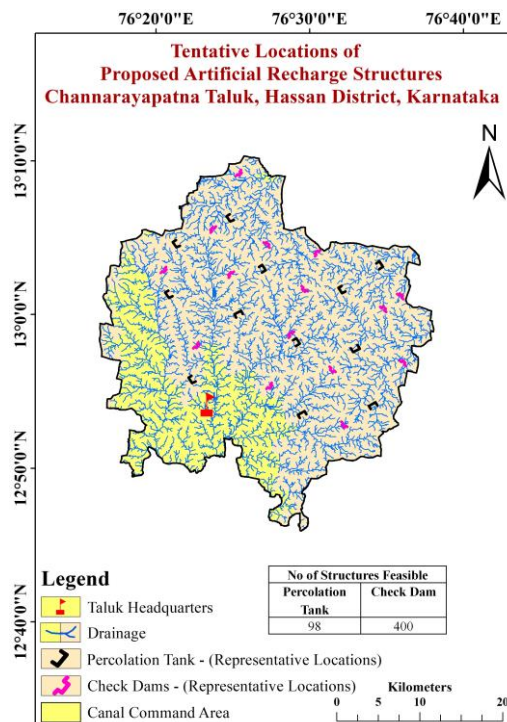
### 4.1 Resource Enhancement by Supply Side Interventions

Recharge phreatic aquifer (Aquifer-I) in the taluk, through construction of artificial recharge structures, viz. Check dams, percolation tanks & subsurface dykes. 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. Artificial Recharge Structures and Water Conservation Plans are proposed in the taluk through utilizing the uncommitted surface runoff of 108.594 MCM (**Table 11**). By constructing 400 check dams, 98 percolation ponds and 3 subsurface dykes in the taluk, 0.098 lakhs hectares of additional irrigation potential can be created.

**Table-11: Details of Proposed AR structures**

Geographical area	1044
Area feasible for AR	952
Non committed monsoon runoff available (MCM)	108.594
Number of Check Dams	400
Number of Percolation Tanks	98
Number of Subsurface dyke	3
Tentative total cost of the project (Rs. in lakhs)	6014.319
Excepted recharge (MCM)	33.48
Additional irrigation Potential (Lakh hectares)	0.098

The existing 90.61% of stage of ground water extraction (2020) would reduce to 73.4% (**Table 12**). The representative tentative locations of the proposed artificial recharge structures are given in **Fig.-13** and the locations are given in **Annexure-I**.



**Fig.13: Proposed Artificial Recharge Structures**

After implementation of Artificial Recharge structures for GW recharge, the annual ground water availability will increase from 14286.1 to 17634.1 ham and the expected improvement in stage of extraction is 17.21% from 90.61% to 73.4%.

**Table 12: Improvement in GW availability (GWRA 2020) due to Recharge**

Taluk	Net annual ground water availability	Existing Ground Water extraction for all uses	Existing Stage of Ground water extraction	Expected recharge from proposed artificial recharge structures	Cumulative annual ground water availability after implementation of AR structures	Expected improvement in stage of ground water extraction after the implementation of the project	Expected improvement in stage of ground water extraction
	HAM	HAM	%	HAM	HAM	%	%
Channarayapattana	14286.1	12943.92	90.61	3348	17634.1	17.21	73.4

## 4.2 Resource Savings by Demand Side Interventions

### 4.2.1 Water Use Efficiency by Micro Irrigation Practices

It is observed that presently, in the command areas, canals are the source of irrigation and in non-command areas, ground water through bore/tube wells is used for irrigation purpose in the taluk. Water use efficiency measures have to be adopted for saving the ground water resources.

Efficient irrigation practices like Drip irrigation and sprinkler has to be adopted by the farmers in the existing 15921 ha of gross irrigated area. Presently, groundwater extraction for irrigation is 12250.71 ham. It is proposed to adopt micro irrigation (drip) techniques in fruits and vegetables (3041 ha) as well as water intensive sugarcane grown area (1312 ha). It is assumed that 50% of this area i.e., 1520 and 656 ha is irrigated by ground water. Implementation of efficient irrigation techniques will contribute in saving ground water by 518 ham and thus enhancing the cumulative net availability of ground water from 17634 ham to 18152 ham. Implementation of efficient irrigation techniques will contribute in saving ground water by 518 ham. Thus, will improve stage of extraction by 2.1% from 73.4% to 71.3% (**Table 13**).

### 4.2.2 Grey Water Utilization

As per data 351 ham of domestic grey water is available. It is suggested to put 50% of this grey water to secondary treatment and use the treated water either for irrigation or recharging the tanks and ponds. Thus 175 ham of treated sewage water can be utilized for gainful purposes thereby reducing the load on fresh groundwater. The resource enhancement by grey water use will bring the stage of extraction from 71.3% to 70.62%.

**Table 13: Improvement in GW availability due to saving by adopting water use efficiency and Grey Water**

SI	Resource Details	As per 2020 Estimation
1	Cumulative Ground Water availability after implementation of artificial recharge schemes (ham)	17634.1
2	Existing Ground Water Extraction for all uses in ham	12943.92
3	Expected improvement in stage of Ground Water extraction after implementation of artificial recharge schemes	73.4%
4	Saving due to adopting Water Use Efficiency measures in ham a. <b>Fruits &amp; Vegetables</b> irrigated by GW – 2467 ha, CWR by surface flooding – 0.50m, CWR by drip irrigation – 0.375 m, Savings – 0.125 b. <b>Sugarcane</b> irrigated by GW – 241 ha, CWR by surface flooding – 2.00 m, CWR by drip irrigation – 1.50 m, Savings – 0.50	518 ham 190 ham  328 ham
5	Additional saving by adopting Grey Water (50% of Available grey water) in ham	175
6	Cumulative Ground Water Availability after adopting WUE and Grey water in ham	18327.1
7	Expected improved stage of Ground Water extraction after implementation of all interventions (%)	70.62
8	Total water likely to be saved after all interventions (ham)	4041

#### 4.2.3 Regulation and Control

Channarayapatna taluk has been categorized as **Critical**, since the Stage of ground water extraction has reached **90.61%** (GEC 2020). Hence, stringent action has to be taken up through Karnataka Ground Water Authority to control ground water exploitation in the taluk. Ground water recharge component needs to be made mandatory in the taluk to save the situation from deteriorating further.

## 5. SUMMARY AND RECOMMENDATIONS

The main ground water issues are over exploitation, limited Ground Water Potential / Limited Aquifer Thickness / Sustainability, deeper water levels particularly in Aquifer II in some parts, semi-urbanized areas which are all inter-related or inter dependent along with nitrate contamination in some parts. The summary of ground water management plan of Channarayapatna taluk is given in **Table-14**.



**Table 14: Summary of Management plan**

Stage of GW Extraction and Category (2020)	90.61%, Critical
Annual Extractable GW Resource (Ham)	14286.1
Total Extraction (Ham)	12943.92
Ground Water Draft for Irrigation (Ham)	12250.71
<b>Ground Water Resource Enhancement by Supply side Interventions</b>	
No of Proposed AR structures	
SSD	3
PT	98
CD	400
FB	0
Expected Additional Recharge to GW due to AR (Ham)	3348
Total Estimated Expenditure (Rs. in Lakhs.)	6014.319
Additional Irrigation Potential that can be created (Ha)	9800
Change in Stage of GW Extraction (%)	90.61 to 73.4
<b>Ground Water Resource Enhancement by Demand side Interventions</b>	
Expected Saving due to adopting WUE measures (ham)	518
Change in Stage of GW Extraction (%)	73.4 to 71.3
Expected Saving by adopting Grey water re-use (ham)	175
Change in Stage of GW Extraction (%)	71.3 to 70.62
Cumulative Ground Water availability by adopting all interventions (ham)	18327.1
Change in Stage of GW extraction after adopting all interventions, %	90.61 to 70.62
Total water likely to be saved after all interventions (ham)	4041

As per the resource estimation – 2020, Channarayapatna taluk falls under Critical category with the stage of ground water extraction is 90.61%. However, there is need to formulate management strategy to tackle the over exploitation, water scarcity related issues and nitrate contamination in the taluk. It is suggested to adopt a scientific and multi-pronged ground water management strategy covering supply side and demand side interventions aspects as mentioned in the management plan suggested above.

**Ground water resource enhancement by supply side interventions:** Quantity of surface water available through non-committed surface run-off is estimated to be 108.594 MCM. This can be used to recharge the aquifer mainly through check dams (400), percolation tanks (98), and sub surface dyke structures (3). The volume of water expected to be recharged is 3348 ham through these AR structures. The approximate cost estimate for construction of these AR structures is Rs. 6014.319 lakhs. However, the figures given are tentative and pre-field studies / DPR are recommended prior to implementation of these recharge structures.

**Ground water resource enhancement by demand side interventions:** At present about 51% of irrigation is by bore wells (ground water). It is proposed to adopt micro irrigation (drip) techniques in fruits and vegetables (3041 ha) as well as water intensive sugarcane grown area (1312 ha). It is assumed that 50% of this area i.e., 1520 and 656 ha is irrigated by ground water. Implementation of efficient irrigation techniques will contribute

in saving ground water by 518 ham and thus enhancing the cumulative net availability of ground water from 17634.1 ham to 18152.1 ham. Implementation of efficient irrigation techniques will contribute in saving ground water by 518 ham.

**Grey water utilization:** As per data 351 ham of domestic grey water is available. It is suggested to put 50% of this grey water to secondary treatment and use the treated water either for irrigation or recharging the tanks and ponds. Thus 225 ham of treated sewage water can be utilized for gainful purposes thereby reducing the load on fresh groundwater.

## a) Tentative Locations of Proposed Check dam

S.No	Longitude	Latitude	Village	Grama Panchayat	Taluk
1	76.5210	12.8469	Sanenahalli	Sundahalli	Channarayapatna
2	76.5353	12.8551	Kumbenahalli	Sundahalli	Channarayapatna
3	76.5551	12.8579	Dhadighatta	Juttanahalli	Channarayapatna
4	76.5058	12.8581	Sanenahalli	Sundahalli	Channarayapatna
5	76.5515	12.8598	Kumbenahalli	Sundahalli	Channarayapatna
6	76.5673	12.8621	Dhadighatta	Juttanahalli	Channarayapatna
7	76.4984	12.8631	Shravanabelagola	Sharavanabelagola	Channarayapatna
8	76.5646	12.8682	Dhadighatta	Juttanahalli	Channarayapatna
9	76.5085	12.8686	Sundanahalli	Sundahalli	Channarayapatna
10	76.5420	12.8711	Chelya	Juttanahalli	Channarayapatna
11	76.5515	12.8751	Chelya	Juttanahalli	Channarayapatna
12	76.5796	12.8790	Kamarahalli	Mathighatta	Channarayapatna
13	76.5369	12.8800	Beeranahalli	Juttanahalli	Channarayapatna
14	76.4887	12.8808	B.Honnenahalli	Bekka	Channarayapatna
15	76.5694	12.8810	Jutenahalli	Juttanahalli	Channarayapatna
16	76.5290	12.8819	Chelya	Juttanahalli	Channarayapatna
17	76.4915	12.8827	Parama	Sundahalli	Channarayapatna
18	76.5776	12.8831	Dhadighatta	Juttanahalli	Channarayapatna
19	76.5134	12.8844	Halebelagola	Gowdagere	Channarayapatna
20	76.5528	12.8857	Mallenahalli	Juttanahalli	Channarayapatna
21	76.5203	12.8885	Chelya	Juttanahalli	Channarayapatna
22	76.5560	12.8897	Mallenahalli	Juttanahalli	Channarayapatna
23	76.5680	12.8916	Jutenahalli	Juttanahalli	Channarayapatna
24	76.5762	12.8918	Ankanahalli	Juttanahalli	Channarayapatna
25	76.4820	12.8949	Halebelagola	Gowdagere	Channarayapatna
26	76.5585	12.8961	Hosuru	Juttanahalli	Channarayapatna
27	76.5294	12.8964	Hulikere	Juttanahalli	Channarayapatna
28	76.5464	12.8964	Pomadihalli	Juttanahalli	Channarayapatna
29	76.4978	12.8985	Halebelagola	Gowdagere	Channarayapatna
30	76.5816	12.9007	Chowlamballi	Mathighatta	Channarayapatna
31	76.5214	12.9010	Hulikere	Juttanahalli	Channarayapatna
32	76.5867	12.9013	Chowlamballi	Mathighatta	Channarayapatna
33	76.5384	12.9019	Channenahalli	Juttanahalli	Channarayapatna
34	76.5473	12.9041	Bommenahalli	Mathighatta	Channarayapatna
35	76.5881	12.9050	Chowlamballi	Mathighatta	Channarayapatna
36	76.5593	12.9055	Mathighatta	Mathighatta	Channarayapatna
37	76.4869	12.9068	Kodi Belagola	Gowdagere	Channarayapatna
38	76.5302	12.9083	Hulikere	Juttanahalli	Channarayapatna
39	76.5351	12.9085	Channenahalli	Juttanahalli	Channarayapatna
40	76.5464	12.9093	Bommenahalli	Mathighatta	Channarayapatna
41	76.5928	12.9095	Ayarahalli	Mathighatta	Channarayapatna

42	76.5777	12.9097	Yagati	Mathighatta	Channarayapatna
43	76.5652	12.9118	Mathighatta	Mathighatta	Channarayapatna
44	76.5049	12.9121	Gullenahalli	Mattanavile	Channarayapatna
45	76.4793	12.9127	Gowdagere	Gowdagere	Channarayapatna
46	76.5359	12.9135	Channenahalli	Juttanahalli	Channarayapatna
47	76.3686	12.9140	Nagasamudra	D.Kalenahalli	Channarayapatna
48	76.4919	12.9149	H.Hosuru	Mattanavile	Channarayapatna
49	76.5492	12.9160	Kesaranahalli	Mathighatta	Channarayapatna
50	76.4729	12.9171	Gowdagere	Gowdagere	Channarayapatna
51	76.5669	12.9184	Byragondanakoppalu	Mathighatta	Channarayapatna
52	76.4984	12.9188	Goolihonnenahalli	Mattanavile	Channarayapatna
53	76.5861	12.9191	Ayarahalli	Mathighatta	Channarayapatna
54	76.4574	12.9218	Ankanahalli	Gowdagere	Channarayapatna
55	76.5525	12.9228	Bookanabetta	Mathighatta	Channarayapatna
56	76.5787	12.9243	Sabbanahalli	Mathighatta	Channarayapatna
57	76.5551	12.9269	Booka	Hirisave	Channarayapatna
58	76.5239	12.9275	Madhihalli (Jamburu Firka)	Mattanavile	Channarayapatna
59	76.5043	12.9281	Goolihonnenahalli	Mattanavile	Channarayapatna
60	76.5313	12.9283	Rajapura	Mattanavile	Channarayapatna
61	76.3650	12.9283	Hosuru	Baragur	Channarayapatna
62	76.4832	12.9288	Gowdagere Kaval	Gowdagere	Channarayapatna
63	76.5940	12.9294	Kotthanahalli	Hirisave	Channarayapatna
64	76.4782	12.9308	Gowdagere Kaval	Gowdagere	Channarayapatna
65	76.5119	12.9317	Mattanavile	Mattanavile	Channarayapatna
66	76.4474	12.9325	Valagere Somanahalli	Dindagoor	Channarayapatna
67	76.3786	12.9328	Belasindha	Gulasunda	Channarayapatna
68	76.5713	12.9347	Arakere	Mathighatta	Channarayapatna
69	76.5199	12.9351	Madhihalli (Jamburu Firka)	Mattanavile	Channarayapatna
70	76.5144	12.9353	Mattanavile	Mattanavile	Channarayapatna
71	76.5941	12.9366	Kotthanahalli	Hirisave	Channarayapatna
72	76.3517	12.9371	Alagondanahalli	Baragur	Channarayapatna
73	76.5424	12.9374	Heggadihalli	Belagihalli	Channarayapatna
74	76.5252	12.9392	Dodderi Kaval	Belagihalli	Channarayapatna
75	76.5544	12.9393	Heggadihalli	Belagihalli	Channarayapatna
76	76.5715	12.9399	Arakere	Mathighatta	Channarayapatna
77	76.4994	12.9403	Mutthugadha Honnenahalli	Mattanavile	Channarayapatna
78	76.4532	12.9416	Somalapura	Kalkere	Channarayapatna
79	76.5387	12.9426	Chikkonahalli	Belagihalli	Channarayapatna
80	76.4638	12.9428	Badakanahalli	Gowdagere	Channarayapatna
81	76.4919	12.9433	Kaggere	Gowdagere	Channarayapatna
82	76.3734	12.9435	Doddamathighatta	Baragur	Channarayapatna

83	76.4292	12.9438	Dindaguru	Dindagoor	Channarayapatna
84	76.4953	12.9452	Mutthugadha Honnenahalli	Mattanavile	Channarayapatna
85	76.4887	12.9454	Kaggere	Gowdagere	Channarayapatna
86	76.5344	12.9462	Chikkonahalli	Belagihalli	Channarayapatna
87	76.5922	12.9471	Thoobinakere	Hirisave	Channarayapatna
88	76.3507	12.9474	Baraguru	Baragur	Channarayapatna
89	76.5009	12.9475	Mutthugadha Honnenahalli	Mattanavile	Channarayapatna
90	76.4782	12.9481	Kaggere	Gowdagere	Channarayapatna
91	76.6014	12.9481	Thoobinakere	Hirisave	Channarayapatna
92	76.4236	12.9483	Sathenahalli	Kalkere	Channarayapatna
93	76.5658	12.9487	Hirisave	Hirisave	Channarayapatna
94	76.4543	12.9489	Harosomanahalli	Kalkere	Channarayapatna
95	76.5151	12.9489	Dodderi	Mattanavile	Channarayapatna
96	76.5783	12.9509	Hirisave	Hirisave	Channarayapatna
97	76.5370	12.9513	Chikkonahalli	Belagihalli	Channarayapatna
98	76.4132	12.9516	Karimaranahalli	Kalkere	Channarayapatna
99	76.4315	12.9516	Sathenahalli	Kalkere	Channarayapatna
100	76.5184	12.9521	Dodderi	Mattanavile	Channarayapatna
101	76.4668	12.9521	Harosomanahalli	Kalkere	Channarayapatna
102	76.5405	12.9534	Chikkonahalli	Belagihalli	Channarayapatna
103	76.5536	12.9534	Honnenahalli	Hirisave	Channarayapatna
104	76.3763	12.9537	Doddamathighatta	Baragur	Channarayapatna
105	76.3530	12.9539	Baraguru	Baragur	Channarayapatna
106	76.3814	12.9547	Gulasindha	Gulasunda	Channarayapatna
107	76.5096	12.9547	Dodderi	Mattanavile	Channarayapatna
108	76.5953	12.9555	Thoobinakere	Hirisave	Channarayapatna
109	76.4944	12.9580	Mutthugadha Honnenahalli	Mattanavile	Channarayapatna
110	76.4834	12.9589	Atthihalli	Jambur	Channarayapatna
111	76.5136	12.9590	Dodderi	Mattanavile	Channarayapatna
112	76.4767	12.9599	Atthihalli	Jambur	Channarayapatna
113	76.3521	12.9600	Baraguru	Baragur	Channarayapatna
114	76.4471	12.9600	Soppinahalli	Kalkere	Channarayapatna
115	76.6069	12.9603	Thoobinakere	Hirisave	Channarayapatna
116	76.5823	12.9630	Metikere	Jinnenahalli	Channarayapatna
117	76.5665	12.9636	Hirisave	Hirisave	Channarayapatna
118	76.4309	12.9638	Devigere	Kalkere	Channarayapatna
119	76.5496	12.9651	Bilagalli	Belagihalli	Channarayapatna
120	76.4343	12.9651	Devigere	Kalkere	Channarayapatna
121	76.3787	12.9653	Chikkanayakanahalli	Gulasunda	Channarayapatna
122	76.5277	12.9663	Kavalu Hosuru	Belagihalli	Channarayapatna
123	76.4117	12.9665	Kallakere	Kalkere	Channarayapatna
124	76.5009	12.9686	Bananakere	Akkanahalli	Channarayapatna

125	76.5311	12.9689	Dodderi Kaval	Belagihalli	Channarayapatna
126	76.4659	12.9693	Tavarekere	Kalkere	Channarayapatna
127	76.4925	12.9696	Bananakere	Akkanahalli	Channarayapatna
128	76.5256	12.9696	Kavalu Hosuru	Belagihalli	Channarayapatna
129	76.3488	12.9703	Darashighatta	Bydarahalli	Channarayapatna
130	76.5410	12.9704	Dodderi Kaval	Belagihalli	Channarayapatna
131	76.4374	12.9705	Devigere	Kalkere	Channarayapatna
132	76.5129	12.9711	Chinnenahalli	Mattanavile	Channarayapatna
133	76.5481	12.9714	Bilagalli	Belagihalli	Channarayapatna
134	76.4488	12.9720	Tenkanahalli	Jambur	Channarayapatna
135	76.5028	12.9736	Chinnenahalli	Mattanavile	Channarayapatna
136	76.5913	12.9739	Yalenahalli	Jinnenahalli	Channarayapatna
137	76.3456	12.9750	Darashighatta	Bydarahalli	Channarayapatna
138	76.5287	12.9764	Buddhikere	Belagihalli	Channarayapatna
139	76.3768	12.9766	Byaladhakere	Gulasunda	Channarayapatna
140	76.4959	12.9766	Bananakere	Akkanahalli	Channarayapatna
141	76.4648	12.9775	Tenkanahalli	Jambur	Channarayapatna
142	76.5509	12.9790	Thota	Jinnenahalli	Channarayapatna
143	76.4794	12.9791	Hullekere	Jambur	Channarayapatna
144	76.3635	12.9792	Madaba	Bydarahalli	Channarayapatna
145	76.5089	12.9793	Buddhikere	Belagihalli	Channarayapatna
146	76.4008	12.9800	Vaddarahalli	Gulasunda	Channarayapatna
147	76.4099	12.9813	Gollara Hosahalli	Kalkere	Channarayapatna
148	76.6259	12.9830	Balaganchi	Balaganchi	Channarayapatna
149	76.3915	12.9849	Kuruvanka	Gulasunda	Channarayapatna
150	76.5439	12.9855	Maradihalli	Belagihalli	Channarayapatna
151	76.5239	12.9863	Katakihalli	Belagihalli	Channarayapatna
152	76.5947	12.9866	Kabbanakere	Balaganchi	Channarayapatna
153	76.5839	12.9869	Jinnenahalli	Jinnenahalli	Channarayapatna
154	76.4572	12.9876	Jamburu	Jambur	Channarayapatna
155	76.3724	12.9878	Kuruvanka	Gulasunda	Channarayapatna
156	76.4381	12.9880	Madhihalli (Akkanahalli Firka)	Jambur	Channarayapatna
157	76.5285	12.9887	Katakihalli	Belagihalli	Channarayapatna
158	76.5745	12.9891	Jinnenahalli	Jinnenahalli	Channarayapatna
159	76.5242	12.9897	Katakihalli	Belagihalli	Channarayapatna
160	76.5810	12.9900	Jinnenahalli	Jinnenahalli	Channarayapatna
161	76.4558	12.9904	Jamburu	Jambur	Channarayapatna
162	76.5597	12.9916	Thota	Jinnenahalli	Channarayapatna
163	76.3833	12.9918	Kuruvanka	Gulasunda	Channarayapatna
164	76.5980	12.9932	Honnashettyhalli	Balaganchi	Channarayapatna
165	76.6181	12.9935	Balaganchi	Balaganchi	Channarayapatna
166	76.5714	12.9959	Jinnenahalli	Jinnenahalli	Channarayapatna
167	76.4564	12.9964	Jamburu	Jambur	Channarayapatna
168	76.5125	12.9964	Katakihalli	Belagihalli	Channarayapatna

169	76.4134	12.9969	Gollara Hosahalli	Kalkere	Channarayapatna
170	76.3422	12.9971	Jakkanahalli	Baladere	Channarayapatna
171	76.5094	12.9976	Katakihalli	Belagihalli	Channarayapatna
172	76.3974	12.9977	Gollara Hosahalli	Kalkere	Channarayapatna
173	76.4337	12.9977	Chowdenahalli	Kalkere	Channarayapatna
174	76.5557	12.9978	Nimbahalli	Jinnenahalli	Channarayapatna
175	76.3827	12.9983	Baguru	Bagur	Channarayapatna
176	76.5335	12.9988	Modalagere	Jinnenahalli	Channarayapatna
177	76.5907	12.9994	Honnashettyhalli	Balaganchi	Channarayapatna
178	76.6018	12.9998	Honnashettyhalli	Balaganchi	Channarayapatna
179	76.6223	13.0005	Balaganchi	Balaganchi	Channarayapatna
180	76.3582	13.0011	Byadarahalli	Bydarahalli	Channarayapatna
181	76.3751	13.0023	Baguru	Bagur	Channarayapatna
182	76.5919	13.0024	Honnashettyhalli	Balaganchi	Channarayapatna
183	76.5989	13.0028	Honnashettyhalli	Balaganchi	Channarayapatna
184	76.3865	13.0034	Baguru	Bagur	Channarayapatna
185	76.5397	13.0043	Modalagere	Jinnenahalli	Channarayapatna
186	76.5028	13.0059	Samudravalli	Akkanahalli	Channarayapatna
187	76.4315	13.0062	Dasapura	Bagur	Channarayapatna
188	76.4807	13.0064	Nuggehalli	Nuggehalli	Channarayapatna
189	76.3386	13.0068	Gerahalli	Kundoor	Channarayapatna
190	76.5806	13.0076	Naganahalli	Didaga	Channarayapatna
191	76.5266	13.0081	Akkanahalli	Akkanahalli	Channarayapatna
192	76.5496	13.0089	Modalagere	Jinnenahalli	Channarayapatna
193	76.3538	13.0089	Chamarajapura	Bydarahalli	Channarayapatna
194	76.3820	13.0093	Baguru	Bagur	Channarayapatna
195	76.5670	13.0101	Hosahalli	Didaga	Channarayapatna
196	76.4781	13.0124	Nuggehalli	Nuggehalli	Channarayapatna
197	76.4406	13.0127	Mavinahalli	Jambur	Channarayapatna
198	76.5401	13.0129	Madlagere Kaval	Jinnenahalli	Channarayapatna
199	76.3757	13.0131	Baguru	Bagur	Channarayapatna
200	76.4501	13.0135	Mavinahalli	Jambur	Channarayapatna
201	76.5147	13.0138	Sosalakere	Akkanahalli	Channarayapatna
202	76.3643	13.0139	Baguru	Bagur	Channarayapatna
203	76.5001	13.0151	Basavanapura	Akkanahalli	Channarayapatna
204	76.4802	13.0170	Nuggehalli	Nuggehalli	Channarayapatna
205	76.4909	13.0172	Nuggehalli	Nuggehalli	Channarayapatna
206	76.5665	13.0174	Pura	Didaga	Channarayapatna
207	76.5210	13.0185	Sosalakere	Akkanahalli	Channarayapatna
208	76.3599	13.0186	Baguru	Bagur	Channarayapatna
209	76.4020	13.0186	B.Honnenahalli	Bagur	Channarayapatna
210	76.5146	13.0193	Joyisara Mavinahalli	Akkanahalli	Channarayapatna
211	76.5641	13.0193	Pura	Didaga	Channarayapatna
212	76.5279	13.0196	Sosalakere	Akkanahalli	Channarayapatna

213	76.5995	13.0202	Mellahalli	Didaga	Channarayapatna
214	76.4389	13.0220	Boovanahalli	Tagadur	Channarayapatna
215	76.5556	13.0223	Madlagere Kaval	Jinnenahalli	Channarayapatna
216	76.5534	13.0238	Madlagere Kaval	Jinnenahalli	Channarayapatna
217	76.5873	13.0242	Vullavalli	Didaga	Channarayapatna
218	76.3394	13.0254	Moodanahalli	Bydarahalli	Channarayapatna
219	76.4685	13.0262	Virupakshapura	Nuggehalli	Channarayapatna
220	76.4311	13.0266	Boovanahalli	Tagadur	Channarayapatna
221	76.3611	13.0269	Kumbarahalli	Bydarahalli	Channarayapatna
222	76.4820	13.0273	Dasapura	Akkanahalli	Channarayapatna
223	76.4942	13.0273	Dasapura	Akkanahalli	Channarayapatna
224	76.5241	13.0278	Sosalakere	Akkanahalli	Channarayapatna
225	76.5413	13.0284	Madlagere Kaval	Jinnenahalli	Channarayapatna
226	76.6029	13.0286	Mellahalli	Didaga	Channarayapatna
227	76.5979	13.0290	Mellahalli	Didaga	Channarayapatna
228	76.4659	13.0299	Virupakshapura	Nuggehalli	Channarayapatna
229	76.3408	13.0301	Mallenahalli	Bydarahalli	Channarayapatna
230	76.4132	13.0308	Obalapura	Tagadur	Channarayapatna
231	76.4522	13.0314	Ramasamudra Kaval	Nuggehalli	Channarayapatna
232	76.4000	13.0335	Dhyavanuru	Bagur	Channarayapatna
233	76.3292	13.0339	Mallenahalli	Bydarahalli	Channarayapatna
234	76.5407	13.0341	Madlagere Kaval	Jinnenahalli	Channarayapatna
235	76.4555	13.0345	Ramasamudra Kaval	Nuggehalli	Channarayapatna
236	76.4381	13.0348	Thagaduru	Tagadur	Channarayapatna
237	76.3552	13.0354	Kalenahalli	Bydarahalli	Channarayapatna
238	76.5861	13.0362	Vullavalli	Didaga	Channarayapatna
239	76.3762	13.0372	Krishnapura	Bagur	Channarayapatna
240	76.4876	13.0373	Hoovinahalli	Nuggehalli	Channarayapatna
241	76.5344	13.0374	Madlagere Kaval	Jinnenahalli	Channarayapatna
242	76.5050	13.0379	Mullakere	Akkanahalli	Channarayapatna
243	76.3562	13.0387	Kalenahalli	Bydarahalli	Channarayapatna
244	76.3861	13.0393	Dhyavanuru	Bagur	Channarayapatna
245	76.5126	13.0404	Masaganahalli	Kabbali	Channarayapatna
246	76.5759	13.0404	Narihalli	Didaga	Channarayapatna
247	76.5665	13.0412	Thuppadhahalli	Kabbali	Channarayapatna
248	76.4869	13.0413	Hoovinahalli	Nuggehalli	Channarayapatna
249	76.4321	13.0421	Thagaduru	Tagadur	Channarayapatna
250	76.5383	13.0434	Vagaragere	Kabbali	Channarayapatna
251	76.5263	13.0436	Vagaragere	Kabbali	Channarayapatna
252	76.3288	13.0442	Belugali	Kundoor	Channarayapatna
253	76.4145	13.0446	Obalapura	Tagadur	Channarayapatna
254	76.5232	13.0450	Settyhalli	Akkanahalli	Channarayapatna
255	76.4685	13.0464	Hullenahalli	Santeshivara	Channarayapatna
256	76.5143	13.0465	Masaganahalli	Kabbali	Channarayapatna



257	76.3324	13.0467	Ankanahalli	Kundoor	Channarayapatna
258	76.4450	13.0467	Ramasamudra Kaval	Nuggehalli	Channarayapatna
259	76.3423	13.0472	Ankanahalli	Kundoor	Channarayapatna
260	76.5850	13.0472	Dhidaga	Didaga	Channarayapatna
261	76.3552	13.0474	Banavasi	Sathenahalli	Channarayapatna
262	76.5983	13.0478	Karikyathanahalli	Didaga	Channarayapatna
263	76.4649	13.0479	Hullenahalli	Santeshivara	Channarayapatna
264	76.5033	13.0479	Nerlakere	Akkanahalli	Channarayapatna
265	76.5745	13.0480	Kanavanaghatta	Didaga	Channarayapatna
266	76.4780	13.0484	Agrahara Belaguli	Santeshivara	Channarayapatna
267	76.5315	13.0486	Vagaragere	Kabbali	Channarayapatna
268	76.4403	13.0492	Lakkarasanahalli	Tagadur	Channarayapatna
269	76.3570	13.0505	Banavasi	Sathenahalli	Channarayapatna
270	76.4007	13.0505	Govinakere	M.Shivara	Channarayapatna
271	76.4701	13.0511	Agrahara Belaguli	Santeshivara	Channarayapatna
272	76.5227	13.0514	Masaganahalli	Kabbali	Channarayapatna
273	76.5584	13.0519	Mookikere	Kabbali	Channarayapatna
274	76.4779	13.0520	Agrahara Belaguli	Santeshivara	Channarayapatna
275	76.5651	13.0530	Kanavanaghatta	Didaga	Channarayapatna
276	76.3865	13.0535	Halasinahalli	M.Shivara	Channarayapatna
277	76.4610	13.0537	Narenahalli	Santeshivara	Channarayapatna
278	76.5257	13.0552	Masaganahalli	Kabbali	Channarayapatna
279	76.4994	13.0554	Nerlakere	Akkanahalli	Channarayapatna
280	76.4275	13.0556	Rangapura	Tagadur	Channarayapatna
281	76.3448	13.0570	Banavasi	Sathenahalli	Channarayapatna
282	76.5187	13.0570	Masaganahalli	Kabbali	Channarayapatna
283	76.5027	13.0571	Ganjigere	Santeshivara	Channarayapatna
284	76.5453	13.0576	Kabballi	Kabbali	Channarayapatna
285	76.3946	13.0579	Govinakere	M.Shivara	Channarayapatna
286	76.5345	13.0579	Kabballi	Kabbali	Channarayapatna
287	76.3172	13.0581	Chavalagala	Sathenahalli	Channarayapatna
288	76.5577	13.0581	Mookikere	Kabbali	Channarayapatna
289	76.4133	13.0587	Kallesomanahalli	Tagadur	Channarayapatna
290	76.3320	13.0589	Sathenahalli	Sathenahalli	Channarayapatna
291	76.3602	13.0589	Agasarahalli	Sathenahalli	Channarayapatna
292	76.5780	13.0596	Kelagina Kamanaghatta	Didaga	Channarayapatna
293	76.5051	13.0600	Ganjigere	Santeshivara	Channarayapatna
294	76.4227	13.0606	Kamanayakanahalli	Tagadur	Channarayapatna
295	76.5388	13.0606	Kabballi	Kabbali	Channarayapatna
296	76.3731	13.0610	Thippuru	Sathenahalli	Channarayapatna
297	76.3480	13.0627	Narayanapura	Sathenahalli	Channarayapatna
298	76.4568	13.0629	Rampura	Santeshivara	Channarayapatna
299	76.5259	13.0629	Duggenahalli	Kabbali	Channarayapatna
300	76.4372	13.0632	Kamanayakanahalli	Tagadur	Channarayapatna

301	76.3225	13.0648	Nettekere	Sathenahalli	Channarayapatna
302	76.3295	13.0649	Nettekere	Sathenahalli	Channarayapatna
303	76.4501	13.0655	Ramasamudra Kaval	Nuggehalli	Channarayapatna
304	76.5643	13.0657	Kelagina Kamanaghatta	Didaga	Channarayapatna
305	76.5848	13.0659	Kelagina Kamanaghatta	Didaga	Channarayapatna
306	76.6008	13.0663	Bidarakere	Didaga	Channarayapatna
307	76.4751	13.0665	Santheshivara	Santeshivara	Channarayapatna
308	76.5924	13.0665	Tumkur	Didaga	Channarayapatna
309	76.5276	13.0669	Dasarahalli	Kabbali	Channarayapatna
310	76.3966	13.0676	Kallumallenahalli	Tagadur	Channarayapatna
311	76.5086	13.0677	Channagonahalli	Santeshivara	Channarayapatna
312	76.3564	13.0678	Agasarahalli	Sathenahalli	Channarayapatna
313	76.3109	13.0684	Tarabenahalli	Sathenahalli	Channarayapatna
314	76.3667	13.0699	Hongehalli	M.Shivara	Channarayapatna
315	76.3155	13.0707	Varanahalli	Sathenahalli	Channarayapatna
316	76.4996	13.0708	Channagonahalli	Santeshivara	Channarayapatna
317	76.3756	13.0709	Hongehalli	M.Shivara	Channarayapatna
318	76.4728	13.0709	Santheshivara	Santeshivara	Channarayapatna
319	76.5487	13.0710	Mandalikanahalli	Kabbali	Channarayapatna
320	76.4591	13.0713	Chikkonahalli	Santeshivara	Channarayapatna
321	76.4637	13.0715	Chikkonahalli	Santeshivara	Channarayapatna
322	76.5606	13.0716	Mandalikanahalli	Kabbali	Channarayapatna
323	76.3216	13.0718	Varanahalli	Sathenahalli	Channarayapatna
324	76.3435	13.0738	Kurikaval	Sathenahalli	Channarayapatna
325	76.5270	13.0739	Dasarahalli	Kabbali	Channarayapatna
326	76.4297	13.0747	Kamanayakanahalli	Tagadur	Channarayapatna
327	76.5013	13.0748	Channagonahalli	Santeshivara	Channarayapatna
328	76.4421	13.0756	Appenahalli	Tagadur	Channarayapatna
329	76.4017	13.0758	Somanahalli	M.Shivara	Channarayapatna
330	76.3827	13.0760	Maraguru	M.Shivara	Channarayapatna
331	76.3120	13.0771	Tarabenahalli	Sathenahalli	Channarayapatna
332	76.4543	13.0772	Chikkonahalli	Santeshivara	Channarayapatna
333	76.3200	13.0775	Varanahalli	Sathenahalli	Channarayapatna
334	76.3250	13.0775	Varanahalli	Sathenahalli	Channarayapatna
335	76.3895	13.0775	Somanahalli	M.Shivara	Channarayapatna
336	76.4855	13.0782	Santheshivara	Santeshivara	Channarayapatna
337	76.4261	13.0802	Bhaktharahalli	Navile	Channarayapatna
338	76.3817	13.0804	Shivara	M.Shivara	Channarayapatna
339	76.3844	13.0813	Kamanahalli	M.Shivara	Channarayapatna
340	76.3669	13.0819	Madagodnahalli	M.Shivara	Channarayapatna
341	76.4758	13.0824	Hosahalli	Santeshivara	Channarayapatna
342	76.4690	13.0831	Hosahalli	Santeshivara	Channarayapatna
343	76.3337	13.0836	Kurikaval	Sathenahalli	Channarayapatna

344	76.3549	13.0840	Madagodnahalli	M.Shivara	Channarayapatna
345	76.3806	13.0849	Shivara	M.Shivara	Channarayapatna
346	76.3486	13.0857	Madagodnahalli	M.Shivara	Channarayapatna
347	76.3636	13.0861	Madagodnahalli	M.Shivara	Channarayapatna
348	76.3453	13.0870	Joyisarahalli	Sathenahalli	Channarayapatna
349	76.4480	13.0877	Navile	Navile	Channarayapatna
350	76.4169	13.0889	Bhaktharahalli	Navile	Channarayapatna
351	76.4243	13.0892	Bhaktharahalli	Navile	Channarayapatna
352	76.4684	13.0896	Nagenahalli	Karehalli	Channarayapatna
353	76.4124	13.0918	Kakkenahalli	Kembalu	Channarayapatna
354	76.4413	13.0921	Navile	Navile	Channarayapatna
355	76.3955	13.0929	Kalamaranahalli	M.Shivara	Channarayapatna
356	76.4089	13.0931	Kakkenahalli	Kembalu	Channarayapatna
357	76.4287	13.0961	Bhaktharahalli	Navile	Channarayapatna
358	76.4042	13.0964	Kakkenahalli	Kembalu	Channarayapatna
359	76.3703	13.0977	Balaghatta	Kembalu	Channarayapatna
360	76.4398	13.0993	Navile	Navile	Channarayapatna
361	76.3859	13.1015	Kembalu	Kembalu	Channarayapatna
362	76.3964	13.1021	Kakkenahalli	Kembalu	Channarayapatna
363	76.3773	13.1026	Lakkiahalli	Kembalu	Channarayapatna
364	76.3697	13.1052	Balaghatta	Kembalu	Channarayapatna
365	76.3665	13.1054	Balaghatta	Kembalu	Channarayapatna
366	76.4045	13.1057	Kakkenahalli	Kembalu	Channarayapatna
367	76.4375	13.1086	Navile	Navile	Channarayapatna
368	76.4234	13.1094	Chikkonahalli	Navile	Channarayapatna
369	76.3946	13.1099	Kembalu	Kembalu	Channarayapatna
370	76.4627	13.1104	Channenahalli	Karehalli	Channarayapatna
371	76.3903	13.1138	Kembalu	Kembalu	Channarayapatna
372	76.4472	13.1147	Rechihalli	Karehalli	Channarayapatna
373	76.4264	13.1151	Adihalli	Navile	Channarayapatna
374	76.4036	13.1159	Kembalu	Kembalu	Channarayapatna
375	76.3775	13.1170	Balaghatta	Kembalu	Channarayapatna
376	76.4341	13.1174	Chatnahalli	Karehalli	Channarayapatna
377	76.4615	13.1176	Channenahalli	Karehalli	Channarayapatna
378	76.4108	13.1204	Hullenahalli	Anathi	Channarayapatna
379	76.4373	13.1210	Chatnahalli	Karehalli	Channarayapatna
380	76.3964	13.1260	Basavanapura	Kembalu	Channarayapatna
381	76.4388	13.1261	Honnenakoppalu	Karehalli	Channarayapatna
382	76.4156	13.1263	Beechagondanahalli	Anathi	Channarayapatna
383	76.4569	13.1263	Karehalli	Karehalli	Channarayapatna
384	76.3844	13.1271	Chikkarasanahalli	Kembalu	Channarayapatna
385	76.4017	13.1290	Basavanapura	Kembalu	Channarayapatna
386	76.4417	13.1298	Honnenakoppalu	Karehalli	Channarayapatna
387	76.3932	13.1313	Bidare	Kembalu	Channarayapatna

388	76.4217	13.1326	Anathi	Anathi	Channarayapatna
389	76.4432	13.1341	Honnenakoppalu	Karehalli	Channarayapatna
390	76.4247	13.1370	Anathi	Anathi	Channarayapatna
391	76.3962	13.1391	Gobbalihalli	Kemalu	Channarayapatna
392	76.4632	13.1418	Papanaghatta	Karehalli	Channarayapatna
393	76.4087	13.1427	Valagerihalli	Anathi	Channarayapatna
394	76.4373	13.1429	Anathi	Anathi	Channarayapatna
395	76.4331	13.1431	Anathi	Anathi	Channarayapatna
396	76.4462	13.1435	Anathi	Anathi	Channarayapatna
397	76.4114	13.1518	Valagerihalli	Anathi	Channarayapatna
398	76.4232	13.1536	Valagerihalli	Anathi	Channarayapatna
399	76.4335	13.1570	Kodihalli	Anathi	Channarayapatna
400	76.4341	13.1686	Kodihalli	Anathi	Channarayapatna

**b) Tentative Locations of Percolation tanks**

S.No	Longitude	Latitude	Village	Grama Panchayat	Taluk
1	76.5734	12.8532	Dhadighatta	Juttanahalli	Channarayapatna
2	76.5667	12.8734	Jutenahalli	Juttanahalli	Channarayapatna
3	76.5346	12.8737	Chelya	Juttanahalli	Channarayapatna
4	76.5526	12.8801	Mallenahalli	Juttanahalli	Channarayapatna
5	76.5299	12.8889	Chelya	Juttanahalli	Channarayapatna
6	76.4916	12.8925	Halebelagola	Gowdagere	Channarayapatna
7	76.5225	12.8965	Hulikere	Juttanahalli	Channarayapatna
8	76.5855	12.8979	Chowlamballi	Mathighatta	Channarayapatna
9	76.5669	12.9025	Madanevu	Mathighatta	Channarayapatna
10	76.5396	12.9101	Bommenahalli	Mathighatta	Channarayapatna
11	76.4838	12.9152	Gowdagere	Gowdagere	Channarayapatna
12	76.5375	12.9274	Rajapura	Mattanavile	Channarayapatna
13	76.3722	12.9277	Belasindha	Gulasunda	Channarayapatna
14	76.5885	12.9307	Kotthanahalli	Hirisave	Channarayapatna
15	76.5478	12.9314	Bookanabetta	Mathighatta	Channarayapatna
16	76.5594	12.9323	Booka	Hirisave	Channarayapatna
17	76.4736	12.9356	Gowdagere Kaval	Gowdagere	Channarayapatna
18	76.4993	12.9359	Mutthugadha Honnenahalli	Mattanavile	Channarayapatna
19	76.4841	12.9410	Kaggere	Gowdagere	Channarayapatna
20	76.3607	12.9435	Baraguru	Baragur	Channarayapatna
21	76.5253	12.9478	Dodderi Kaval	Belagihalli	Channarayapatna
22	76.5061	12.9499	Dodderi	Mattanavile	Channarayapatna
23	76.5786	12.9566	Hirisave	Hirisave	Channarayapatna
24	76.5319	12.9592	Dodderi Kaval	Belagihalli	Channarayapatna
25	76.5507	12.9619	Bilagalli	Belagihalli	Channarayapatna
26	76.3564	12.9688	Baraguru	Baragur	Channarayapatna
27	76.4861	12.9718	Atthihalli	Jambur	Channarayapatna

28	76.5334	12.9720	Dodderi Kaval	Belagihalli	Channarayapatna
29	76.3762	12.9725	Byaladhakere	Gulasunda	Channarayapatna
30	76.4375	12.9751	Devigere	Kalkere	Channarayapatna
31	76.4107	12.9780	Gollara Hosahalli	Kalkere	Channarayapatna
32	76.4538	12.9782	Jamburu	Jambur	Channarayapatna
33	76.5907	12.9843	Kabbanakere	Balaganchi	Channarayapatna
34	76.3482	12.9888	Y.Singenahalli	Baladere	Channarayapatna
35	76.4156	12.9889	Gollara Hosahalli	Kalkere	Channarayapatna
36	76.5670	12.9896	Jinnenahalli	Jinnenahalli	Channarayapatna
37	76.5171	12.9901	Katakihalli	Belagihalli	Channarayapatna
38	76.3658	12.9932	Chamarajapura	Bydarahalli	Channarayapatna
39	76.5302	12.9939	Katakihalli	Belagihalli	Channarayapatna
40	76.4471	12.9944	Jamburu	Jambur	Channarayapatna
41	76.6227	12.9966	Balaganchi	Balaganchi	Channarayapatna
42	76.5770	12.9991	Jinnenahalli	Jinnenahalli	Channarayapatna
43	76.5158	13.0008	Akkanahalli	Akkanahalli	Channarayapatna
44	76.4236	13.0022	Chowdenahalli	Kalkere	Channarayapatna
45	76.5858	13.0067	Naganahalli	Didaga	Channarayapatna
46	76.6021	13.0071	Mudibetta Kaval	Balaganchi	Channarayapatna
47	76.3664	13.0074	Baguru	Bagur	Channarayapatna
48	76.5626	13.0092	Pura	Didaga	Channarayapatna
49	76.4935	13.0093	Nuggehalli	Nuggehalli	Channarayapatna
50	76.5483	13.0169	Madlagere Kaval	Jinnenahalli	Channarayapatna
51	76.3771	13.0174	Baguru	Bagur	Channarayapatna
52	76.4729	13.0203	Nuggehalli	Nuggehalli	Channarayapatna
53	76.3476	13.0217	Chamarajapura	Bydarahalli	Channarayapatna
54	76.4461	13.0229	Mavinahalli	Jambur	Channarayapatna
55	76.5048	13.0237	Basavanapura	Akkanahalli	Channarayapatna
56	76.5347	13.0252	Madlagere Kaval	Jinnenahalli	Channarayapatna
57	76.4172	13.0255	Heggadigere	Tagadur	Channarayapatna
58	76.4870	13.0286	Dasapura	Akkanahalli	Channarayapatna
59	76.5100	13.0289	Mullakere	Akkanahalli	Channarayapatna
60	76.5922	13.0293	Vullavalli	Didaga	Channarayapatna
61	76.4452	13.0340	Ramasamudra Kaval	Nuggehalli	Channarayapatna
62	76.5192	13.0345	Settyhalli	Akkanahalli	Channarayapatna
63	76.4703	13.0358	Hullenahalli	Santeshivara	Channarayapatna
64	76.5592	13.0380	Bilikere	Kabbali	Channarayapatna
65	76.4171	13.0390	Obalapura	Tagadur	Channarayapatna
66	76.3497	13.0408	Kalenahalli	Bydarahalli	Channarayapatna
67	76.3870	13.0457	Govinakere	M.Shivara	Channarayapatna
68	76.3715	13.0473	Thippuru	Sathenahalli	Channarayapatna
69	76.4504	13.0493	Ramasamudra Kaval	Nuggehalli	Channarayapatna
70	76.5121	13.0521	Masaganahalli	Kabbali	Channarayapatna
71	76.4318	13.0524	Rangapura	Tagadur	Channarayapatna

72	76.5759	13.0552	Dhidaga	Didaga	Channarayapatna
73	76.3366	13.0560	Sathenahalli	Sathenahalli	Channarayapatna
74	76.5628	13.0593	Kanavanaghatta	Didaga	Channarayapatna
75	76.4029	13.0621	Kallumallenahalli	Tagadur	Channarayapatna
76	76.5257	13.0652	Dasarahalli	Kabbali	Channarayapatna
77	76.3702	13.0680	Hongehalli	M.Shivara	Channarayapatna
78	76.3280	13.0688	Nettekere	Sathenahalli	Channarayapatna
79	76.4218	13.0695	Muddenahalli Kavalu	M.Shivara	Channarayapatna
80	76.4090	13.0696	Maraguru	M.Shivara	Channarayapatna
81	76.5379	13.0699	Kabbali	Kabbali	Channarayapatna
82	76.4474	13.0726	Chikkonahalli	Santeshivara	Channarayapatna
83	76.4728	13.0744	Santheshivara	Santeshivara	Channarayapatna
84	76.3383	13.0759	Kurikaval	Sathenahalli	Channarayapatna
85	76.3556	13.0762	Kurikaval	Sathenahalli	Channarayapatna
86	76.3761	13.0790	Shivara	M.Shivara	Channarayapatna
87	76.4055	13.0842	Muddenahalli Kavalu	M.Shivara	Channarayapatna
88	76.3835	13.0866	Shivara	M.Shivara	Channarayapatna
89	76.3919	13.0899	Kalamaranahalli	M.Shivara	Channarayapatna
90	76.4328	13.0949	Chavenahalli	Navile	Channarayapatna
91	76.4581	13.1018	Thimmalapura	Karehalli	Channarayapatna
92	76.4143	13.1044	Kakkenahalli	Kemalu	Channarayapatna
93	76.3869	13.1089	Kemalu	Kemalu	Channarayapatna
94	76.4566	13.1129	Rechihalli	Karehalli	Channarayapatna
95	76.4190	13.1150	Anathi	Anathi	Channarayapatna
96	76.4267	13.1289	Anathi	Anathi	Channarayapatna
97	76.3895	13.1344	Bidare	Kemalu	Channarayapatna
98	76.4329	13.1626	Kodihalli	Anathi	Channarayapatna